



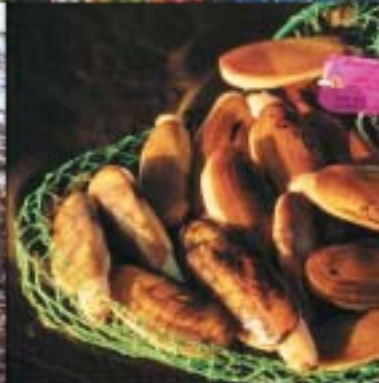
Washington Department of Fish & Wildlife

BIENNIAL REPORT

Sound Stewardship of Fish and Wildlife

1999

2001





1999-01 Biennial Report

Washington Department of Fish and Wildlife

Washington Fish and Wildlife Commission

Russ Cahill,

Chair, Olympia

Will Roehl

Vice Chair, Bellingham

Ron Ozment

Commissioner, Cathlamet

Lisa Pelly

Commissioner, Bainbridge Island

Dawn Reynolds

Commissioner, Pullman

Fred Shiosaki

Commissioner, Spokane

Bob Tuck

Commissioner, Selah

R.P. Van Gytenbeek

Commissioner, Seattle

Kelly White

Commissioner, Kettle Falls

Washington Department of Fish and Wildlife

Jeffrey Koenings, Ph.D

Director



1999-01 Biennial Report

Washington Department of Fish and Wildlife

Produced by the Public Affairs Office

Craig Bartlett
Editor

Doug Hoyer
Graphics/Layout

Document Review Team

Andy Appleby - Hatcheries, Olympia
Dan Ayres - Fish Program, Montesano
Peggy Crain - Wildlife Program, Olympia
Debi Hewitt - Director's Office, Olympia
Connie Iten - Habitat Program, Omak
Deanna Jacobsen - Fish Program, Point Whitney
Bob Marmaduke - Engineering, Olympia
Pat Patillo - Intergovernmental Resource Management, Olympia
Darrell Pruett - Business Services, Olympia
Bruce Sanford - Fish Program, Olympia
Carol Stedman - Licensing Division, Olympia
Dale Swedberg - Wildlife Program, Loomis
Eric Winther - Fish Program, Vancouver

The State of Washington is an equal opportunity employer. Persons with disability who need assistance in the application or testing process, or those needing this booklet in an alternative format, may call (360) 664-1960 or Telecommunications Device for the Deaf (360) 753-4107.

INTRODUCTION

IN THE SPRING OF 2001, SPORTFISHERS caught more “spring chinook” salmon on the Columbia River than in any season in nearly 30 years. Drawn by news of a record run, consisting primarily of hatchery-origin fish, anglers made more than 170,000 fishing trips to the Columbia, catching 26,000 salmon and generating an estimated \$15.4 million in revenue for businesses on both sides of the river. As one angler put it, “there were so many people out there you couldn’t buy a bag of chips west of Bonneville Dam.”

That fishing season on the Columbia River was remarkable for more than its record salmon run and the economic boost it gave to local communities: It was also the first time that mass-marking of hatchery-origin fish made it possible to conduct a *selective* fishery on those stocks. By requiring anglers to release any salmon with an adipose fin that hadn’t been machine-clipped at a hatchery, resource managers were able to provide protection for weak wild runs and still allow anglers access to abundant hatchery stocks.

Selective fishing is one of a variety of new strategies employed by the Washington Department of Fish and Wildlife (WDFW) in recent years to meet the challenge of managing the state’s fish and wildlife resources in the 21st century. On issues ranging from salmon recovery to cougar management, WDFW and its governing board, the Washington Fish and Wildlife Commission, have developed a wide range of new approaches, partnerships and technologies to help balance the needs of both fish and wildlife in the western state with the smallest land area and a population second only to that of California.

This report, written in accordance with RCW 77.04.120, describes the status, use and management of the state’s fish and wildlife resources during the 1999-01 Biennium, the period from July 1, 1999 to June 30, 2001 when many of these new strategies were developed, tested and implemented on a broad scale. It also outlines major operational changes at WDFW, itself, which have helped to unite the Department under common goals, modernize its financial systems, improve customer service and reinforce science as the basis for WDFW management decisions.



Meeting legislative mandates

Under state law (RCW 77.04.012), the Washington State Legislature has directed WDFW and the Fish and Wildlife Commission to fulfill the following mandates:

- “Preserve, protect, perpetuate, and manage the wildlife and food fish, game fish, and shellfish in state waters and offshore waters.”
- “Promote orderly fisheries and enhance and improve recreational and commercial fishing in this state.”
- “Attempt to maximize the public recreational game fishing and hunting opportunities of all citizens, including juvenile, disabled and senior hunters.”

Balancing these various mandates has always presented a challenge, but never more so than in the last decades of the 20th century when a growing number of native fish and wildlife species showed increasing signs of decline. While the number of licensed fishers and hunters in Washington remained relatively constant through the 1990s, the addition of one million people to the state’s general population has greatly accelerated the loss of fish and wildlife habitat critical to many species’ survival.

Conserving fish and wildlife

No other single issue commanded more attention from WDFW or the Commission in the 1999-01 Biennium than the recovery of Washington’s wild salmon, steelhead and bull trout populations. While WDFW has worked for more than a decade to minimize fishing pressure on weak native stocks and realign hatchery programs to support salmon recovery, the listing of seven additional salmon and steelhead population

Estimated Economic Value to Washington

Fishing, Wildlife Viewing and Hunting, 2001

<u>Activity</u>	<u>Value</u>	<u>Examples</u>
Recreational Fishing	\$1 billion in spending¹	<ul style="list-style-type: none"> • 2001 freshwater fishing, \$381 million² • 2001 Columbia River spring chinook fishery, \$15.4 million³ • Razor clam fishery, \$9.2 million⁴ • 2001 Lake Washington sockeye fishery, \$6 million⁵
Wildlife Viewing	\$1.3 billion in spending⁶	<ul style="list-style-type: none"> • 2000 whale watching, \$13.5 million⁷ • 2001 Issaquah Salmon Days Festival, \$7.4 million⁸ • Grays Harbor Shorebird Festival, \$200,000⁹ • 2001 Skagit Bald Eagle Festival, \$100,000¹⁰
Hunting	\$408 million in spending¹¹	<ul style="list-style-type: none"> • 2000 deer hunting, \$111 million¹²
Commercial Fishing	\$289.2 million in economic impacts¹³	<ul style="list-style-type: none"> • 2000 Dungeness crab, \$38.2 million • 2000 salmon and steelhead, \$9.91 million • 2000 halibut, \$6.8 million

Source

1. 2001 U.S. Fish and Wildlife Service survey
2. WDFW update to 1996 U.S. Fish and Wildlife Service survey
3. Northwest Sportfishing Association
4. Grays Harbor/Pacific County economic development councils
5. WDFW estimate using the 2001 U.S. Fish and Wildlife Service survey data and estimated participation levels.
6. 2001 U.S. Fish and Wildlife Service survey
7. WDFW update to 1998 International Fund for Animal Welfare's Whale Watching Report
8. WDFW estimate based on attendance data supplied by Issaquah Salmon Days Festival and using updated 2001 U.S. Fish and Wildlife Service survey data
9. Grays Harbor Chamber of Commerce
10. WDFW estimate based on attendance data supplied by Skagit Bald Eagle Festival and using updated 2001 U.S. Fish and Wildlife Service survey data
11. 2001 U.S. Fish and Wildlife Service survey
12. WDFW update to 1996 U.S. Fish and Wildlife Service survey
13. Based on 1998 Pacific Fishery Management Council estimate of the economic benefit of the commercial fishery, calculated as 2.1 times the ex-vessel value of the catch.

groupings under the federal Endangered Species Act (ESA) in March of 1999 galvanized support for wild salmon recovery like never before.

The Salmon Recovery Act, approved by the Washington State Legislature in 1998, set the stage for a new era in wild salmon restoration, establishing a new network of local recovery organizations (“Lead Entities”) to help prioritize and implement habitat restoration projects in watersheds throughout the state. Drawing from existing staff, WDFW created a

team of watershed stewards to provide needed technical assistance to the new Lead Entities and another science team to support the state’s landmark Forests and Fish agreement – both key steps toward restoring critical salmon habitat.

Meanwhile, WDFW continued to work with tribal fisheries managers, federal agencies and fisheries organizations to design fisheries in ways that protect weak wild runs and still allow for the harvest of abundant hatchery stocks. Selective salmon fisher-

ies, first tested in 1998, were expanded to 52 recreational fisheries by 2001 when half of all returning hatchery chinook and virtually all hatchery coho were easily identifiable by their clipped adipose fin.

The WDFW Enforcement Program's newly consolidated Marine Division found that 98% of salmon anglers were in compliance with new rules requiring the release of unmarked fish and the newly constituted Fish Science Division tested two types of selective commercial salmon gear with promising results. Recovery programs for wild salmon at 21 state hatchery programs also showed clear signs of success, as the WDFW initiated a comprehensive assessment of its hatchery operations along with treaty tribes, federal agencies and a group of independent scientists.

Of course, WDFW's responsibilities don't end with salmon. As discussed in this report, the Department and the Commission took various actions during the 1999-01 Biennium to protect and conserve the state's marine fish, crab, shrimp, elk and deer as well as non-game species such as the state-endangered pygmy rabbit and western pond turtle. As part of that effort, WDFW staff developed state recovery plans for three threatened and endangered species and completed status reviews on four candidate species. Draft reviews for the bald eagle and peregrine falcon recommended downlisting those species to "sensitive," due to their growing abundance in recent years.

Providing fish and hunting opportunities

At the same time, WDFW and the Commission worked to fulfill its mandate to expand hunting and fishing opportunities wherever scientifically supportable. Continued increases in waterfowl populations allowed for the most liberal duck-hunting rules ever in 2001. Nearly 130,000 large triploid trout were planted to boost fishing opportunities at lowland lakes, while a resurgence in the coastal sardine population allowed for the first commercial sardine fishery in nearly 50 years. Thanks to the combination of selective fisheries and improving runs, salmon fishing improved year by year from 1999 through 2001.

As indicated by the example of the spring chinook fishery on the Columbia, fishing and hunting provide a major boost to the economy of local communities – and to the state as a whole. According to a

study by the U.S. Fish and Wildlife Service (USFWS), anglers spent well over \$1 billion on recreational fishing trips in our state in 2001 alone, supporting businesses ranging from tackle shops to motels. Meanwhile, commercial fisheries had the fifth highest volume of landings in the nation, providing thousands of jobs from Ilwaco to Blaine.

Fish and wildlife also contribute to the state's economy in other ways. In 2001, bird watchers and other wildlife viewing enthusiasts spent \$1.3 billion in Washington communities, according to that same USFWS study. To encourage public interest in "watchable wildlife, WDFW joined with the Washington state tourism office and local communities to promote viewing opportunities throughout the state. As part of that effort, WDFW's website was expanded to include a listing of wildlife species that can be found on individual Department lands and gave viewers an opportunity to watch a pair of eagles tending their eggs in real time through WDFW's enormously popular EagleCam feature.

Managing for the 21st century

The 1999-01 Biennium was a time of dramatic change for the Department, the Commission and resource management in general. Faced with growing pressures on the state's fish and wildlife resources, WDFW drew on its scientific expertise to develop new strategies for fish and wildlife management in the 21st century. At the same time, the Department stepped up to a new, expanded role in helping governments and other organizations meet their own responsibilities for resource protection.

Important changes were also made in WDFW's basic operating systems. Old, inadequate business systems, which had contributed to a serious revenue deficit within the Department in 1998, were replaced with help from the state Legislature and the Office of Financial Management. Installation of a new, automated licensing system (Project WILD) ended the decade-old practice of processing licenses by hand, and – for the first time – allowed fishers and hunters to buy licenses over the phone or the Internet. Thanks to a new cost accounting system, revenue projection model and stringent oversight by Department management, WDFW ended the 1999-01 Biennium with money in the bank.

The Department ended the biennium stronger in other ways, too. In June 2000, all state laws governing fish

and wildlife were consolidated under a single statute, providing a common legal foundation for managing fish and wildlife for the first time since those responsibilities were merged under a single agency in 1994. Approval of WDFW's first formal strategic plan in 2001 further solidified the Department's shared sense of purpose and priorities.

Thanks to the hard work, resiliency and professionalism of Department staff, WDFW ended the biennium in a strong position to provide sound stewardship of Washington's fish and wildlife resources in the 21st century. The course is now set, and the main job ahead is to make sure that those new strategies and innovations take hold in the new century. ■



Russ Cahill
Chair
Washington Fish and Wildlife Commission



Jeff Koenings
Director
Washington Department of Fish and Wildlife

Table of Contents

Introduction	i
Strategic Goals & Objectives	vi
Executive Summary	1
Key Agency Accomplishments	1
Organization	5
Department Finances	6
Intergovernmental & Legal Actions	9
Fish & Wildlife Commission	13
Director's Office	15
Regional Offices	16
Intergovernmental Resource Management	18
Legislative & External Affairs	20
Public Affairs	20
Business Services	22
Information Services	22
Financial Services	24
Licensing	26
Capital Programs and Engineering	26
Habitat	27
Watershed Stewardship Team	30
Environmental Restoration	30
Technical Guidelines	32
Forests & Fish Agreement	33
Regulatory Services	33
Major Projects (Energy)	35
Oil Spill Team	35
Habitat Science	36
Fish	39
Salmon	42
ESA Listings and Salmon Recovery	44
Salmon Harvest	49
Salmon Hatcheries	67
Naturally Spawning Salmon Runs	76
Applied Salmon Research	82
Freshwater Fish	87
Marine Fish	99
Shellfish	108
Wildlife	125
Game Management	126
Wildlife Diversity	137
State Listed Species	139
WDFW Lands	146
Wildlife Science	152
Enforcement	155
Outreach	161

Strategic Goals & Objectives

Mission: “Sound Stewardship of Fish and Wildlife”

We serve Washington’s citizens by protecting, restoring and enhancing fish and wildlife and their habitats, while providing sustainable fish and wildlife-related recreational and commercial opportunities

I. Healthy and diverse fish and wildlife populations and habitats

Objective 1

Develop, integrate and disseminate sound fish, wildlife and habitat science.

Objective 2

Protect, restore and enhance fish and wildlife populations and their habitats.

Objective 3

Ensure WDFW activities, programs, facilities and lands are consistent with local, state and federal regulations that protect and recover fish, wildlife and their habitats.

Objective 4

Influence the decisions of others that affect fish, wildlife and their habitats.

Objective 5

Minimize adverse interactions between humans and wildlife.

II. Sustainable fish and wildlife-related opportunities

Objective 6

Provide sustainable fish and wildlife-related recreational and commercial opportunities compatible with maintaining healthy fish and wildlife populations and habitats.

Objective 7

Work with tribal governments to ensure fish and wildlife management objectives are achieved.

Objective 8

Improve the economic well-being of Washington by providing diverse, high quality recreational and commercial opportunities.

III. Operational excellence and professional service

Objective 9

Provide excellent professional service.

Objective 10

Improve the effectiveness and efficiency of WDFW’s operational and support activities.

Objective 11

Recruit, develop and retain a diverse workforce with high professional standards.

EXECUTIVE SUMMARY

IN MANY WAYS, THE 1999-01 Biennium marked the beginning of a new era for the Washington Department of Fish and Wildlife (WDFW), tribal managers and everyone involved in fish and wildlife management in Washington.

Salmon recovery became a statewide priority, supported by new funding and a new level of involvement at the local level. Science also played an increasingly important role in guiding policy decisions about resource management of all kinds, while WDFW's own business systems were retooled for the modern age.

As a key participant in these and other changes, WDFW developed an array of new partnerships, new technologies and new management strategies that helped to set a new course for fish and wildlife stewardship in the 21st century. It also continued to build on its unique working relationship with Washington's treaty tribes, who share management responsibilities for hunting, fishing and hatchery operations in many areas of the state.

Throughout this dynamic period, WDFW was guided by its legislative mandates to conserve Washington's fish and wildlife resources, while also working to maintain fishing and hunting opportunities for the people of the state.

KEY ACCOMPLISHMENTS

From surveying streams to enforcing the state's fishing and hunting laws, WDFW performs hundreds of activities each year to fulfill its mission of providing "sound stewardship of fish and wildlife." Below are some key actions taken during the 1999-01 Biennium that not only advanced the Department's immediate goals but also set a new course for the future.

GOAL 1: Healthy and Diverse Fish and Wildlife Populations and Habitats

Salmon recovery: No issue received more attention from WDFW or the Commission than the recovery of declining wild salmon, steelhead and bull trout stocks. Key recovery efforts include:

- **Selective salmon fisheries:** Mass-marking of hatchery salmon made it possible to extend selective fishing rules to 52 recreational salmon fisheries, providing protection for weak wild runs as well as fishing opportunities on abundant hatchery stocks. Successful tests conducted with new types of commercial fishing gear paved the way for selective commercial fisheries in the years ahead.
- **Local salmon recovery:** WDFW provided critical technical assistance to a new network of local salmon recovery organizations, which together helped to channel \$92 million in funding to 510 restoration projects during the biennium. Besides supporting the new network of Lead Entities created by the 1998 Legislature, the Department continued its partnership with Regional Fisheries Enhancement Groups (RFEs) and other volunteer organizations to restore vital freshwater salmon and steelhead habitat.
- **Hatchery reform:** Recovery programs for wild salmon at state hatcheries resulted in several record returns in 2001. Meanwhile, WDFW filed reports on 128 hatchery programs to comply with federal requirements under the Endangered Species Act (ESA), and worked with treaty tribes, federal agencies and a panel of independent scientists to reform state, tribal and federal hatchery operations.
- **State/tribal conservation plans:** Years before the 1999 listing of seven salmon and steelhead stocks under the ESA,



Marked vs. unmarked salmon: *Fin clipping opens the door to selective fisheries. See Page 49*

state and tribal fisheries managers began working together on harvest conservation plans for two declining stocks: Puget Sound chinook salmon and Hood Canal/Strait of Juan de Fuca summer chum salmon. Those plans were completed and submitted to the National Marine Fisheries Service in 2000, providing the foundation for the first comprehensive recovery plans for those species.

- **Adaptive management in forestry:** The landmark Forests and Fish Agreement of 1999, which WDFW helped to design, includes a provision that allows for adjustments in forestry rules as new scientific information becomes available. Under this groundbreaking “adaptive management” provision, WDFW scientists initiated a number of studies that may help to further refine the state’s forestry rules.
- **Habitat restoration:** Besides providing technical assistance to local organizations, WDFW spearheaded several habitat restoration projects of major importance. The Deepwater Slough project – one of the largest of its kind in the nation – opened up more than 300 acres of prime estuarine habitat to juvenile salmon on the south fork of the Skagit River. On Goldsborough Creek in Mason County, WDFW teamed up with Simpson Timber and the U.S. Army Corps of Engineers to remove an aging wooden dam, opening up 14 miles of ideal spawning habitat upstream. WDFW also helped to negotiate an agreement for the removal of Condit Dam on the White Salmon River in 2006.
- **Focus on science:** By creating the position of “chief scientist” within each of the Department’s three resource-management programs, WDFW Director Jeff Koenings established a clear priority for the role of science in the Department. Major topics of research during the biennium include interactions between hatchery and naturally spawning salmon, marine biotoxins and the effects of various forestry practices on fish and wildlife. The Habitat Program also continued work with treaty tribes on a map-based database linking salmon runs to stream conditions throughout western Washington.
- **Marine Enforcement Division:** In light of the new ESA listings in 1999, all marine enforcement detachments were consolidated un-

der a new division to step up enforcement of state salmon regulations. Field contacts with anglers showed a 98% compliance rate with new selective fishing rules.

- **Groundfish/shellfish protection:** WDFW and the Commission took a number of actions to protect marine fish and shellfish in state waters. On the coast, bottom trawling was prohibited to protect declining groundfish stocks and pot limits were established for the commercial crab fishery. Changes in Puget Sound included new harvest quotas on Dungeness crab, limited entry for commercial shrimp fisheries and two new marine reserves to provide long-term protection for rockfish species.
- **Game management:** Most big game populations showed substantial recovery from the hard winter of 1996-97, but some needed a helping hand. For the first time, long-term plans were drafted for all 10 state elk herds, identifying management actions needed to bolster those with sagging populations. WDFW increased sampling of deer and elk for chronic wasting disease, even though no cases of this fatal disease have been detected to date in Washington.

GOAL 2: Sustainable Fish and Wildlife-Related Opportunities

- **Selective salmon fisheries:** Besides providing protection for listed salmon populations, selective fisheries helped to expand recreational fishing opportunities focused on abundant hatchery stocks. In 2000, for example, the selective season for salmon anglers fishing in the ocean area off Westport lasted a full six weeks. If not for the requirement to safely release unmarked coho, fisheries managers estimate that they would have had



Big game: Mild winters improve deer populations.
See Page 126

to close that season after a week to 10 days of fishing to protect weak wild stocks. The situation was much the same in fisheries from northern Puget Sound to the Columbia River.

- **Triploid trout:** Fishing in Washington's lowland lakes got a lot more interesting in 2000, when WDFW began stocking triploid trout with the support of funding provided by the state Legislature. Voracious feeders, the sterile rainbow trout quickly grow to an average size of 1½ pounds.
- **Warmwater fisheries:** The Meseberg Hatchery, the state's first large-scale rearing facility for warmwater fish, became fully operational, producing bass, walleye and other species for one of the state's fastest-growing recreational fisheries.
- **Commercial sardine fishery:** In 2000, the Fish and Wildlife Commission approved the first commercial sardine fishery in nearly 50 years, based on stock assessment surveys showing steady growth in the sardine population.
- **Youth fishing:** Nearly 700 volunteers taught 8,900 young people how to handle a rod and reel through WDFW's Fishing Kids program, newly expanded with funding provided by the state Legislature.
- **Hunting opportunities:** Increasing waterfowl populations allowed for some of the most liberal duck-hunting seasons on record. The harvest of deer and elk grew significantly during the biennium as the state's big-game populations rebounded from the hard winter of 1996-97. The wild turkey harvest also increased in proportion to their growing popularity among hunters.
- **WildWatchCams:** Tens of thousands of people logged on to WDFW's new EagleCam website to watch a pair of eagle tend their eggs – and eventually their chicks – in real time. The same educational technology was used to produce a BatCam and SalmonCam, building on WDFW's public outreach efforts.

GOAL 3: Operational Excellence and Professional Service

- **Automated license sales:** WDFW's new electronic licensing system allows hunters and fishers to purchase recreational licenses over the phone or the Internet – for the first time – or from dealers throughout the state. The new system, the Washington Interactive Licensing Database



EagleCam: *Thousands logged on to the WDFW website to watch eagles tend their nest in real time. See Page 146.*

(WILD), also eliminated the old practice of processing licenses by hand, streamlining the process and adding greater financial accountability.

- **New business systems:** Improvements in agency technology, including new financial accounting and information systems, also contributed to the Department's efficiency and financial accountability. After running a substantial revenue shortfall in 1998, the Department finished the 1999-01 Biennium well within budget.
- **Strategic planning:** In 2001, after extensive involvement by WDFW employees throughout the state, the Department adopted its first formal strategic plan, clarifying WDFW's goals and objectives. In June of 2000, the Legislature consolidated all fish and wildlife laws under a single statute, also contributing to the Department's new sense of unity and stability.
- **Cougar management:** After hound hunting for cougars was banned by voter initiative in 1996, public complaints about cougars grew year by year. At the direction of the Legislature, WDFW designed a system for removing cougars that present a threat to public safety within the parameters of the initiative.
- **Hydraulic permit turnaround:** In 2001, the Department significantly reduced processing time for Hydraulic Permit Approvals (HPAs) needed before doing various types of work in or near state's waters. By the last quarter of the year, only 1.5% (14 permits) of HPAs took longer than 45 days to process compared to 6.2% (57 permits) in the first quarter.

WDFW ORGANIZATION

1999-01 Biennium



ORGANIZATION

Since passage of Referendum 45 in 1995, the responsibility for setting basic policy direction for WDFW has been vested in the Washington Fish and Wildlife Commission. The Commission's nine members, who each serve six-year terms, are appointed by the Governor and confirmed by the state Senate.

The Commission establishes fishing and hunting seasons and makes a wide range of policy decisions, which included imposing a ban on ocean trawling and establishing marine reserves in the 1999-01 Biennium. Minutes of public meetings and workshops held by the Commission are posted on WDFW's website at <http://www.wa.gov/wdfw/com/minutes/minutes.htm>.

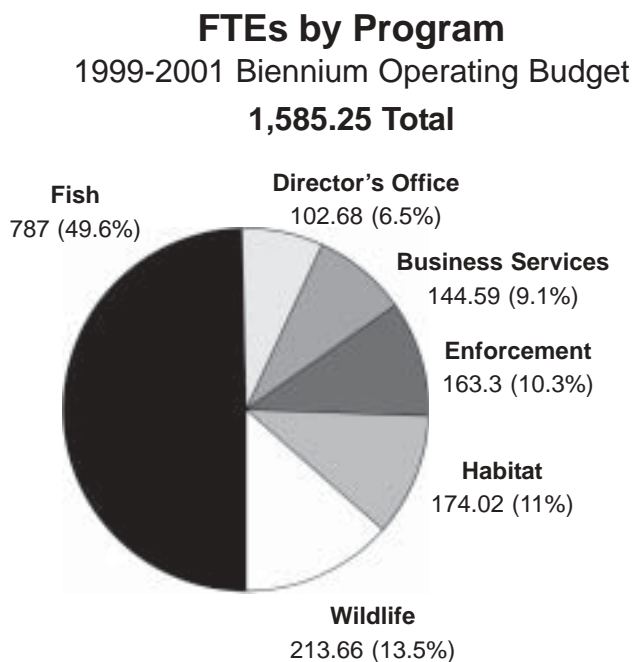
In January 1999, the Commission hired Jeffrey Koenings, Ph.D, as WDFW Director, with the responsibility for supervising 1,645 full-time equivalent (FTE) employees, including 60 supported by the capital budget. Koenings also oversaw an operating budget of \$274.8 million and a capital budget of \$26.7 million as part of his overall management responsibility for the Department.

WDFW operations were organized under six major programs, each with its own divisions and sub-programs. Approximately 47% of the Department's staff worked out of the WDFW headquarters in Olympia, while the remaining 53% reported to six regional offices throughout the state. Major programs include:

- **Director's Office:** In addition to the Director, the Deputy Director and their support staff, the Director's Office includes Personnel, Regional Office administration, Legislative and External Affairs, Public Affairs and the new Intergovernmental Resource Management (IRM) group discussed below. The Director's Office had a budget of \$18.4 million and 102.7 FTEs in the 1999-01 Biennium.
- **Business Services:** Business Operations includes Licensing, Information Systems, Financial Services, Capital Programs and Engineering, with an operating budget of \$56.3 million and 145 FTE staff.
- **Habitat:** The Habitat Program is responsible for protecting, restoring and enhancing the

state's fish and wildlife habitats. The program is organized into five main divisions: Environmental Services, Environmental Restoration, Major Projects, Science and Regional Operations. The program had an operating budget of \$22.6 million in the 1999-01 Biennium, supporting 174 FTEs.

- **Fish:** The Fish Program is responsible for protecting and perpetuating all game fish, food fish, shellfish, unclassified marine aquatic species, aquatic pests and all fish culture activities for WDFW. The Program is organized into four divisions: Hatcheries, Fish Management, Science and Administrative Operations. The largest of the programs within WDFW, the Fish Program had an operating budget of \$113.1 million in the 1999-01 Biennium, supporting the work of 787 FTEs.
- **Wildlife:** The Wildlife Program manages a wide variety of wildlife species and their habitats to perpetuate those populations and provide recreational opportunities for the public. Five divisions within the program include Wildlife Diversity, Game, Lands, Science and Administration. In 1999-01, the Wildlife Program had an operating budget of \$35.6 million, supporting the work of 213.7 FTEs.
- **Enforcement:** Fish and Wildlife Enforcement officers are charged with a broad array of responsibilities, ranging from regulating fishing and hunting activities to responding to bear and cougar complaints. The Enforcement Program is



composed of headquarters administrative staff, field operations and an aviation and vehicle/vessel shop. Like other WDFW program staff, fish and wildlife officers are deployed throughout the state in communities where they live and work. The Enforcement Program had an operating budget of \$28.8 million with 163.3 FTE commissioned and non-commissioned staff.

While this basic organizational structure had been in place since 1997, the Director made two changes early in the biennium to improve agency-wide operations in two high-priority areas.

- **Chief Scientists:** Reflecting the critical role that science plays in the agency's operations, Director Koenings named a chief scientist to each of WDFW's resource programs: Fish, Wildlife and Habitat. Their role was to elevate scientific research throughout the agency and coordinate its application in the field.
- **Intergovernmental Resource Management:** In July of 1999, Director Koenings created the Intergovernmental Resource Management (IRM) group to take the lead in developing policies that affect the department's relationships with Indian tribes, federal and state governments and other state agencies. Creation of the new resource management group was designed to improve agency coordination on critical issues ranging from implementing court orders on tribal hunting and fishing rights to developing state policies for salmon recovery under the federal Endangered Species Act. Nearly all the 20 staff members who make up IRM were drawn from agency resource programs, providing the new policy group with a knowledgeable and experienced staff.

DEPARTMENT FINANCES

WDFW entered the 1999-01 Biennium under close scrutiny by the state Office of Financial Management and the state Legislature after reporting an expected shortfall of \$17.5 million in the State Wildlife Fund during the previous biennium. Citing problems endemic to WDFW since the merger of the former Department of Fisheries and the Department of Wildlife, a consultant's report commissioned by

the Legislature attributed the shortfall to poor financial controls, incomplete financial reporting and a lack of automation, combined with an unexpected decline in fishing and hunting licenses which support the Wildlife Fund.

The solution to the Department's 1998 financial crisis required WDFW to cut \$7.5 million in planned expenditures, eliminate 106 staff positions and sell off \$2.1 million in lands owned by the Department. To help cover the shortfall, the Legislature also extended a \$3.5 million line of credit from the State Treasury, which the new Director never used.

Eager to avoid repeating that situation, the Department's new Director and his management team paid close attention to WDFW's financial condition throughout the 1999-01 Biennium, following recommendations made by the management consultant, Talbot, Korvola & Warwick (TKW). With \$489,000 approved by the state Legislature, the WDFW also initiated a number of improvements to agency information systems identified in the Department's new strategic plan.

WDFW ended the 1999-01 Biennium in stable financial condition, with a balance of more than \$6 million remaining in the State Wildlife Fund. Moreover, the investments made to bolster the Department's business systems have left WDFW in a much better position to respond to future downturns in revenues.

Revenues

State funds comprised 59% of the Department's financial support in the 1999-01 Biennium, with the remainder coming from federal and local government agencies. Among state funds, the State General Fund accounted for 33% of incoming revenues, while 16% came from the State Wildlife Fund and 10% from other dedicated state funds.

Unlike the previous biennium, revenues accrued in the historically volatile Wildlife Fund remained consistent with Department projections. Supported by increasing sales of recreational fishing and hunting licenses, the Wildlife Fund produced \$50.7 million for WDFW during the two-year period, consistent with the ten-year average. Aided by a new automated licensing system, the Department monitored license

sales closely throughout the biennium, ending with a positive balance of \$6 million. Other dedicated state funds were also stable and were closely managed by WDFW managers.

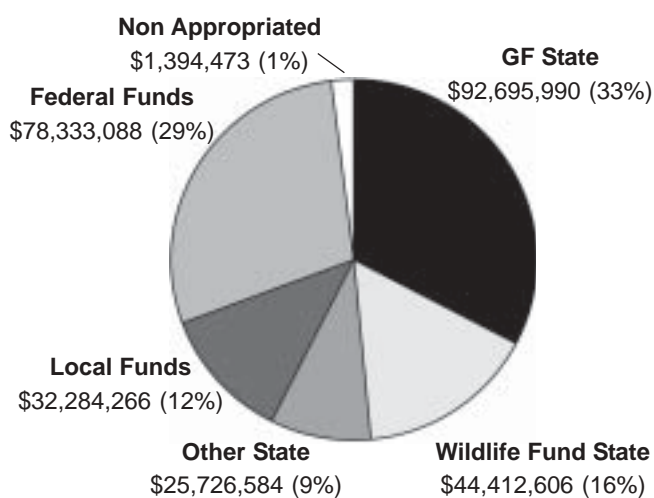
State General Fund support for the Department increased 8.7% from the previous biennium, although the majority of those funds were earmarked as “pass-through” funding for new activities mandated by the Legislature rather than ongoing WDFW responsibilities. This, together with the rising cost of doing business, required Department managers to make difficult choices regarding the expenditure of scarce General Fund resources.

Federal and local funds made up the remaining 41% of the Department’s biennial revenue, increasing by \$7.5 million from the previous budget period. These funds, which support habitat mitigation and other projects carried out by WDFW staff, were also relatively stable, with some exceptions. Reduced support from federal Dingell-Johnson (Sportfish Restoration Act) funds in 1999 forced spending reductions in a number of fish management programs, including groundfish studies, management of rockfish and lingcod, mass-marking and other activities. Other federal sources such as Pittman-Roberts (Wildlife Restoration Act) and Mitchell Act funding (hatcheries) remained relatively stable, while local funding – primarily from public utility districts – increased slightly.

Major Revenue Sources

1999-2001 Biennium

\$274,847,007 Total



Operating Budget

WDFW’s total operating expenditures for the 1999-01 Biennium, including supplemental appropriations approved by the state Legislature in 2000 and 2001, were \$274.8 million. Of this amount, \$165.3 million was supported by state funds while \$109.5 million was supported by federal and local funds.

An additional \$1.3 million, was also provided in the Office of Financial Management’s budget to help WDFW upgrade its information processing infrastructure and make business systems improvements. This funding allowed WDFW to upgrade its information network, establish a 42-month personal computer replacement schedule and support three additional information systems positions and an economist.

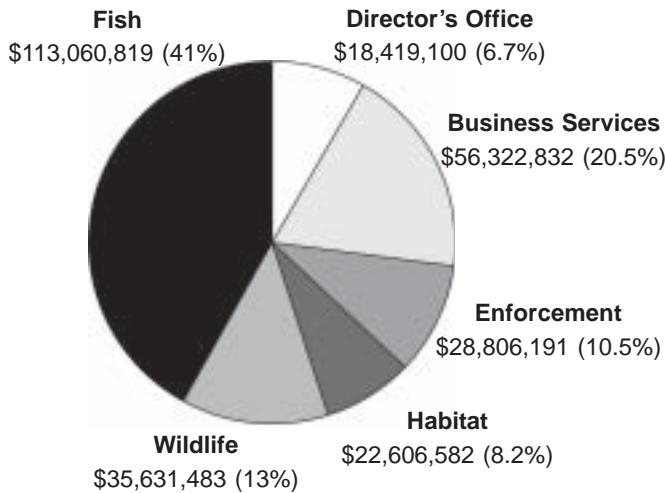
The operating budget for the 1999-01 Biennium contained two significant structural changes in funding for WDFW activities:

- Salmon recovery:** Funding for statewide salmon recovery activities was transferred from WDFW to a newly created Salmon Recovery Account, administered by the Interagency Committee for Outdoor Recreation. The new Salmon Recovery Funding Board was created by the state Legislature to allocate funds from this new account along with federal funding to regional salmon-recovery efforts. The Department received \$10.1 million from the account for various salmon-recovery activities, including \$2.5 million to support Lead Entity operations. The Department also received \$3.5 million from the State General Fund to hire 12 additional WDFW enforcement officers to guard against the illegal harvest of salmon and steelhead and protect fish habitat.
- SSHEAR:** During the 1999 Legislative Session, funding for the Salmon Screening, Habitat Enhancement, and Restoration (SSHEAR) Program was moved from the capital budget to the operating budget. However, the operating budget provided SSHEAR with only one year of funding and WDFW was directed to pursue funding for the second fiscal year through the Salmon Recovery Funding Board. The Department was successful in doing so, although this approach was not deemed to be a long-term solution and funding for SSHEAR remained unresolved at the close of the biennium.

Operating Budget by Program

1999-2001 Biennium

\$274,847,007 Total



In other areas, the two-year budget approved in 1999 provided additional funding from the State General Fund to implement a new automated recreational licensing system (\$500,000), control green crab infestation (\$464,000), rebuild distressed elk herds (\$100,000), eradicate noxious weeds (\$334,000) and implement new crab catch record cards (\$100,000). The Department also received \$2.34 million in state funds and \$4.67 million in federal support to buy back commercial fishing licenses, followed by an additional \$19.8 million in federal buyback funds in 2000.

In all, the 2000 Supplemental Budget provided WDFW with an additional \$1.8 million in General Fund-State (GF-S) funding, of which \$703,000 was earmarked to restore hatchery production and modify some hatchery facilities to meet requirement of the federal Endangered Species Act (ESA). In addition, the Legislature provided \$800,000 to add eight enforcement officers to address problem bear and cougar situations and \$400,000 to support recovery of marine fish populations.

In addition to these GF-S appropriations, the 2000 Supplemental Budget provided WDFW with an additional \$840,000 in Wildlife Fund-State funding to maintain hatchery production, rebuild distressed elk herds, meet Chiliwist fire expenditures, re-

move pheasant pens on Whidbey Island and increase pheasant production. WDFW also received \$789,000 from the Salmon Recovery Account to repair and replace salmon screens in the Methow Valley.

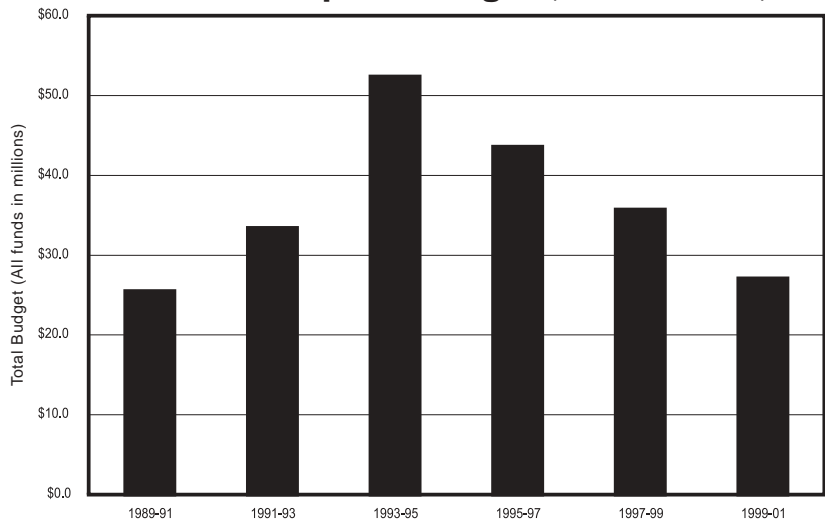
The 2001 Supplemental Budget provided WDFW with \$645,000 GF-S in fund to cover the cost of combating eastern Washington wild fires that occurred in the summer and fall of 2001. The Legislature also provided increased appropriation authority from the Wildlife Fund-State to improve sanitation at Department access sites and spend revenues generated from pamphlet advertising to offset production costs.

Capital Budget

The 1999-01 capital budget continued the steady decline in state capital funding the Department has received since the 1993-95 Biennium. The result was that renovations at a number of state salmon hatcheries were deferred, improvements at public access sites were put on hold and WDFW was again forced to delay acquisition of several critical wildlife habitat sites.

The 1999-01 Capital Budget approved by the Legislature provided the Department with a total of \$26.7 million, of which \$14.98 million was supported by state bonds. Of the total amount, WDFW expended \$19.85 million along with additional reappropriated funds from the 1997-99 Biennium. A minimal amount of reappropriation of 1999-01 funds were necessary due to permit delays required for projects requiring work within state waters.

WDFW Capital Budget (FY 1991-2001)



As in previous biennia, WDFW used its limited capital funding to make emergency repairs at Department facilities, construct and repair fences to protect crops from wildlife and make renovations at hatcheries and other facilities necessary to continue operations and comply with the ESA. Two major projects funded in the 1999-01 Biennium were renovation of the Issaquah Salmon Hatchery and removal of Goldsborough Dam in Mason County.

INTERGOVERNMENTAL and LEGAL ACTIONS

Under state law, WDFW is directed to “preserve, protect, perpetuate and manage” the fish and wildlife resources of the state. Meeting those responsibilities requires more than a dedicated staff and a clear sense of public purpose. In a modern world, where fish and wildlife management is a shared responsibility, it also requires strong partnerships with tribal co-managers, other states and state agencies, the federal government, local governments, private businesses, non-profit organizations and, occasionally, other nations. Sometimes, it also requires legal action to clarify these rights and responsibilities.

Below is a listing of the major intergovernmental agreements reached between WDFW and other parties during the 1999-01 Biennium, followed by a summary of the Department’s legal actions. Major intergovernmental agreements fall into two basic categories: Those with treaty tribes involving joint resource management and those with federal agencies resulting from listings under the ESA.

Intergovernmental Agreements

- **Comprehensive Chinook Plan:** In December of 2000, WDFW and Puget Sound treaty tribes completed and submitted to National Marine Fisheries Service (NMFS) a jointly developed Puget Sound Chinook Harvest Management Plan. The two-year plan included maximum recovery exploitation rates and harvest management strategies designed to protect and recover Puget Sound chinook salmon listed under the ESA. The plan was approved by NMFS in March of 2001, providing ESA coverage under a 4(d) rule exemption for state and tribal fisheries in 2001 and 2002.
- **Summer Chum Initiative:** In April of 2000, WDFW and Point No Point treaty tribes released the Summer Chum Salmon Conservation Initiative, the first comprehensive regional conservation plan for a federally protected salmon population in western Washington. The plan was also sent to NMFS, which is responsible for adopting recovery plans for salmon species listed under the ESA. In the spring of 2001, NMFS accepted the harvest management portion of the initiative as a recovery plan for the protection of summer chum during fisheries for other salmon species under section 4(d) of the ESA. In the fall of 2001, NMFS accorded the same ESA recovery plan status to the hatchery supplementation portion of the initiative.
- **Centennial Accord:** The Department developed a Centennial Accord Implementation Plan following Governor Locke’s meeting with the tribal and state agency officials in Leavenworth and subsequent modifications to the Centennial Accord on December 2, 1999. The Department’s implementation plan calls for annual meetings with the tribes on specific fish management issues, including shellfish, in addition to the frequent and routine contacts with individual tribal representatives. Wildlife management issues are also an important component of tribal/state cooperative management initiatives, and Director Koenings provided Governor Locke with a March 14, 2000 memorandum which described specific actions the Department has taken in response to concerns raised at the Leavenworth meeting.
- **Columbia River Accord:** The State of Washington along with the State of Oregon, the four Columbia River treaty tribes, and the federal government signed a multi-year abundance-based plan that established conservation goals for depressed wild salmon stocks on the Columbia and Snake rivers in 2001. The multi-year plan focuses on rebuilding Snake River spring and summer chinook, upper Columbia spring chinook and Snake River sockeye. Under the plan, harvest rates were to be adjusted based on the number of wild fish projected to return in a given year. The plan was designed to provide stability in both harvest and hatchery production arenas.
- **Annual salmon management plans:** In April of 1999 and again in April of 2000 and 2001, the Department and the tribes successfully developed comprehensive annual fishery

More WDFW activities require federal authorization under ESA

The number of intergovernmental agreements required for the Department to meet its various management responsibilities increased substantially during the 1999-01 Biennium, following the listing of seven additional population groups of salmonids under the federal ESA. While WDFW had been managing for listed stocks on the Snake River since the early 1990s, the new listings required federal authorization for numerous fisheries, hatchery operations and research activities throughout the state.

Under the ESA, any activity that could incidentally “take” members of a listed stock while conducting other activities requires authorization from the National Marine Fisheries Service or the U.S. Fish and Wildlife Service.

Listed below are various types of incidental “take” authorizations filed by WDFW with those agencies to comply with the ESA. This process is discussed in greater detail in the section of this report titled “ESA Listings and Salmon Recovery.”

State-Tribal Resource Management Plans

- Comprehensive Chinook Plan for Puget Sound
- Summer Chum Salmon Conservation Initiative

Hatchery Genetic Management Plans

- Plans filed for 128 state hatchery operations during 1999-01 Biennium.

Fisheries Management Evaluation Plans

- Lower Columbia River tributaries
- Snake River and its tributaries

management plans for state and tribal fisheries in Puget Sound and the coast. The annual plans include specific management regimes for chinook, coho, and chum salmon. Plans for pink and sockeye salmon were developed through the Pacific Salmon Commission process. In addition, the Department and Columbia river tribes completed spring/summer and fall fishery management plans in 2001. These plans demonstrated great improvement in cooperatively managing Columbia River stocks between the states and the tribes.

4(d) Research Authorization

- More than 50 individual research projects ranging from spawner surveys in Puget Sound to dam studies on the Columbia River.
- Adaptive management studies conducted by the Cooperative Monitoring, Evaluation and Research (CMER) panel under the Forests and Fish Agreement

Section 6 Cooperative Agreement

- Hatchery and research impacts on bull trout

Section 7 Applications

- 2001 Pacific Fishery Management Council fisheries
- 2000/2001 fisheries on the mainstem Columbia River
- Biological assessment for 2000/2001 fisheries on the Snake River

Section 10 Applications

- Hatchery projects on the Upper Columbia River
- Steelhead research at Hanford Reach
- Steelhead and spring chinook research on the Upper Columbia River
- Spawning surveys and other research on the Upper Columbia River.
- Hatchery projects on the Upper Columbia River.
- Sockeye propagation at Wells Priest Rapids and Lake Wenatchee
- Upper Columbia River sport fisheries
- Snake River spring chinook research
- Tucannon River broodstock projects

- **Shellfish harvest plans:** In each year of the biennium, state and tribal co-managers completed 25 shellfish management plans, establishing catch allocations, fishing seasons, harvest regulations and other measures designed to protect the resource.
- **Medicine Creek hunting rights:** The Department, affected county prosecutors and the signatory tribes to the Medicine Creek Treaty employed two facilitators to ascertain, for enforcement purposes, the southern extent of tribal hunting rights under the treaty. After a report was

submitted by the facilitators, the Department commenced rule making and adopted the enforcement boundary definition in December of 2001. Since then, the tribes have adopted the boundary in their respective hunting regulations and the affected county prosecutors have used that definition in their prosecutorial decisions.

Lawsuits

- **U.S. v. Washington:** In January 2001, twenty treaty tribes and the United States initiated a new sub-proceeding against the state of Washington under the federal court's jurisdiction, alleging that the state violates the tribes' treaty "right of taking fish" by owning culverts that block fish passage, to the extent that such culverts impair the tribes' ability to earn a "moderate living" from fishing. The state takes the position that its ongoing efforts to identify and repair defective culverts satisfy any treaty-imposed obligation to provide fish passage. Trial preparation is under way.
- **U.S. v. Oregon:** Under the continuing jurisdiction of the federal court, three states, five treaty tribes negotiated several interim agreements on the management of Columbia River fisheries below Priest Rapids Dam. The parties' goal is to reach agreement on a long-term management plan for fisheries and hatcheries.
- **Midwater Trawlers Cooperative v. U.S. Department of Commerce:** In an agreed order approved by the court in March 2000, WDFW agreed to drop its challenge to a federal rule describing usual and accustomed areas for tribal groundfish fishing off the Washington coast in exchange for the federal government's statement that the rule does not establish tribal usual and accustomed fishing grounds and stations for the purposes of the ongoing *United States v. Washington* treaty fishing litigation, and that the rule has no precedential effect in that litigation.
- **Sea Shepherd Conservation Society v. WDFW:** In March 2001, the Thurston County Superior Court dismissed a claim that WDFW must enforce state laws prohibiting the taking of gray whales by Makah tribal whale hunters. The court said that the Makah Tribe and the federal government were "indispensable parties" in the case who could not be joined in the state court action because of their sovereign immunity.
- **Wildboy Creek Sediment Spill:** During May of 1997, Longview Fibre lowered the water level behind Camp Kwoneesum Dam, resulting in a significant sediment spill into Wildboy Creek and adversely impacting fish and habitat in the creek. WDFW investigated the incident and sent a natural resource damage claim to Longview Fibre. After settlement talks and meetings, the parties signed a settlement agreement in August of 1999. Longview Fibre agreed to complete restoration work on Boulder and Wildboy Creeks, to monitor Boulder Creek, and to pay WDFW about \$10,000 for its costs responding to the incident.
- **Elliot Bay Marina v. WDFW, U.S. Army Corps of Engineers and U.S. Fish and Wildlife Service:** This U.S. District Court case involved Elliot Bay Marina's request for release of a performance bond held by the defendants to secure the mitigation plan associated with the permits issued for the construction of Elliot Bay Marina. In December of 1999, the parties signed a settlement agreement whereby the defendants agreed to release the bond and Elliot Bay Marina would pay \$70,000 to restore habitat in Elliot Bay. It was also agreed that the money would be split between the Muckleshoot and the Suquamish tribes for habitat restoration projects. Based on the settlement agreement, the court entered an order dismissing the case.
- **WDFW v. Gary and Dione Davis:** In 1998, WDFW filed a lawsuit in Grays Harbor Superior Court against Gary Davis and his former wife, Dione. Mr. Davis was employed by WDFW when he embezzled approximately \$133,000 from WDFW. Grays Harbor Superior Court issued an order for a pre-judgment writ of attachment on Mr. Davis' personal property and authorized the recording of a writ of attachment on the real property. The court also required Mr. Davis to deposit the proceeds of his state retirement fund with the court when he cashed out his retirement money. The parties recently signed a Settlement Agreement and the court entered orders giving all the personal property and the retirement money to WDFW, giving WDFW a share in the proceeds from the sale of the real

property, dismissing Dione (Davis) Sowers from the case, and entering a judgment against Mr. Davis in the amount of \$133,108.65.

- **Condit Dam Relicensing:** In September 1999, PacifiCorp, the owner and operator of Condit Dam on the White Salmon River, entered into a settlement agreement with the major parties to the relicensing, agreeing to pay up to \$17.5 million for the dam's eventual removal. The settlement was submitted to the Federal Energy Regulatory Commission for approval and PacifiCorp has started the removal permitting process.
- **Citizens for Responsible Wildlife Management v. State (I):** A coalition of trappers and sportsmen brought a lawsuit in Thurston County Superior Court challenging the constitutionality of Initiative 713, which bans the use of body gripping traps and two kinds of poisons. Animal rights groups intervened on the side of the state

and the Washington State Farm Bureau participated as an *amicus*, supporting arguments of the plaintiffs. After hearing cross motions for summary judgment on July 13, 2001, Judge Strophy upheld the constitutionality of I-713 on all grounds challenged. Plaintiffs have indicated they plan to appeal the ruling directly to the state Supreme Court.

- **Citizens for Responsible Wildlife Management v. State (II):** The lead plaintiff in the first challenge to Initiative 713 brought a second lawsuit in Spokane County, this time challenging both Initiatives 713 and 655 on the basis that they contravene the public trust doctrine in Washington. Plaintiffs argue that the public trust doctrine applies to wildlife resources, WDFW is the sole entity charged with implementing trust duties pursuant to the doctrine, and the two initiatives unlawfully interfere with WDFW's management program. ■

FISH & WILDLIFE COMMISSION

SINCE PASSAGE OF REFERENDUM 45 in 1995, the responsibility for setting basic policy direction for fish and wildlife management has been vested in the Washington Fish and Wildlife Commission. The Commission's nine members, each of whom serves a six-year term, are appointed by the Governor and confirmed by the state Senate.

Among its various responsibilities, the Commission establishes hunting and fishing regulations for each season and designates species in need of special protection. It also supervises the Director of the Washington Department of Fish and Wildlife (WDFW) and approves the Department's budget to ensure that WDFW's actions are consistent with its goals and objectives.

Throughout the 1999-01 Biennium, the Commission worked closely with the WDFW director to address a wide range of resource issues, ranging from groundfish protection to cougar management. Commissioners also took an active role in the Department's legislative program, helping to secure the state funding necessary to modernize the Department's operating systems and monitor improvements in WDFW's business practices.

During the course of the biennium, the Commission held 11 formal public meetings and eight informal workshops where citizens had an opportunity to participate in the decision-making process for Washington's fish and wildlife resources. Minutes of those meetings, as well as the Commission's conference calls, are posted at <http://www.wa.gov/wdfw/com/comintro.htm>

Washington Fish & Wildlife Commission

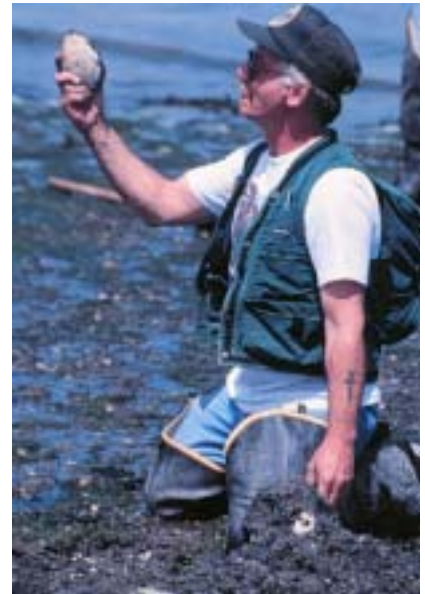
- **Russ Cahill**, Olympia; elected chair, 2001; served as vice chair 1999-01
- **Kelly White**, Kettle Falls; served as chair, 1999-01
- **Will Roehl**, Bellingham; elected vice chair, 2001
- **Ron Ozment**, Cathlamet
- **Lisa Pelly**, Bainbridge Island
- **Dawn Reynolds**, Pullman
- **Fred Shiosaki**, Spokane
- **Bob Tuck**, Selah
- **R.P. Van Gytenbeek**, Seattle

The Commission has 2.6 FTE staff positions, funded through the Business Services Program, to support Commission operations. The total operating budget for the Commission during the 1999-01 Biennium was \$284,000.

Key actions taken by the Washington Fish and Wildlife Commission during the 1999-01 Biennium include:

- **Marine sanctuaries:** Established two new marine sanctuaries (no fishing) and a marine preserve (salmon trolling only) in Puget Sound to protect depressed marine fish stocks.
- **Trawl ban:** Prohibited the use of trawl gear in state coastal waters to catch groundfish, many species of which are in decline.
- **Cougar management:** Oversaw the development of new rules, consistent with Initiative 655 and subsequent legislation, for the use of dogs to remove cougars to protect public safety.
- **Ballast water:** Adopted new controls on the discharge of ballast water into state waters to protect against the release of exotic species.
- **Catch record card:** Required recreational crab fishers to document their catch on a catch record card to aid in harvest estimates.
- **Salmon eggs:** Prohibited the sale of chum salmon eggs separate from the carcasses to discourage wastage.
- **Commercial sardine fishery:** Authorized the first commercial sardine fishery in nearly 50 years in recognition of the stock's recovery.
- **Rotenone:** Imposed a year-long moratorium on the use of rotenone, a naturally occurring chemical to rehabilitate lakes, until safety issues could be addressed.
- **Endangered species:** Down-listed the peregrine falcon from "state-endangered" to "state-sensitive" but added two other species (mardon skipper, northern spotted frog) to the state-endangered species list, reflecting the changing status of those species. ■

Stewardship starts with a dedicated staff



DIRECTOR'S OFFICE

THE DIRECTOR'S OFFICE PROVIDES strategic direction and operational oversight for Washington Department of Fish and Wildlife (WDFW) employees throughout the state, working to turn policies adopted by the state Legislature and the Fish and Wildlife Commission into action. Since assuming the position as WDFW director in January of 1999, Jeff Koenings, Ph.D, has guided the Department in a wide range of initiatives designed to promote sound management of the state's fish and wildlife resources – and of the Department itself.

Selective fisheries, hatchery reform, closer working relations with treaty and other federally recognized tribes, new partnerships with local salmon recovery organizations – these and other resource management initiatives discussed in this report reflect priorities advanced by the Director during the 1999-01 Biennium. At the same time, the Department also made significant progress in achieving three internal management goals Director Koenings established shortly after arriving at WDFW:

- Improve financial management and update outmoded business systems to support the Department's work throughout the state.
- Unite WDFW staff under a shared understanding of the Department's goals and objectives.
- Emphasize the role of science as the foundation for all of WDFW's fish and wildlife stewardship responsibilities.

One of the Director's most pressing challenges at the start of the biennium was to rectify the Department's financial management practices. After a serious revenue shortfall in 1998, WDFW emerged from the 1999-01 Biennium in a stable financial position under the careful financial oversight of a new management team and an

overhaul of the Department's business systems. (See next section titled "Business Services.")

The Department's first strategic plan was also completed under the Director's leadership. The plan, which clearly articulates WDFW's goals and objectives, was one of 53 items identified by employee advisory committees created by the Director to recommend operational improvements at the Department. More than 95% of those improvements, ranging from supervisory training to a thorough review of the Department's technology requirements, were completed by the end of the biennium.

A central theme of Koenig's leadership of the Department is the importance of science as the cornerstone of fish and wildlife management. To reinforce that principle, he created the position of "chief scientist" within each of the Department's three resource-management programs and put a high priority on applied research projects ranging from wildlife genetic studies to digital mapping of riparian corridors. Several major legislative initiatives relied on scientific and technical support from WDFW, including the new network of local Lead Entities, the 12 Regional Fisheries Enhancement Groups and the Forests and Fish Agreement.

During the 1999-01 Biennium approximately 25 employees within the Director's Office focused on providing administrative support for the Director and

Director's Office Funding and Personnel, 1999-01 Biennium

(dollars in thousands)						
Programs	GF-S		OTHER FUNDS		TOTAL	
	Funding	FTEs	Funding	FTEs	Funding	FTEs
<u>Internal Services</u>						
Director's Office	\$740	4	\$781	7	\$1,521	11
Personnel	\$626	6	\$968	9	\$1,594	15
<u>External Services</u>						
Regional Operations	\$1,676	11	\$1,772	16	\$3,448	27
Intergovernmental	\$1,759	19	\$0	0	\$1,759	19
LEAP	\$47	1	*\$9,107	21	*\$9,154	22
Public Affairs	\$459	5	\$484	4	\$943	9
TOTAL	\$5,307	46	*\$13,112	58	*\$18,419	103

* Includes \$2.5 million for Lead Entity Grants

the Department. These include the Deputy Director, the internal auditor, a quality/performance position and Personnel Office staff.

Besides addressing issues raised by the employee advisory committees, the Personnel Office revitalized 27 employee safety committees to identify workplace hazards and followed through with inspections. These efforts helped to reduce employee injuries by 25% from the previous biennium. It also established a partnership with the Department of Natural Resources and the Interagency Committee for Outdoor Recreation to improve access to state lands for people with disabilities.

The remaining 75 employees within the Director's Office were dedicated to providing programmatic support for the Department, including intergovernmental resource management, regional operations, legislative and constituent relations, volunteer coordination and communications. These work units, discussed below, help to provide overall direction and continuity for WDFW programs throughout the state.

Regional Offices

While WDFW, like other state agencies, is administered from a central office in Olympia, more than half of its employees are assigned to regional offices throughout the state. Each of these six regional offices serves as a hub of activity for biological field work, enforcement of hunting and fishing regulations and customer service.

WDFW's six regional offices are each managed by a regional director, who works with regional program managers to resolve local issues at the local level. As the Director's representatives to each region, the regional directors, along with their support staff, are part of the WDFW Director's Office. Internally, regional directors have responsibility for assuring that Department policy, strategic plans, goals and objectives are implemented in programs administered by regional staff. Externally, they also serve as the main point of contact for local legislators, tribal authorities, county commissioners and the general public.

By balancing responsibilities between central and regional offices, WDFW provides consistency in statewide policy implementation while also drawing on local knowledge and diversity of people throughout the state. While many management re-

sponsibilities – such as wild salmon recovery and dangerous wildlife response – are common to all six regions, others are unique to specific areas of the state. Below is a sampling of the work done by WDFW regional offices during the biennium.

Region 1: Eastern Washington

Regional Office: Spokane

Serving: Serving Asotin, Columbia, Ferry, Garfield, Lincoln, Pend Oreille, Spokane, Stevens, Walla Walla and Whitman counties

- Piloted the Cooperative Compliance Program, helping more than 350 landowners in the Walla Walla River Basin achieve compliance with state and federal laws on fish passage and screening to protect federally-listed salmonids.
- Worked closely with the Snake River/Asotin Lead Entity, local governments and treaty tribes to facilitate salmon recovery in the Snake River Basin.
- Responded to 476 public complaints about cougar activity in 2000 and 2001.
- Launched a five-year research project using radio and satellite telemetry equipment to learn more about mule deer populations in northeast and northcentral Washington.

Region 2: Northcentral Washington

Regional Office: Ephrata

Serving: Adams, Chelan, Douglas, Grant and Okanogan counties

- Helped to establish the Upper Columbia Salmon Recovery Board, a regional salmon recovery forum including three counties and two tribes on the upper Columbia River. Also helped to establish the Okanogan Basin technical working group, designed to address cross-boundary salmon management issues in the Okanogan River affecting the U.S. and Canada.
- Worked with key constituents, agency staff and other partners to secure an easement for the Arrowleaf property in the Upper Methow River drainage, a critical watershed for area salmon recovery. Also worked with local governments to acquire key shrubsteppe areas to protect critical habitat for sharptail and sage grouse.
- Joined with WDFW watchable wildlife specialists and local governments to develop a Coulee Corridor scenic byways program on State Highway 17.

Region 3: Southcentral Washington

Regional Office: Yakima

Serving: Benton, Franklin, Kittitas and Yakima counties

- Worked with a broad coalition of partners to acquire two key properties for fish and wildlife conservation: the McWhorter Ranch in the Yakima watershed and the Trust for Public Lands/Arrowleaf property in Okanogan County. Together, these properties provide critical habitat for a variety of threatened and endangered species, from the pygmy rabbits to naturally spawning salmon.
- Negotiated a land trust to mitigate the effects on fish and wildlife of the new \$50 million Trend West resort in Kittitas County.
- Responded to the drought of 2001 by monitoring stream flows, constructing diversion channels for stranded fish and working with the Department of Ecology to acquire water rights to facilitate fish passage in the Yakima, Methow, Walla Walla and other river basins.
- Assisted in the formation of the Yakima Basin Lead Entity to coordinate salmon-recovery efforts by area cities, counties and the Yakama Nation.
- Designed special hunting seasons and relocated elk to reduce conflicts with wheat growers in the Hanford area. Also worked to reduce elk conflicts in the Nile area.
- Staffed salmon seasons on the Columbia River, areas of which had not been open to salmon fishing in more than 40 years. Provided anglers with information on regulations, river flows and appropriate gear and conducted bag checks to ensure compliance with regulations.

Region 4: Northern Puget Sound

Regional Office: Mill Creek

Serving: King, Skagit, Snohomish, Island, San Juan and Whatcom counties

- Provided logistical support to the U.S. Army Corps of Engineers during the Deepwater Slough Restoration Project, which restored over 300 acres of estuarine habitat on the South Fork of the Skagit River.
- Worked with local governments, legislators, constituents and WDFW staff to complete several watchable wildlife projects, including the

observation tower at Tennant Lake in Whatcom County and the DeBay Slough Swan Reserve and Fir Island Farm Snow Goose Reserve in Skagit County.

- Provided policy and technical assistance to the Tri-County Salmon Recovery Committee, which is working to coordinate salmon recovery projects in Pierce, King and Snohomish counties.
- Arrested four Canadian crab fishers in a major effort to crack down on illegal commercial crab fishing near the Canadian border.

Region 5: Southwest Washington

Regional Office: Vancouver

Serving: Clark, Cowlitz, Klickitat, Lewis, Skamania and Wahkiakum counties

- Participated in negotiations with the Medicine Creek Tribes on an interim hunting and enforcement boundary in areas ceded to the federal government. Regional staff were also the primary contact with legislators and local residents in the affected area.
- Served as lead technical advisor on fish and wildlife issues for the Lower Columbia Fish Recovery Board, which secured \$3 million to complete 15 salmon recovery projects in the region. Regional staff also assisted board members and staff in the development of a comprehensive salmon recovery plan.
- Helped Clark County acquire the Lucia Falls site on the Lewis River for the purpose of protecting ESA-listed steelhead in the area. Regional staff also assisted the county in the acquisition of key chinook salmon habitat on the north fork of the Lewis River.
- Coordinated a feeding effort for elk at Mount St. Helens found starving due to heavy snows and lack of habitat. Also participated in the 20th anniversary of the Mount St. Helens anniversary celebration.

Region 6: South Sound/Pacific Coast

Regional Office: Montesano

Serving: Clallam, Grays Harbor, Jefferson, Kitsap, Mason, Pacific, Pierce and Thurston counties

- Worked with Willapa Bay commercial and recreational fishers to develop a regional planning process specific to Bay fisheries. This plan not

WDFW Management Regions



only laid the foundation for Willapa Bay fisheries, but also provided a model for joint planning efforts in other parts of the state.

- Contributed to the development of the Summer Chum Salmon Conservation Initiative, the first comprehensive regional conservation plan for a federally listed salmon population in Washington. Staff also prepared and submitted a Hatchery and Genetic Management Plan to NMFS for supplementation programs designed to aid recovery of summer chum and Puget Sound chinook salmon.
- Managed the state's highly popular razor clam fishery, attracting 370,000 digger trips and producing an estimated \$9.2 million in economic benefits for coastal communities in the 1999-01 Biennium. Region 6 enforcement officers increased "emphasis" patrols on coastal beaches, resulting in a marked decline in digging outside of allowable harvest areas.
- Provided instruction about the marine environment to more than 3,500 students through school field trips and classroom visits. The region's Marine Education program also reached thousands more people through training events for adults and with displays at state fairs.

Intergovernmental Resource Management Group

In July of 1999, Director Koenings created the Intergovernmental Resource Management (IRM) group to take the lead in developing management options on issues affecting the Department's relationships with tribal governments, foreign nations and federal, state and local agencies. The new management group was designed to improve agency coordination of critical issues ranging from implementation of court orders on tribal hunting and fishing rights to state policies on salmon recovery and the Forests and Fish agreement.

IRM is organized into three divisions.

- The Environmental Management Group largely deals with policy issues affecting fish and wildlife habitat and works closely with local governments and the Department's Habitat Program.
- The Natural Resource Management Group specializes in fish and wildlife resource management issues involving tribal governments, and with federal and international fish and wildlife organizations such as the National Marine Fisheries

Service, the U.S. Fish and Wildlife Service, the Pacific Salmon Commission and the Pacific and North Pacific Fishery Management Councils.

- The Columbia River Management Group focuses on fish and wildlife issues in multi-state and tribal forums such as the Columbia River Compact, Northwest Power Planning Council and Columbia Basin Fish and Wildlife Authority.

All of these activities requires a focused effort, apart from the day-to-day management management of individual fish and wildlife species. To support the Department's co-management responsibilities, for example, IRM staff works throughout the year with 24 individual treaty tribes in a process to establish annual harvest-sharing arrangements. Each agreement determines tribal/non-tribal harvest sharing for a wide range of salmon, steelhead, marine fish, shellfish and hunted species.

Nearly all the 20 staff members who make up the IRM were drawn from agency resource programs, providing the new policy group with a knowledgeable and experienced staff. Key activities of IRM in the 1999-01 Biennium include:

- **Salmon recovery:** Throughout the biennium, IRM played a leading role in ensuring that WDFW met its responsibilities for salmon recovery. Activities ranged from developing plans and permits required to conduct fisheries and research activities in listed waters to coordinating WDFW's work with other state and federal agencies, treaty tribes and private landowners to facilitate salmon recovery through improvements in forestry and agricultural practices. In addition, IRM was an active participant in the Puget Sound Salmon Forum,

which developed the "Shared Strategy for Salmon Recovery in Puget Sound" to promote recovery of listed stocks on a regional basis.

- **Puget Sound chinook plan:** Uncertainty about the application of the ESA to Puget Sound chinook for fisheries management created an unstable management environment for WDFW, the Northwest treaty tribes and the public. Through two years of intensive, cooperative effort, IRM and tribal fisheries staffs developed the Puget Sound Comprehensive Chinook Management Plan, designed to protect and restore naturally spawning salmon populations in the Sound and still allow for sustainable recreational, commercial and tribal fisheries. The approach outlined in the comprehensive plan provided the foundation for federal approval of Puget Sound fisheries in 2001, the first year those fisheries were managed under the ESA.
- **North of Falcon season-setting process:** Each year, IRM plays a leading role in establishing fishing seasons in state waters designed to protect weak stocks while fairly apportioning harvestable salmon between recreation, commercial and tribal fishers. In the spring of 2000, tensions between these groups led to a



* The Oregon-based Umatilla and Warm Springs tribes, and the Nez Perce tribe based in Idaho, have treaty hunting and/or fishing rights in eastern Washington.

near impasse, resulting in unnecessary fishing restrictions, an erosion of state-tribal cooperation, and loss of public confidence in the North of Falcon season-setting process. In response, IRM worked with tribal leadership and non-Indian recreational and commercial advisors to restructure the process for 2001 planning cycle, providing more time and information to help resolve differences. These changes led to improved cooperation in 2001 among all parties involved in the negotiations.

- **Columbia River spring chinook:** Working with the four Columbia River treaty tribes, the National Marine Fisheries Service and the fish and wildlife departments of Oregon and Idaho, IRM represented the agency in developing an agreement governing the harvest of Columbia River spring chinook for 2001 through 2005. This precedent-setting agreement established an abundance-based approach to salmon management, designed to provide sustainable fishing opportunities while rebuilding natural spawning populations.
- **Ocean groundfish management:** In representing WDFW on the federal Pacific Fishery Management Council, IRM provided leadership in developing coastwide plans to protect and rebuild eight rockfish species declared overfished by the National Marine Fisheries Service. Management actions adopted by the Council have included strict reductions in harvest as well as development of a groundfish strategic plan to address critical issues of fleet capacity and limited-entry requirements. In addition, IRM led WDFW's efforts to develop new experimental fishing opportunities (e.g. sardines, arrowtooth flounder) for Washington-based fishers in tandem with an on-water observer program to determine whether gear and fishing changes are effectively minimizing the encounters of overfished species.
- **Shellfish management:** Concerned about increasing harvest pressure on Puget Sound shrimp, IRM organized a state-tribal work group to develop a better understanding of these shrimp populations, particularly spot shrimp. The work group, which includes fisheries biologists from the University of Washington, successfully identified methods for estimating

shrimp population size, which ultimately help fisheries managers improve management for sustainable harvest.

Legislative and External Affairs

In the 1999-01 Biennium, the Legislative and External Affairs Program (LEAP) encompassed a variety of public outreach activities, ranging from volunteer services to hunter education. Most of those activities are discussed in the last section of this report, titled "Outreach."

As an efficiency measure, LEAP was eliminated in December of 2001 as a specific program and its various activities were assigned to other programs. WDFW's Legislative Office, which coordinates Department activities with the state Legislature, was the only component of LEAP to remain within the Director's Office.

Public Affairs

WDFW's Public Affairs Office works with the Director and the executive management team to coordinate departmental communications with the news media, the public, the Governor's Office and other agencies, tribal governments and various constituent groups. Recognizing the importance of providing timely, accurate information, the Public Affairs staff reaches its diverse audience in a variety of ways.

During the 1999-01 Biennium, Public Affairs staff wrote, edited and distributed 627 news releases and responded to hundreds of inquiries from the news media on topics ranging from hunting prospects in the Olympic foothills to recovery plans for listed salmon stocks. All public releases are posted on the Department's web page, which was expanded to include new features that include an on-line science magazine designed to inform and educate citizens about scientific research undertaken by WDFW employees. Staff also produced a number of interactive web pages, providing an avenue for members of the public to share their views on particular issues and events such as the North of Falcon season-setting process for salmon fisheries.

Public Affairs is also responsible for coordinating responses to public records requests under the state's

Public Records Act. In 1999-01, staff processed 640 requests for records on issues ranging from vessel landings to fish and wildlife survey results.

“Wild About Washington,” a monthly television program produced by Public Affairs and hosted by WDFW employees, was aired by approximately 30 cable outlets throughout the state during the 1999-01 Biennium. Initiated in October of 1998, the program provides viewers with up-to-date information about recreational opportunities and WDFW initiatives.

For more information on those issues, outdoor enthusiasts often turn to “Weekender,” a bimonthly publication produced by the Public Affairs staff that focuses on consumptive and non-consumptive recreational outdoor opportunities offered by the Department. Other publications produced by the staff include a quarterly employee newsletter, special reports including one on the Department’s salmon-recovery efforts (“Partnerships in Science: A New Era in Salmon Recovery”) and other reports to the Legislature and the public. ■

Washington Department of Fish and Wildlife

Sound Stewardship of Washington's Fish and Wildlife

What's New | News Releases | Search | FAQ | Contact WDFW

IN THE NEWS
June 10, 2002

SEATTLE - A Mount Vernon man who admitted to poaching a chinook salmon from the Skagit River in July 2001 has been fined \$5,000 for violating the federal Endangered Species Act (ESA), state and federal fisheries officials announced.
[Full story](#)

OLYMPIA - In a meeting here Friday and Saturday (June 7 and 8) the Washington Fish and Wildlife Commission will vote on rules that would lead to stiffer penalties for taking threatened or endangered fish.
[Full story](#)

OLYMPIA - The Washington Department of Fish and Wildlife (WDFW) is accepting public comments until June 28th on the environmental impact of the department's proposed six-year game species management plan.
[Full story](#)

WE GET MAIL

WDFW Public Event Calendar

Weekender REPORT
The latest in fish and wildlife opportunities around Washington State

WILDWATCH CAMS

Fish & Wildlife SCIENCE
An Online Science Magazine

Thousands of people every year access WDFW's website (<http://www.wa.gov/wdfw/>) for up-to-date information on fish, wildlife and outdoor opportunities.

BUSINESS SERVICES

THE MISSION OF THE WASHINGTON Department of Fish and Wildlife (WDFW) is “sound stewardship of fish and wildlife.”

Since the merger of the former Department of Fisheries and the Department of Wildlife in 1994, WDFW has relied on the knowledge and commitment of its resource managers, field biologists, research scientists, engineers and other program staff to carry out that mission. But by start of the 1999-01 Biennium, the Department also recognized the importance of developing business systems adequate to support its work in an increasingly complex world.

The need for these improvements in this area became readily apparent in 1998, when an unanticipated shortfall in the State Wildlife Fund revealed a lack of adequate financial controls. While finding that the Department is “passionate about its mission to provide sound stewardship of fish and wildlife,” a consultant’s study commissioned by the state Legislature found that “the Department of Fish and Wildlife has historically lacked the requisite business systems characteristic of most state agencies its size.” The report went on to observe that “current systems do not address the requirements of a large, complex and modern organization with 27 operating funds and over 70 different operating budget appropriations.”

With the support of the state Legislature and the Washington State Fish and Wildlife Commission, WDFW made significant progress toward correcting those deficiencies in the 1999-01 Biennium. New business systems were deployed to support functions ranging from cost accounting to license sales, greatly improving operational efficiency and accountability. A critical non-Y2K computer was replaced, and a new strategic planning process was established to determine WDFW’s future information technology requirements.

These improvements, together with careful supervision by the Director and WDFW program managers, not only restored the Department’s financial standing but also prompted greater diversification of program support through partnerships and other sources of funding.

The Business Services Program is divided into four divisions, each with an important role to play in helping WDFW achieve its mission.

Information Services

In its 1998 assessment of WDFW’s business practices, the consulting and accounting firm of Talbot, Korvola & Warwick (TKW) found that “the Department depends on business and financial systems that are part manual, part automated, rely on manual interfaces and lack basic integration capabilities. The technology supporting many of these systems is either outdated or non-existent ...”

Many of these problems, years in the making, were corrected during the 1999-01 Biennium under the leadership of the WDFW Information Services division. Working with a second consulting group that specializes in information technology, the division developed a strategic plan that set the course of improvements in WDFW’s business systems. Key projects completed during the biennium include:

- **Cost Accounting System:** TKW found WDFW’s cost accounting system wholly inadequate to support the agency’s complex financial structure, which involves contracts with local and federal governments as well as a variety



With WDFW’s new WILD system, customers have the option of purchasing fishing and hunting licenses over the counter, by phone or the Internet.

of state funding sources. With \$288,000 in funding provided by the Legislature, WDFW defined its business needs, purchased necessary software and implemented the initial phase of its new cost accounting system in FY 2001. This first phase focused on automating the computation of WDFW's annual indirect cost recovery rate that is applied to federal and local contracts. Also programmed into the new model were program activities and time spent on contracts to ensure WDFW was adequately compensated for those activities. In late 2001, the agency initiated the second phase of the project, which will tie cost accounting system activity to goals and objectives of the Department's overall strategic plan. By 2003, the system is expected to provide cost information that is directly related to levels of effort and performance.

- Revenue Projection Model:** The State Wildlife Fund, which provided 16% of WDFW's operating revenues in the 1999-01 Biennium, has historically been highly volatile, creating financial uncertainty for the agency. Working with the Washington State Institute for Public Policy, a cross-program WDFW team developed a revenue-projection model that allows the Department to analyze and project Wildlife Fund revenue based on economic, demographic and other trends. Once implemented, the model proved remarkably accurate.
- Vehicle Mileage Tracking System:** Because of the nature of WDFW's work, the agency has a statewide fleet of more than 1,000 licensed vehicles – including cars, trucks, boats and heavy equipment – in its motorpool. To ensure accurate and timely reporting of licensed vehicle use, the agency implemented an automated Vehicle Mileage Tracking System (VMTS), which allows staff responsible for vehicle management to report monthly usage on-line through the agency Intranet and also get detailed reports of historical costs and usage.
- WILD Recreational Licensing System:** On March 1, 2001, WDFW's new computerized recreational fish and hunting li-

censing system became operational, ending the decades-old practice of processing license sales by hand. For customers, arrival of the new Washington Interactive Licensing Database (WILD) meant that licenses could be purchased over the phone or – as of July 2001 – via the Internet. For WDFW, the new system reduced the average 45-day processing time for license revenues received from dealers to just two weeks. Automatic deductions from dealers' accounts have also significantly reduced outstanding debts owed by dealers since the WILD system was deployed. WDFW continues to meet weekly with MCI/WorldCom, which developed WILD in return for a 9.5% transaction fee on sales, to improve the stability and reliability of the system.

- Licenses and Fish Tickets (LIFT):** At WDFW, Y2K computer compliance centered on two issues: older personal computers (PCs) and the aging Prime mini-computer. Testing and remediation of PCs was completed in the 1997-99 Biennium, but it was determined that the Prime system – used to manage fish ticket and commercial license data – could not be brought into compliance. With \$770,000 from the state's Y2K funding pool, the agency's Information Services division safeguarded that data by transferring it to existing Unix systems and built the new LIFT system which became operational in October of 2000. The new LIFT system achieved all major objectives, but more work remains to be done in building additional capabilities.

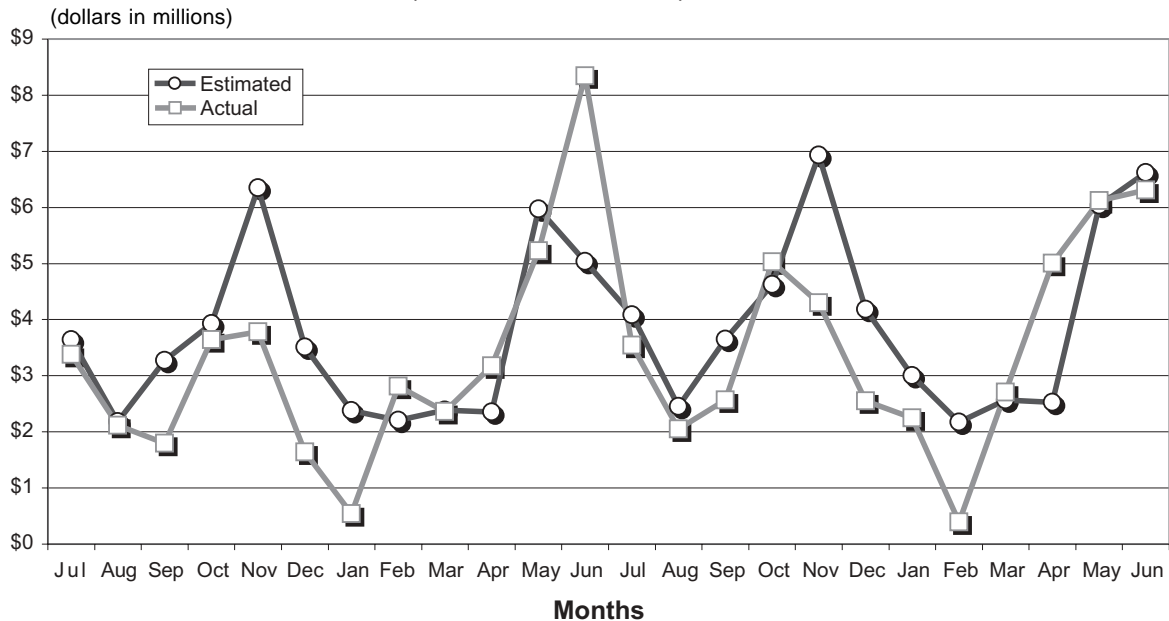
Other changes implemented under WDFW's strategic plan for information systems include evaluating information technology specialists across the agency, reorganizing into a more efficient, centralized structure, adding three new programmers to manage the

Business Services Funding and Personnel, 1999-01 Biennium

(dollars in thousands)						
Division	GF-S		OTHER FUNDS		TOTAL	
	Funding	FTEs	Funding	FTEs	Funding	FTEs
Business Services	\$697	6	\$720	10	\$1,417	16
Information Services	\$2,311	14	\$842	7	\$3,153	21
Financial Services	\$5,215	25	\$16,124	34	\$21,340	59
Licensing	\$1,161	14	*\$26,400	14	*\$27,561	28
Capital/Engineering	\$162	4	\$2,407	14	\$2,569	18
Commission	\$138	2	\$146	1	\$284	3
TOTAL	\$9,683	65	*\$46,640	80	*\$56,323	145

* Includes \$24.5 million in federal funds for Commercial Fishing License Buy Back

Wildlife Fund Revenues Track Closely with Projections (1999-01 Biennium)



Department's business support applications and moving to a 42-month lease plan and replacement schedule for agency PCs.

In addition, a new governance model was implemented in January of 2000, giving WDFW's Executive Management Team (EMT) formal responsibility for developing recommendations to the Director on information services policies and strategies. The Information Services Manager works with the Deputy Director and the Assistant Director of Business Services to define and present issues to the EMT for discussion and approval. A cross-program Information Technology Technical Committee provides staff support on technical issues.

Financial Services

Few areas of WDFW's operations received more scrutiny – or support – during the 1999-01 Biennium than the Financial Services Division. While the size of the division's staff remained virtually unchanged from the previous biennium, its methods of operation underwent a major transformation as the Department overhauled its business systems.

Various units with the Financial Services Division prepare and monitor the Department's biennial bud-

get, track and project revenues, provide centralized accounting services for all WDFW programs and manage the Department's vehicle fleet. The division also manages nearly 2,000 active grants and contracts, ranging from incoming federal hatchery funds to expenditures for field studies conducted by other agencies and institutions.

Technological improvements completed during the biennium revolutionized the way many of these tasks are performed. As previously noted, WDFW's new cost accounting system, revenue projection model, vehicle mileage tracking system and recreational licensing system all provided access to timely information necessary to accurately monitor the Department's financial position.

An economist was also added to the Business Services staff to provide expertise in revenue analysis and marketing. In addition, WDFW became a pilot agency for the statewide Fastrack system, which provides a wide range of state financial information over the Intranet.

In line with these changes, the division was realigned and additional training was provided for staff. Several positions were upgraded to attract highly qualified applicants as part of the Department's new focus on efficient business operations.

Fishing and Hunting License Revenues

Recreational Fishing

	FY00 Licenses	FY00 Revenue	FY01 Licenses	FY01 Revenue	Biennial Licenses	Biennial Revenue	Historical ¹ Average
Combination							
Resident	120,349	\$4,332,564	157,798	\$5,680,728	278,147	\$10,013,292	\$9,382,790
Non Resident	933	\$67,176	1,256	\$90,432	2,189	\$157,608	\$188,784
Youth	8,075	\$40,375	5,115	\$25,575	13,190	\$65,950	\$72,372
Disabled/Veteran	9,412	\$47,060	10,463	\$52,315	19,875	\$99,375	\$34,098
Freshwater							
Resident	345,042	\$6,900,840	398,836	\$7,976,720	743,878	\$14,877,560	\$14,309,930
Non Resident	9,147	\$365,880	13,067	\$522,680	22,214	\$888,560	\$958,350
Senior	30,580	\$152,900	36,393	\$181,965	66,973	\$334,865	\$116,686
Saltwater							
Resident	49,512	\$891,216	49,591	\$892,638	99,103	\$1,783,854	\$1,584,732
Non Resident	2,263	\$81,468	2,319	\$83,484	4,582	\$164,952	\$208,948
Senior	10,574	\$52,870	14,239	\$71,195	24,813	\$124,065	\$37,278
Shellfish/Seaweed							
Resident	144,874	\$1,014,118	158,755	\$1,111,285	303,629	\$2,125,403	\$1,368,100
Non Resident	7,602	\$152,040	8,643	\$172,860	16,245	\$324,900	\$178,170
Senior	15,250	\$76,250	18,490	\$92,450	33,740	\$168,700	\$116,980
Two-Day	206,549	\$1,239,294	228,575	\$1,371,450	435,124	\$2,610,744	\$2,318,080
Total Recreational Fishing	960,162	\$15,414,051	1,103,540	\$18,325,777	2,063,702	\$33,739,828	\$30,875,298

Recreational Hunting

	FY00 Licenses	FY00 Revenue	FY01 Licenses	FY01 Revenue	Biennial Licenses	Biennial Revenue	Historical ¹ Average
Small Game							
Resident	92,631	\$187,480	108,512	\$2,600,014	201,143	\$2,787,494	\$3,217,614
Non Resident	2,754	\$214,080	2,862	\$227,896	5,616	\$441,976	\$295,808
Youth	8,233	\$92,975	10,400	\$122,657	18,633	\$215,632	\$125,182
Disabled/Veteran	1,458	\$14,488	1,736	\$20,793	3,194	\$35,281	\$10,442
Big Game							
Resident	191,457	\$8,305,164	208,751	\$10,315,778	400,208	\$18,620,942	\$17,456,432
Non Resident	8,848	\$3,161,580	1,655	\$638,400	10,503	\$3,799,980	\$1,041,778
Youth	11,761	\$264,173	15,265	\$349,793	27,026	\$613,966	\$566,790
Disabled/Veteran	2,891	\$75,419	3,714	\$96,557	6,605	\$171,976	\$109,074
Total Recreational Hunting	320,033	\$12,315,359	352,895	\$14,371,888	672,928	\$26,687,247	\$22,823,120

Commercial License Revenues

	FY00 Licenses	FY00 Revenue	FY01 Licenses	FY01 Revenue	Biennial Licenses	Biennial Revenue	Historical ² Average
Salmon Gear	927	\$476,630	862	\$430,595	1,789	\$907,225	\$1,003,048
Salmon waiver	650	\$74,750	825	\$65,780	1,475	\$140,530	\$150,816
Charter	175	\$78,325	142	\$60,365	317	\$138,690	\$138,068
Other food fish	258	\$48,858	264	\$54,020	522	\$102,878	\$104,396
Shellfish	893	\$241,280	642	\$179,900	1,535	\$421,180	\$413,766
Wholesale	749	\$130,210	819	\$138,875	1,568	\$269,085	\$274,070
Commercial water/ non-salmon	457	\$79,285	457	\$78,025	914	\$157,310	\$169,488
Specialized Wildlife	1,380	\$126,391	927	\$117,865	2,307	\$244,256	\$247,378
Other	1,167	\$69,198	1,268	\$68,533	2,435	\$137,731	\$130,006
Total Commercial	6,656	\$1,324,927	6,206	\$1,193,958	12,862	\$2,518,885	\$2,631,036

¹Average biennial revenue from recreational license revenues from 1989-1999, with the exception of some senior licenses. Special licenses for saltwater fishing were not available to seniors until 1992 or until 1995 for shellfish. Annual averages for those license revenues are based on a seven- and five-year period respectively.

²Average biennial revenue from commercial licenses from 1998-02. Previous totals are not comparable due to changes in licensing system.

Licensing

Working in conjunction with more than 550 authorized dealers statewide, the 15 employees in the Licensing Division processed nearly three million new recreational and commercial hunting and fishing licenses during the 1999-01 Biennium, along with associated permits, tags and catch record cards. Total revenues generated by these sales exceeded \$60 million.

Deployment of the new WILD recreational licensing system in 2001 brought a number of added conveniences for WDFW's customers, while increasing efficiency and accountability at the Department. That followed a major change in the timing and structure of recreational hunting and fishing licenses made in January of 1999. With the approval of the state Legislature, the license year was changed from January 1 through December 31 to April 1 through March 31 to correspond more closely to hunting and fishing seasons. An interim license was available for hunters and fishers wishing to hunt and fish between January 1, 1999 and March 31, 1999.

In addition, old licensing designations of "food fish" and "game fish" were changed to "saltwater" and "freshwater." Enhancement funds such as the "warm water enhancement fund" were rolled into the cost of these fishing licenses, making the new licenses more straight-forward and easy to understand. Similarly, the new hunting license structure rolled individual hunting license items together into packages, offered at discounted prices.

Capital Programs and Engineering

During the 1999-01 Biennium, WDFW work crews completed major renovation projects at eight fish hatcheries, installed custom-fitting screens at 10 new locations to protect migrating fish, built nearly 10 miles of new elk fencing and graded more than 200 miles of agency-owned roads.

For these and other projects, WDFW relies on the Engineering and Capital Programs Division and its staff of engineers, surveyors and other construction professionals. In addition, the Division develops and prepares the Department's ten-year capital construc-

Fishing and hunting licenses go WILD

Hunters and anglers saw several major changes in WDFW's licensing system during the 1999-01 Biennium – including the added convenience of being able to purchase a recreational license over the phone or the Internet.

Immediately after WDFW's new Washington Interactive Licensing Database (WILD) became operational March 1, 2001, agency customers could purchase recreational licenses over the phone or at one of 550 dealers connected to the WILD system statewide. As of July 2, hunting and fishing licenses could also be purchased over the Internet.

The new system also helped to reduce the average 45-day processing time for license revenues received from dealers to just two weeks. It has also significantly improved the timely collection of licensing fees and reduced outstanding debts owed by dealers.

tion plan and biennial capital budgets. The four work groups within the division include:

- Capital Budget Management, which managed the Department's \$26.7 million capital budget during the 1999-01 Biennium.
- The Engineering Design and Technical Group, which provides facility planning and permitting and manages WDFW's public works projects.
- The Lands Surveying Group, which conducts topographic and property boundary surveys for use by the engineering group and Real Estate Services.
- The Construction and Maintenance Group, which performs general construction and maintenance work at WDFW facilities, wildlife areas and access areas.

Key Division accomplishments during the biennium include renovation of the Issaquah Hatchery, completion of the Deepwater Slough project in Skagit County and accessibility improvements at dozens of access areas, boat ramps and toilets maintained by WDFW. ■

HABITAT

VIABLE HABITAT IS THE most basic life requirement for all birds, fish and other animals. Without adequate food, water and shelter, no fish or wildlife species can survive, much less flourish, even under the most careful management.

But as human populations have grown and expanded into new areas, Washington and other states have lost a great deal of native fish and wildlife habitat. In the past century alone, Washington lost more than 80% of its native old-growth forests, displacing a range of animals from marbled murrelet to caribou. In eastern Washington, agriculture and other human activities consumed 60% of the native shrub steppe, while 95% of western Washington's native prairie grasslands are now gone. In a state renown for its native salmon runs, dams impede migration on the Columbia, Snake and other major rivers, hundreds of rivers fail to meet clean water standards and others run dry in summer for lack of established in-stream flows.

As the 20th century drew to a close, the Washington State Legislature took action to address these conditions, particularly those affecting habitat for wild salmon populations. Anticipating the listing of a number of new salmon populations under the federal Endangered Species Act (ESA), the 1998 Legislature approved the Salmon Recovery Act (HB 2496), which established a network of regional salmon recovery groups to coordinate habitat restoration work on local watersheds throughout the state. In 1999, the Legislature created the Salmon Recovery Funding Board (SRFB) to prioritize funding for projects proposed by the new regional restoration groups, designated as "Lead Entities" in the state's salmon recovery effort. It also adopted the landmark Forest and Fish Agreement, which established new standards for logging practices that affect habitat for fish and wildlife.



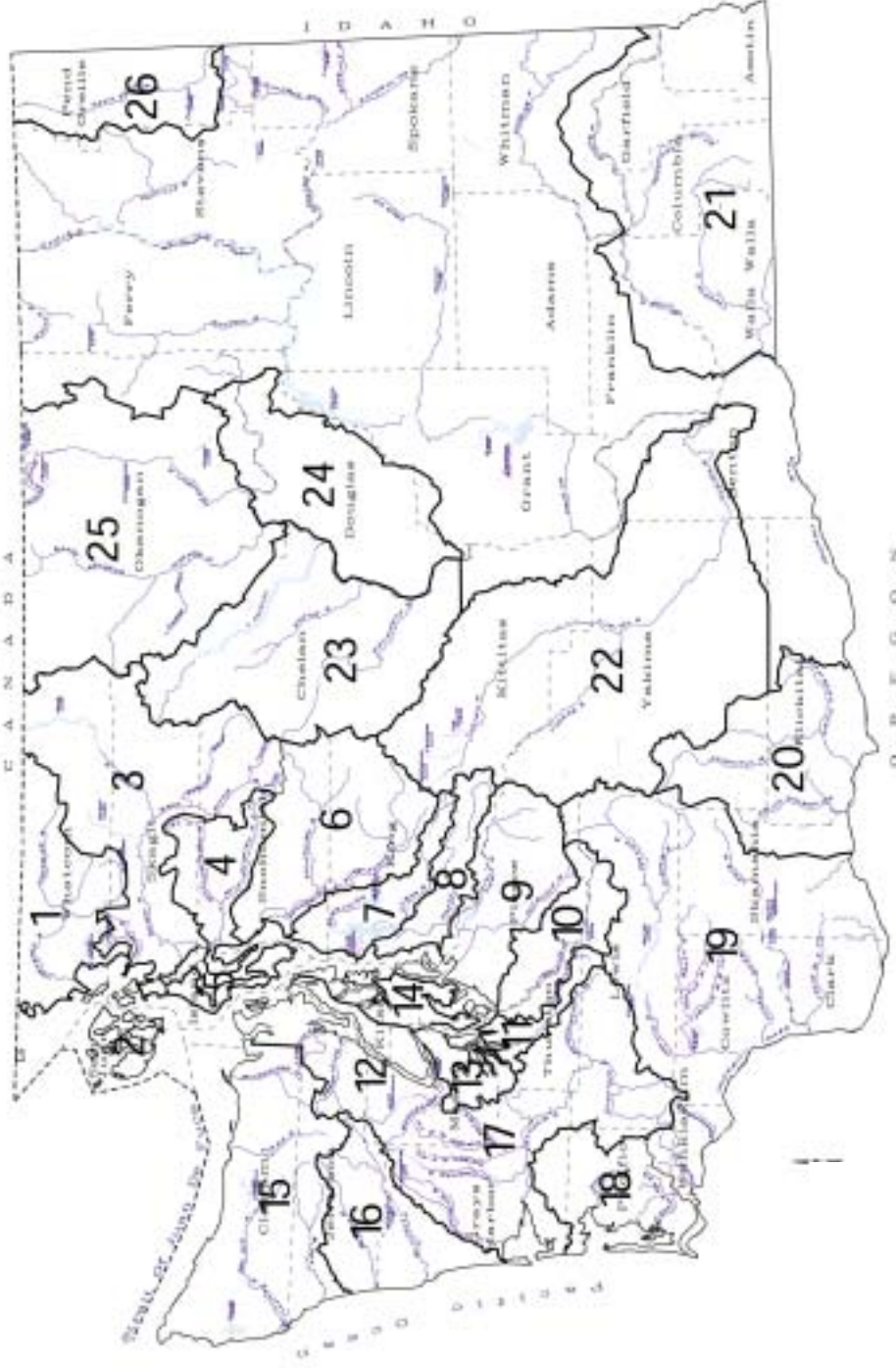
Natural habitat is a fundamental requirement for fish and wildlife, and a major focus of attention for the state's salmon recovery efforts.

All of these measures called upon biologists from the Washington Department of Fish and Wildlife (WDFW) to deliver a range of scientific findings and technical services critical to the success of the new recovery effort. Meeting that challenge was a top priority for WDFW in the 1999-01 Biennium.

To ensure that the new Lead Entities and other salmon-recovery organizations received the help they needed, the agency formed a dedicated team of biologists to provide assistance in areas ranging from stream assessment to project planning and implementation. At the same time, a separate team of WDFW biologists was formed to support and monitor key elements of the Forest and Fish Agreement, which incorporates a flexible "adaptive management" approach to timber practices that allows for adjustments in forestry rules as new scientific information becomes available.

By the end of the biennium, the Department was engaged in a range of new partnerships, involving salmon-recovery groups, farmers, foresters, treaty

Washington State Lead Entity Organizations (2001)



Lead Entity Organizations

- | | | | | | | | |
|---|---------------------------------------------------|----|---------------------------------|----|------------------------------------|----|------------------------------------------|
| 1 | Whatcom County | 7 | King County (WRIA 8) | 14 | Kitsap County | 20 | Klickitat County |
| 2 | San Juan Conservation District | 8 | King County (WRIA 9) | 15 | North Olympic Peninsula LE | 21 | Snake River Salmon Recovery Board |
| 3 | Skagit Watershed Council | 9 | Pierce County | 16 | Quinalt Indian Nation | 22 | Yakima River Basin Salmon Recovery Board |
| 4 | Snohomish County and Stillaguamish Trice (WRIA 5) | 10 | Nisqually River Salmon Recovery | 17 | Grays Harbor County | 23 | Chelan County |
| 5 | Island County Public Works | 11 | Thurston Conservation District | 18 | Pacific County | 24 | Foster Creek Conservation District |
| 6 | Snohomish County (WRIA 7) | 12 | Hood Canal Coordinating Council | 19 | Lower Columbia Fish Recovery Board | 25 | Okanogan County and Colville Tribe |
| | | 13 | Mason Conservation District | | | 26 | Pend Oreille Conservation District |

tribes, irrigators, local governments and other state and federal agencies. In all of these efforts, WDFW's chief contribution was the scientific and technical expertise provided by Department biologists from a wide range of disciplines.

In addition to supporting these new initiatives, the agency maintained its commitment to protect and restore fish and wildlife habitat through ongoing programs and activities administered by the WDFW Habitat Program. As administrator for the state's hydraulics code, WDFW reviewed thousands of projects for compliance with state environmental laws while streamlining permitting requirements for critical transportation projects. Other sections within the Habitat Program took the lead in correcting major barriers to fish passage, ensuring adequate mitigation for hydroelectric projects and responding to oil spills in state waters.

The Habitat Program's 1999-01 operating budget totaled \$22.6 million, of which \$15.58 million came from the State General Fund. The remain-

Habitat Program Funding and Personnel, 1999-01 Biennium						
(dollars in thousands)						
Division	GF-S		OTHER FUNDS		TOTAL	
	Funding	FTEs	Funding	FTEs	Funding	FTEs
Administration	\$1,325	11	\$358	2	\$1,683	13
Environmental Services	\$2,676	18	\$1,256	8	\$3,932	26
Major Projects	\$811	6	\$1,355	12	\$2,166	18
Environmental Restoration	\$2,433	16	\$1,311	9	\$3,744	25
Habitat Science Team	\$96	1	\$250	13	\$346	14
Regional	\$6,364	48	\$1,446	18	\$7,810	66
SSHEAR	\$1,846	11	\$1,054	1	\$2,900	12
Belated Claims	\$26	--	--	--	\$26	--
TOTAL	\$15,577	111	\$7,030	63	\$22,607	174

der came from other state, local and federal funds. The Program's 174 FTE staff members are spread among the Department's headquarters in Olympia and six regional offices, where they provided direct services to landowners, treaty tribes, fishers and conservation groups as well as state, local and federal governments.

Whether processing hydraulic permits, surveying forest lands or supporting locally based salmon-recovery groups, employees of the WDFW Habitat Program have been active partners in the statewide effort to protect and restore fish and wildlife habitat.

WDFW makes support for Lead Entities a top priority

Recognizing the critical role Lead Entities would play in the future of salmon recovery, WDFW made their success a top priority for the agency in the 1999-01 Biennium. WDFW assistance for the new network of local organizations was coordinated directly through the Office of the Director, which received \$2.45 million in state funding to support their operations during the biennium.

In addition to providing scientific and technical support for regional projects, WDFW also helped to reinforce the new salmon-recovery network in other ways. Recognizing, for example, that effective communication would be critical to the new regional recovery effort, WDFW established the Lead Entity

Advisory Group (LEAG) to foster ties among Lead Entities, between Lead Entities and state agencies, and between Lead Entities and the Salmon Recovery Funding Board.

WDFW also played a major role in expanding the network of Lead Entities during the 1999-01 Biennium by helping to create four new ones to serve previously unrepresented areas of the state. The new Lead Entities include the San Juan Conservation District, the Foster Creek Conservation District, the Pend Oreille Conservation District and the Yakima River Basin Salmon Recovery Board.

Watershed Stewardship Team

WDFW served as a source of scientific and technical expertise for local watershed-restoration activities long before the Salmon Recovery Act was passed into law in 1998. Department habitat biologists had been working since 1990 with 14 established Regional Fisheries Enhancement Groups (RFEs) to help these volunteer organizations make the most of their efforts to restore streambank vegetation, replace fish-blocking culverts, plant salmon carcasses to provide key nutrients and a variety of other activities. Habitat Program staff also worked one-on-one with individuals seeking Hydraulic Project Approval (HPA) for specific projects, with citizen volunteers and with local governments seeking to comply with state environmental and growth management laws.

But the new network of local salmon-recovery organizations established by HB 2496 in 1998 represented a new level of commitment by both the state and WDFW. In the 1999-01 Biennium, the newly created Salmon Recovery Funding Board distributed \$92 million to fund 510 salmon-recovery projects recommended by local Lead Entities throughout the state. To help these groups make the most of that funding, WDFW re-directed existing staff to form the Watershed Stewardship Team (WST), comprised of 14 biologists assigned to provide technical assis-

tance to Lead Entities, RFEs and local watershed groups in disciplines ranging from salmon biology and habitat restoration to project administration and community relations.

As part of that effort, WST members helped Lead Entities, RFEs and other local watershed groups to:

- Develop strategies for improving and restoring habitat within given watersheds.
- Review, prioritize and select projects for proposed funding.
- Develop recovery plans.
- Review Limiting Factors Analyses on 26 watersheds to assess their potential for salmon recovery.
- Make presentations to landowners and volunteer groups.
- Find the services needed from WDFW, whether from habitat biologists, fish management staff, agency engineers, instream flow specialists or other professional staff.

In addition to providing support for established Lead Entities, WDFW also helped to create four new ones to serve previously unrepresented areas of the state. The 26 Lead Entities in existence by the end of 2001 included 13 counties, five conservation districts, three tribes and five non-profit watershed-restoration groups.

Regional Fisheries Enhancement Group Boundaries



Environmental Restoration

While the Watershed Stewardship Team was created to provide front-line technical support for Lead Entities and other local salmon recovery groups, team members and the organizations they serve routinely draw on expertise throughout the Department. A major source of that expertise is the Habitat Program's Environmental Restoration Division, which has a staff of 80 biologists, engineers, welders, heavy equipment operators

and other specialists experienced in all types of habitat-restoration projects.

Throughout the Biennium, the Department's Environmental Restoration Division responded to hundreds of calls for assistance from salmon recovery groups, local governments and landowners on issues ranging from stream hydrology to engineering. The division also offered dozens of training sessions on conducting fish passage inventories and assessments attended by representatives of local resource recovery groups, local governments, conservation districts, treaty tribes, fishing groups and others.

Meanwhile, division staff continued work on a number of high-priority projects that support state, local, and federal initiatives to maintain and restore wild salmonid populations and their habitat. Since the mid-1980s, the division has worked with the Washington State Department of Transportation (WSDOT) to correct or replace 64 highway culverts, opening up hundreds of miles of salmon habitat. It has also worked with irrigators to screen water diversions – mostly in eastern Washington – that can present a hazard to migrating salmon. Work completed by the division within the 1999-01 Biennium includes:



"Hanging culverts" like this one present a major barrier to fish passage and are being replaced through a partnership with the Washington Department of Transportation.

- Completion of 25 major fish passage projects, including replacement of inadequate culverts and restoration of former stream reaches. These projects were conducted in cooperation with WSDOT, county governments and others.
- Fabrication and installation of 15 major irrigation diversion screens to protect salmon in eastern Washington streams, where water is diverted for agricultural purposes.

WDFW projects aim to boost salmon survival

Two projects completed by the WDFW Environmental Restoration and Engineering divisions illustrate the Department's focus on improving salmon habitat and correcting barriers to fish passage during the 1999-01 Biennium.

Deepwater Slough

In the fall of 2000, WDFW in concert with the U.S. Army Corps of Engineers and the Skagit System Cooperative completed a major part of a renovation project at the Skagit Wildlife Area, opening up 250 acres of prime estuarine habitat to juvenile salmon on the south fork of the Skagit River. The Deepwater Slough project, which involved breaching or removing some 14,000 feet of dikes and shoring up others, is expected to substantially improve survival rates for young

Skagit River chinook and coho salmon while also protecting a popular hunting area against flooding.

Ballard Locks

For years, salmon smolts suffered high mortality rates at the Ballard Locks in Seattle when they were drawn into the facility's barnacle-encrusted piping system as the locks filled with water. In the summer of 2000, WDFW took action to solve this problem through a joint effort with the U.S. Army Corps of Engineers, the National Marine Fisheries Service, the Muckleshoot Tribe and local governments. Four "smolt slides" were installed, allowing young salmon to bypass the lock chambers and avoid being drawn into the constricted pipes. Initial indications are that fish fatalities have dropped substantially, and WDFW continues to monitor the long-term success of the project.

- Inventory of fish passage and screening problems in three WDFW Wildlife Areas, on Jefferson County-owned road crossings, on road crossings owned by WSDOT in six Water Resource Inventory Areas and in several watersheds in the Skagit and Olympic Peninsula of Washington.
- Inspection of 470 fishways and 140 screens on an annual basis, with followup maintenance on 80 fishways and 40 screens.

The division also maintained the statewide fish passage database, which is used to store information about fish passage barriers that is used by WDFW, Lead Entities and other state agencies and organizations. Among its many purposes, the database serves as a foundation for prioritizing remedies for fish-passage barriers.

Technical Guidelines

Accurate, helpful information is critical to the success of habitat protection and restoration projects, whether the work is undertaken by individual landowners, local governments, regional recovery groups or others involved in the recovery process. During the 1999-01 Biennium, WDFW worked to expand its existing archive of technical guidelines to provide the best available science to project managers throughout the state.

PHS Program

Since it was first created in 1989, the WDFW Priority Habitats and Species (PHS) Program has served as the principal means for disseminating technical information about fish, wildlife and their habitat needs to the public. During the 1999-01 Biennium, PHS staff produced and distributed more than 8,000 copies of the *Priority Habitats and Species List*, which identifies priority species and habitats, 5,000 state-of-the-art GIS maps which display the locations of those species and more than 7,000 copies of *Management Recommendations for Washington's Priority Habitats and Species*.

One section of the management guidelines has become a virtual handbook for local officials in developing ordinances for riparian areas, and was hailed by the Seattle University Law Review as a

prime example of “best management practices” in that area. In addition, PHS information was used to screen thousands of Forest Practices Applications, Hydraulic Project Approvals and State Environmental Policy Act reviews during the biennium. A majority of Washington’s cities and counties used PHS information to develop ordinances consistent with the Growth Management Act and PHS also was used to guide statewide oil spill prevention and response efforts.

Aquatic Habitat Guidelines

In 1999, as more organizations and individuals were becoming involved in salmon recovery, the Governor’s Statewide Salmon Recovery Strategy called on WDFW and two other agencies to develop a series of new technical guidelines that lay out best practices for recovery projects. Throughout the 1999-01 Biennium, WDFW worked with the state departments of Ecology and Transportation – joined by the U.S. Army Corps of Engineers in 2001 – to develop a practical set of guidelines that employ an integrated approach to marine, freshwater, and riparian habitat protection and restoration.

Draft guidelines on four topics initially identified were completed in mid-2001 and have been posted on WDFW’s Aquatic Habitat Guidelines website (<http://www.wa.gov/wdfw/hab/ahg/>). Those drafts, which are scheduled for publication in early 2002, include: *Fishway Guidelines for Washington State*, *Fish Passage Design at Road Culverts*, *Fish Protection Screen Guidelines for Washington State*, and *Integrated Streambank Protection Guidelines*. Development of a fifth and final guideline, *Stream Habitat Restoration and Channel Design*, was initiated late in the biennium and is scheduled for publication in the summer of 2002.

In addition, seven papers identifying possible future guidelines were completed. They include *Marine Overwater Structures*, *Freshwater Overwater Structures*, *Treated Wood Issues*, *Marine and Estuarine Shoreline Modifications Issues*, *Channel Design*, *Ecological Issues in Floodplain and Riparian Corridors*, and *Marine Dredging*. WDFW white papers on *Water Crossings* and *Freshwater Sand and Gravel Removal* were scheduled for completion in the fall of 2001.

Forests & Fish Agreement

Forestry has long been a mainstay of Washington's economy, but cutting timber can also have significant impacts – both positive and negative – on fish, wildlife and their habitat. Concerned about declining salmonid populations and the growing number of forested streams with impaired water quality, WDFW joined with timberland owners, environmental groups, treaty tribes, local governments, and other state and federal agencies in 1997 to propose changes to state forest practice rules that provide greater protection for aquatic and riparian habitat on non-federal forest lands.

Participants in the negotiations outlined their recommendations in the *Forests and Fish Report*, which was adopted into law (ESHB 2091) by the state Legislature in June of 1999. The landmark accord sets higher standards for logging practices and road maintenance over the next 50 years, while also ensuring that forest landowners receive the technical support they need to comply with the new rules. It also includes an “adaptive management” provision, which allows for adjustments in forestry rules as new scientific information becomes available.

Having played a major role in negotiating the accord, WDFW dedicated nine staff members to help implement its provisions during the 1999-01 Biennium. Key contributions include:

- **Policy development:** Through its new position on the Forest Practices Board and its involvement as a key stakeholder, WDFW participated throughout the biennium in developing guidelines for specific forest practices consistent with legislation. These guidelines include provisions for stream buffers, channel migration, forest roads, unstable slopes, slash clearing, streamside management and other forest practices that affect habitat for fish and wildlife.
- **Scientific research:** A cornerstone of the Forests and Fish agreement was the concept of “adaptive management,” which allows for adjustments in forestry rules as new scientific information becomes available. The chief scientist for WDFW's Habitat Program co-chairs the Cooperative Monitoring, Evaluation and Research panel, which oversees all research conducted

under the Forests and Fish Agreement, WDFW also initiated several key studies to evaluate the effectiveness of the new forestry rules in protecting aquatic habitat.

- **Technical assistance:** During the 1999-01 Biennium, WDFW habitat biologists assessed hundreds of culverts and other fish-passage barriers on forest lands, identifying dozens in need of correction. They also worked with the state Department of Natural Resources (DNR) to review forest road maintenance and abandonment plans, and helped to develop a single application for projects that require a Forest Practices Permit from DNR and Hydraulic Project Approval (HPA) from WDFW. The Department was also working on a matrix that cross-references all water-related forest-practice rules with hydraulics rules to determine where integration is possible.
- **Landowner assistance:** WDFW biologists worked one-on-one with forest landowners – particularly those with small properties – to develop plans to meet habitat-protection objectives on a site-specific basis. This type of assistance was a key provision of the original agreement, and WDFW dedicated staff to meet this commitment. The goal is to meet resource-protection requirements while providing flexibility for individual landowners.

Regulatory Services

Besides working to restore habitat for fish and wildlife, WDFW also administers two regulatory programs designed by the state Legislature to prevent or mitigate further damage to the environment. In the 1999-01 Biennium, the Regulatory Services section of the Habitat Program gave advice and took action on thousands of projects governed by the State Environmental Policy Act (SEPA) and the Hydraulic Project Approval (HPA) programs, providing recommendations to agency staff and property owners throughout the state.

SEPA and HPA

WDFW is one of several state agencies responsible for reviewing projects under SEPA, which was adopted into law in 1971 to ensure that environmental values and natural science receive consideration in any project or



Weirs installed at Goldsborough Creek create a gentle cascade where an aging wooden dam formerly presented a formidable barrier to migrating fish. Project partners included WDFW, the Army Corps of Engineers and Simpson Timber.

activity that may have an impact on the environment. During the 1999-01 Biennium, WDFW made 220 determinations of environmental significance or non-significance under the SEPA law and reviewed hundreds of other proposals. The number of formal determinations was down slightly from the previous biennium, when WDFW took action on 250 proposals.

The state's Hydraulic Code, which became law in 1949, was specifically designed to protect the state's fish resources. The code requires a permit – a hydraulic project approval (HPA) – from WDFW for any project that will “use, divert, obstruct or change the natural flow or bed of any of the salt or fresh waters of the state.”

During the 1999-01 Biennium, WDFW reviewed more than 8,000 project proposals for impacts to fish and fish habitat and approved approximately 6,000 HPAs, all of which included measures to eliminate or mitigate those impacts. The number of HPAs issued reflects a decrease of approximately 25% from the previous biennium, due primarily to WDFW's efforts to streamline the permit process without sacrificing protection of the resource. For example, WDFW distributed more than 5,000 pamphlet HPAs outlining rules and procedures for small-scale mining activities in streams during the course of the biennium. Individuals who comply with the standards set forth in the pamphlet are not required to obtain an individual HPA permit. Similar programmatic approaches to HPAs

have been developed to address projects involving beaver dams, removal of debris adjacent to culverts and maintenance of fishways and boat ramp access.

As population growth encroaches into the remaining areas of suitable fish habitat, project reviews and mitigation requirements have become increasingly complex. Thus, while the number of HPAs declined from earlier years, workload pressures on agency staff remain high – particularly in the Puget Sound and coastal regions.

Streamlining Transportation Permits

Transportation is a vital component of Washington's economic health, but roads, bridges and other transportation projects can significantly affect the state's fish and wildlife resources. Pursuant to Engrossed Senate Bill 6188, WDFW worked during the 1999-01 Biennium to facilitate the planning and development of transportation projects while ensuring protection of fish and wildlife habitat.

Two biologists joined the Habitat Program to help streamline the permit process for state transportation projects under ESB 6188, and the Department anticipated adding three additional biologists in the 2001-03 Biennium. The Department's goal is to create an expedited environmental permitting process for transportation projects of statewide significance and streamline the permit process through increased use of programmatic or general permits. This effort is being conducted in cooperation with state and local agencies, Indian tribes, environmental organizations and the business community.

WDFW also assisted the Washington State Department of Transportation (WSDOT) in developing alternative mitigation to offset environmental impacts, and worked with WSDOT and the state Department of Ecology to revise WSDOT's *Highway Runoff Manual* – an effort designed to streamline transportation projects with stormwater considerations.

In addition, WDFW liaisons have been able to help resolve disputes on individual projects between regional staff from both agencies, including the Highway 202 bridge over the Snoqualmie River where such efforts allowed WSDOT to meet its work schedule. Up-front reviews by WDFW of such projects as I-405 in eastern King County and I-104 in Kitsap County have also helped to head off potential conflicts between the two agencies.

Major Projects

There are nearly one thousand dams of various types in Washington State, ranging in size from the massive hydroelectric dams on the Columbia River to small irrigation dams no more than a few feet high. While most of these structures serve a useful purpose, many also present a significant barrier to the migration of native salmon.

WDFW has little direct control over most dams and other energy projects, but it does provide scientific recommendations to the Federal Energy Regulatory Commission and other federal agencies that license them. During the 1999-01 Biennium, the Major Projects section of the Habitat Program provided technical guidance on more than 150 energy projects, including hydroelectric dams, water supply and flood control dams, combustion gas turbine plants, petroleum pipelines, natural gas pipelines, nuclear projects and wind farms.

Consistent with its responsibilities under state law, WDFW recommended ways to avoid, minimize or compensate for damage to fish, wildlife and their habitat from energy facilities and other major development. Significant accomplishments of the Major Projects section during the 1999-01 Biennium include helping to secure:

- Help to renegotiate an agreement in 1999 with PacifiCorp to remove Condit Dam from the White Salmon River in 2006. This project, which involves the largest dam scheduled for removal in the nation, will open up 25 miles of spawning habitat for salmon;
- Congressional approval for \$5 million in fish passage improvements at Wynoochee Dam, including fish screens and a fish-bypass system;
- Improved instream flows below Cushman Dam for steelhead, coho, chinook and sea-run cutthroat;
- 1,100 acres of wildlife mitigation land associated with the Lewis River Project, involving Merwin, Yale, and Swift dams;
- A new license for the Nisqually Project that includes 3,500 acres of wildlife mitigation land and the release of 500,000 kokanee into the reservoir;



WDFW biologists and volunteers net fish stranded during a major stream renovation project on Goldsborough Creek in Mason County. Completed in 2001, the project is expected to open up 14 miles of prime salmon-spawning habitat.

- Improved fish passage at the Ballard Locks in Seattle for steelhead, sockeye, coho, and chinook; and
- A study of the smolt passage problems at the Toutle River Sediment Retention Structure.

WDFW was also one of three major partners in the removal of Goldsborough Dam, an unused, 80-year-old structure in Mason County that blocked passage to 14 miles of ideal spawning habitat upstream. Other partners included the U.S. Army Corps of Engineers and Simpson Timber, the dam's owner, both of which shared in the costs of removing the dam and restoring the stream. The Major Projects section provided state oversight on the project and work was completed – on schedule – in the fall of 2001. Newly rehabilitated, Goldsborough Creek is eventually expected to support an additional 2,000 adult coho salmon, 10,000 chum salmon and hundreds of steelhead and sea-run cutthroat trout every year.

Oil Spill Team

The WDFW Oil Spill Response Team works closely with the state Department of Ecology, the U.S. Coast Guard, and other agencies to mitigate damages to fish, wildlife and their habitats caused by petroleum spills in state waters. Key responsibilities include:

- Conducting 24-hour spill response and management.
- Representing fish and wildlife resources within the state's Incident Command structure.
- Response preparedness through contingency planning and drills.
- Providing expertise and training assistance to petroleum-related industry and businesses.
- Oiled shoreline clean-up.
- Oiled wildlife rescue and rehabilitation.
- Baseline data collection and natural resource damage assessments.
- Spill settlement negotiation and restoration.

During the 1999-01 Biennium, the six-member Spill Team responded to 260 reports of petroleum spills, including the grounding of a barge carrying 2.5 million gallons of gasoline on the Columbia River and the rupture of a pipeline that spilled over 225,000 gallons of gasoline in Whatcom Creek in Bellingham. The Whatcom Creek spill and the fire it sparked was the most serious incident during the course of the biennium, killing three people, burning 25 acres of riparian and mature forest habitat and destroying all terrestrial and aquatic organisms for nearly three miles along the stream.

In the aftermath of the Whatcom Creek spill, the Spill Team conducted a damage assessment and began working with the responsible party and trustees to develop a restoration plan. In all, the Spill Team worked on 75 damage assessment cases during the biennium. Team members also were actively involved in negotiating and approving a variety of restoration projects, including the implementation of the Tenyo Maru Restoration Plan, spartina removal and the purchase of 450 acres of habitat.

There were no catastrophic spills off the Washington coast of the magnitude of the Nestucca spill in 1988 or the Tenyo Maru spill in 1991, when thousands of oiled seabirds died. However, the Spill Team did help coordinate wildlife rescue efforts following several smaller spills. In one spill near Port Angeles, oiled birds were collected, treated, rehabilitated, and released back to the wild.

As a step toward improving the state's wildlife rescue capabilities, the Spill Team completed a pre-design study of an "Oiled Wildlife Rescue Center" in conjunction with the Washington Wildlife Rescue Coalition. The team also continued efforts to develop partnerships with local, state, public and private entities for funding of the center.

Habitat Science

Reversing decades of habitat losses for fish and wildlife requires more than just dedication and hard work on the part of biologists, engineers, landowners, administrators and volunteers. At a time when watershed groups throughout the state are competing for limited funding and resource policies can affect entire communities, decision-makers need to rely on hard science, not hunches or good intentions.

Many critical resource-management issues addressed during the 1999-01 Biennium rely on information provided by the Science Division within WDFW's Habitat Program. With 14 FTE staff, the division coordinated a variety of research activities, many integral to the state's salmon-recovery effort.

One major research effort initiated during the biennium will provide the scientific foundation for the "adaptive management" provision of the Forests and Fish Agreement. Another helped local planning units establish stream flows to ensure sufficient water for fish passage, while a third has led to the development of a map-based GIS database to help decision-makers prioritize salmon-recovery projects in local watersheds. In addition, division staff helped to oversee the development of a WDFW Corporate Data System, used to manage natural resources across the state.

Adaptive Management

A cornerstone of the Forests and Fish Agreement was the concept of "adaptive management," which allows for adjustments in forestry rules as new scientific information becomes available. This requires managers to identify uncertainties about impacts to natural resources from timber harvests, then prioritize research projects to address questions and coordinate those projects.

The chief scientist for WDFW's Habitat Program co-chairs the Cooperative Monitoring, Evaluation and Research (CMER) panel, which oversees all research conducted under the agreement. Other CMER stakeholders include the state departments of Ecology and Natural Resources; the National Marine Fisheries Service, the U.S. Fish & Wildlife Service and the Environmental Protection Agency; treaty tribes, the timber industry and environmental organizations.

Two WDFW scientists with approximately \$400,000 in state grants coordinated several research projects designed to clarify issues with a bearing on the "adaptive management" provision of the Forests and Fish Agreement. They include studies to determine:

- Hydrological characteristics of non-fish-bearing streams, which will influence the development of rules governing timber harvests and the protection of these streams.
- Minimum basin sizes needed to form a stream with perennial flow, which has a bearing on timber harvests near streams that may provide habitat for amphibians.
- The value of seep habitat to amphibians at the headwaters of streams.
- Growth potential of trees in various types of soil, which affects buffer distances needed around different streams.
- The effectiveness of timber harvest rules in keeping water temperatures cool enough to support bull trout.

Some of these studies are expected to show results by the end of 2002, while others will take more time. Four to eight seasonal employees and several work-study students assisted in these research efforts during the 1999-01 Biennium.

Instream Flow

The purpose of the instream flow section of the Habitat Program's Science Division is to determine how water flows in streams affect fish habitat, and to provide technical assistance in establishing instream flows to watershed management planning units and other entities working to manage water, stream flow, and fish habitat. During the biennium, 1.5 FTE staff members:

- Conducted instream flow studies in the Walla Walla, Chehalis, and Cowlitz river basins.
- Provided technical guidance on instream flow studies conducted for watershed management planning in the Samish and Nooksack basins.
- Conducted reconnaissance instream flow evaluations of the San Juan Islands (WRIA 2).
- Provided technical presentations to watershed management planning units for the northwest Olympic Peninsula (WRIA 19 and 20); Elwha River, Morse Creek, and Dungeness River; Columbia Gorge (WRIA 29 and 30); and the Walla Walla, Colville, and Pend Oreille basins.
- Provided technical assistance in discussions leading toward Habitat Conservation Plans for mid-Columbia tributaries, including the Methow River system.
- Conducted a field study in the Quilcene River to validate and extend study done earlier.
- Coordinated with the Instream Flow Council, an international organization of instream flow specialists, to develop guidelines for managing instream flows.
- Worked with hydroelectric utilities to resolve instream flow and ESA fish passage issues on the Cowlitz River.
- Began research to integrate riparian land use, water quality (temperature), and instream flow concerns.

SSHIAP Database

In the realm of GIS data systems, Habitat Program scientists in cooperation with tribal co-managers continued development of a map-based fish and aquatic habitat database to assist in salmon recovery. The system created by the Salmon and Steelhead Habitat Inventory and Assessment Project (SSHIAP) provides a digital representation of streams and rivers in Washington, including information about stream gradients, blockages and known fish populations.

Throughout the biennium, fish and habitat data were collected and assembled for 30 of Washington's 62 Watershed Resource Inventory Areas (WRIAs), with current efforts focused in the lower Columbia River for use in recovery planning of listed salmonids.

Stream Map Created from SSHIAP Data



SSHIAP data will help identify and prioritize areas across the state for salmon recovery projects, thus ensuring effective expenditure of public funds. Contributors to the data collection include the Washington State Department of Transportation, State Conservation Commission and Puget Sound tribes.

Habitat Research Publications

The publications that follow are a sampling of research projects published by WDFW Habitat Program staff members during the 1999-01 Biennium.

Vadas, R.L. Jr., and D.J. Orth. 2001. Formulation of habitat-suitability models for stream-fish guilds: do the standard methods work? *Transactions of the American Fisheries Society* 130: 217-235.

Hayes, M.P., C.A. Pearl, and C.J. Rombough. 2001. *Rana aurora aurora*: Movement. *Herpetological Review* 32(1):35-36.

Bull, Evelyn; and M.P. Hayes. 2001. Post-breeding movements of Columbia spotted frogs (*Rana luteiventris*) in northeastern Oregon. *Western North American Naturalist* 61(1):119-123.

Altman, R.; M.P. Hayes, R.D. Forbes, and S.D. Janes. 2001. Chapter 10: Wildlife communities of westside grassland and

chaparral. In D.H. Johnson and T. O'Neill (editors), *Habitat-Species Relationships of Oregon and Washington*, Oregon State University Press. [Book chapter]

Kennedy, P. G. and T. Quinn. 2001. Understory Plant Establishment on Old-Growth Stumps and the Forest Floor in Western Washington. *Forest Ecology and Management*. (In press).

Quinn, T. 2001. Precious Heritage: The Status of Biodiversity in the United States. Book Review. *Environmental Practice* 3: 64-65.

Quinn, T., J. Gallie, and D. P. Volsen. 2001. Amphibian occurrence in artificial and natural wetlands of the Teanaway and lower Swauk River drainages of Kittitas County, Washington. *Northwest Science* 75:84-89.

Quinn, T. and D. H. Johnson. 2001. Five cases studies of wildlife modeling applications. In D. H. Johnson and T. O'Neill (Editors). *Wildlife-habitat relationships in Oregon and Washington*. Oregon State University Press, Corvallis.

Roloff, G.J., G.F. Wihere, T. Quinn, and S. Kohlmann. 2001. An overview of models and their role in wildlife management. In D. H. Johnson and T. O'Neill (Editors). *Wildlife-habitat relationships in Oregon and Washington*. Oregon State University Press, Corvallis. ■

FISH

SALMON, STEELHEAD, CLAMS, oysters, crab, shrimp – these and other finfish and shellfish are an integral part of the history and culture of the Pacific Northwest. Today, as in centuries past, they play an important role in the economy, recreation and cultural identity of Washingtonians and the entire Pacific region. Fish are also a natural wonder in their own right, serving as a barometer of the general health of the state’s aquatic environment.

Commercial fishers harvested nearly 200 million pounds of marine finfish and shellfish during the last two years, supporting thousands of jobs in processing, wholesaling and retailing. The price paid to tribal and non-tribal fishers for that catch – prior to processing or distribution – was approximately \$170 million. Recreational fishers took far fewer fish, but generated significantly more in retail sales on fishing trips and gear throughout the state. According to a study recently published by the National Marine Fisheries Service, saltwater anglers in Washington state spent well over \$1 billion on fishing trips (e.g. boat rentals, motel accommodations, meals, etc.) in 2000 alone.¹ All these fishing activities make a significant contribution to the state’s economy and help to sustain many communities – both urban and rural – on Puget Sound, the Pacific coast and the Columbia River.

Many finfish and shellfish fisheries are jointly managed by the Washington Department of Fish and Wildlife (WDFW) and Washington treaty tribes, which have a legally established right to catch up to 50% of the allowable harvest within their usual and customary fishing areas. In the 1999-01 Biennium, as in previous years, WDFW worked closely with tribal fisheries managers to establish harvest plans consistent with joint conservation goals for salmon, steelhead, Dungeness crab, shrimp and other marine fish. WDFW’s legislative mandate in managing all marine and freshwater species is to “preserve, protect and perpetuate” fish populations and at the same time to “enhance and improve recreational and commercial fishing in this state.”

Meeting these diverse goals always presents a challenge, but never more so than after the 1999 listing



A WDFW diver has a close encounter with a smallmouth bass in Lake Washington.

of an additional seven salmonid population groupings under the federal Endangered Species Act (ESA) brought a new urgency to salmon management. Other species, from Dungeness crab to zebra mussels, brought challenges of their own. Actions taken by WDFW and the Washington Fish and Wildlife Commission to address these challenges are discussed in this section of the report, along with the status of game and non-game species, hatchery production and annual landings. Key developments in four management areas are summarized below.

- **Salmon:** With new ESA listings as a backdrop, state and tribal co-managers gained federal approval for fishery management plans designed to protect depressed populations while providing fishing opportunities focused on abundant hatchery and wild stocks. Selective salmon fisheries were greatly expanded, requiring anglers to release salmon not visibly marked as hatchery fish in many areas. State hatcheries released somewhat fewer juvenile salmon than in recent years, but salmon recovery programs at some facilities saw record

¹ *The study by the National Marine Fisheries Service (NMFS) estimated that saltwater fishers spent from \$1.2 billion to \$1.6 billion on fishing trips in Washington state in 2000. A previous study issued by the U.S. Fish and Wildlife Service estimated that anglers spent \$710 million on fishing trips in Washington in 1996. The variation in these estimates appears to be due to differences in methodology, rather than major changes in fishing or spending patterns.*

Landings by Commercial Fisheries in Washington*

<i>Species</i>	1999		2000	
	<i>Lbs.</i>	<i>Est. Value</i>	<i>Lbs.</i>	<i>Est. Value</i>
SALMONIDS				
Chinook	2,507,900	\$1,742,800	2,278,900	\$1,819,700
Chum	2,603,800	783,200	3,087,300	1,151,700
Pink	202,800	31,000	1,800	1,600
Coho	1,739,000	870,000	3,725,700	1,722,900
Sockeye	122,400	150,300	3,248,700	3,820,100
Steelhead	260,400	23,300	315,000	32,300
Salmon Eggs	71,400	295,500	115,200	825,400
Total Salmonids	7,507,700	\$3,896,100	12,772,600	\$9,373,700
MARINE FISH				
Sturgeon (White)	144,400	150,800	212,100	251,100
Sturgeon (Green)	16,700	5,900	57,200	19,800
Mixed Shad	96,400	9,700	78,700	9,900
Columbia River Smelt	10,600	27,500	9,900	25,500
Albacore Tuna	4,190,700	3,313,400	6,724,100	5,556,600
Herring	774,700	204,300	532,800	208,400
Anchovy	215,600	66,300	173,400	47,700
Sardines	3,000	1,600	10,674,500	519,400
Silver Smelt	136,200	62,200	143,600	62,100
Pacific Halibut	3,092,500	7,715,200	2,325,300	6,365,100
Sole (General)	24,900	8,500	39,000	12,400
Sole (Dover)	1,770,500	577,000	1,673,900	579,600
Sole (English)	893,900	282,200	1,320,200	408,600
Sole (Petrale)	566,800	545,900	873,700	880,500
Sole (Rex)	48,600	16,500	83,900	29,400
Sole (Rock)	17,100	5,700	32,400	11,000
Sole (Sand)	21,400	14,000	11,800	8,400
Starry Flounder	185,400	40,300	190,900	35,500
Arrowtooth Flounder	6,539,100	625,000	4,594,000	501,600
Sablefish	4,088,000	4,748,500	3,756,600	5,318,300
Lingcod	109,900	60,900	69,000	41,900
Pacific Cod	628,000	265,500	816,900	372,600
Pacific Whiting	20,139,000	752,500	26,799,700	1,022,300
Rockfish	1,004,800	472,200	423,028	204,442
Rockfish (Canary, Red)	262,600	101,800	21,900	10,000
Rockfish (Widow, Brown)	1,130,800	424,000	825,100	360,200
Rockfish (Yellowtail, Green)	1,241,500	444,000	1,891,500	827,400
Pacific Ocean Perch	339,300	129,100	178,500	66,400
Long Spine Thornyhead	70,000	46,200	41,500	32,000
Short Spine Thornyhead	133,300	101,600	103,400	84,800
Pile Perch	23,200	14,200	16,100	11,800
Shark (General)	13,300	1,900	700	200
Spiny Dogfish	1,129,900	166,200	1,428,100	237,100
Thresher Shark	144,300	127,400	98,500	101,600
Skate	369,000	33,900	686,700	47,800
Misc Marine Fish Total	382,700	35,500	106,700	14,400
Total Marine Fish	49,958,100	\$21,597,400	67,015,328	\$24,285,842
SHELLFISH				
Geoduck Clams	4,236,200	16,484,500	3,448,900	15,254,600
Native Littleneck Clams	87,200	62,600	62,500	47,300
Razor Clams	0	0	69,600	84,100
Manila Clams	761,900	1,111,000	684,400	1,023,800
Pacific Oyster	98,800	243,800	93,300	268,500
Octopus	3,400	2,100	2,500	1,500
Dungeness Crab	19,025,800	37,447,800	17,758,900	36,306,500
Coon Stripe Shrimp	68,400	66,700	76,000	73,300
Spots Shrimp	252,700	1,078,700	278,400	1,434,200
Side Stripe Shrimp	16,400	12,200	13,000	9,900
Pink Shrimp	3,746,200	1,610,400	5,061,100	1,950,300
Sand or Ghost Shrimp	95,300	114,900	107,700	143,000
Crawfish (General)	8,300	14,100	7,200	12,700
Sea Cucumbers	504,400	585,000	605,800	836,700
Red Sea Urchin	342,600	344,900	658,200	504,300
Green Sea Urchin	272,300	261,500	280,800	276,600
Misc Shellfish Total	3,800	2,800	900	800
Total Shellfish	29,523,700	\$59,443,000	29,209,200	\$58,228,100
GRAND TOTAL	86,989,500	\$84,936,500	108,997,128	\$91,887,642

* Includes treaty fisheries and some fish caught outside Washington waters. Excludes imports, aquaculture and invoices.

adult returns in 2001. The 1999 salmon harvest was the lowest on record, but fishing improved significantly in 2000 in most areas and showed even greater promise in 2001, a year that began with a record return of spring chinook to the Columbia River and a strong run of coho off the coast.

- **Freshwater fish:** The Department increased the number of catchable-size trout planted in lowland lakes from 2.3 million in 1999 to 3 million in 2001, and the introduction of large “triploid” trout proved to be especially popular with anglers. With funding provided by the state Legislature The Meseberg Warmwater Fish Hatchery became fully operational and WDFW significantly expanded its youth sport fishing program. Bull trout and naturally spawning steelhead populations in the mid-Columbia River were listed under the ESA in 1999, and WDFW worked throughout the biennium with tribal, federal and local management entities to facilitate their recovery.
- **Shellfish:** Responding to growing fishing pressure on a number of key species, WDFW and the Washington Fish and Wildlife Commission took action to protect the resource and ensure orderly fisheries. The first harvest quotas were established for Dungeness crab in Puget Sound, and pot limits were instituted for commercial fisheries on the coast. Recreational crabbers were also required, for the first time, to record their catch on a catch record card to facilitate better monitoring of the catch. The Puget Sound commercial shrimp fishery was converted to limited entry status in 2000, and the Commission established daily bag limits for previously unregulated species such as shore crabs, marine snails and sea slugs. A major investigation by the WDFW Special Investigations Unit into the geoduck clam industry resulted in charges against a Canadian fish buyer and new commitments by state and tribal fisheries co-managers to monitor the harvest more closely.
- **Marine fish:** The Fish and Wildlife Commission banned bottom trawling within three miles of the Washington coast to provide additional protection for black rockfish, flat fishes and immature marine fish. In Puget Sound, the bag limit for rockfish was reduced to one fish per day and two new no-fishing marine reserves were established to serve as “natural hatcheries” for groundfish populations. At the same time, the

Commission opened the first commercial sardine fishery in nearly 50 years after surveys revealed steady growth in sardine populations off the Washington coast.

In all of these decisions, WDFW and the Commission relied on the best available science to strike a balance between the agency’s dual mandate to protect the resource and to improve recreational and commercial fishing in this state. In the case of salmon fisheries, new mass-marking techniques, coded wire implants, otolith markings and other scientific innovations provided the Department with the information needed to direct fisheries toward abundant stocks while protecting those in decline. Research on new types of fishing gear showed promising results for making commercial salmon fisheries more selective. For Puget Sound crab fisheries, seasons were restructured in 2000 when field studies revealed that the molting season, when crab are in a vulner-



A WDFW shellfish biologist collects oyster samples in the tideflats of Willapa Bay.

able, soft-shelled condition, varies considerably from area to area. In these and other areas, science set the course for fisheries management by WDFW and the commission.

The WDFW Fish Program is responsible for preserving and perpetuating all game fish, food fish, shellfish, unclassified marine aquatic species, aquatic pests and for managing all fish culture activities for the agency. The program is organized into four divisions: Hatcheries, Fish Management, Science and Administrative Operations. The largest of the five programs within WDFW, the Fish Program had an operating budget of \$113.1 million in the 1999-01 Biennium, supporting the work of 787 FTEs. Program managers coordinated the work of staff located at the agency's Olympia headquarters and at six WDFW regional offices throughout the state.

Fish Program Funding and Personnel, 1999-01 Biennium

(dollars in thousands)						
Division	GF-S		OTHER FUNDS		TOTAL	
	Funding	FTEs	Funding	FTEs	Funding	FTEs
Administration	\$3,746	20	\$1,287	8	\$5,033	28
Science	\$3,194	37	\$12,158	88	\$15,352	125
Hatcheries	\$17,303	114	\$38,964	226	\$56,267	340
Fish Management	\$13,078	110	\$23,332	184	\$36,410	294
TOTAL	\$37,321	281	\$75,741	506	\$113,062	787

Major support for the Fish Program's operations was provided by the WDFW Intergovernmental Resource Management Group, which took the lead in developing policies involving treaty tribes, other states and nations, and the federal government. The IRM worked closely with the Fish Program and a variety of other partners to implement salmon-recovery plans consistent with the ESA, develop co-manager harvest plans for finfish and shellfish, and address other intergovernmental issues. Fish Program staff also worked closely with the Habitat Program, both in policy development and in the field, to protect fish in their ocean environment and in watersheds throughout the state.

SALMON

WHEN LEWIS AND CLARK REACHED the confluence of the Columbia and Snake rivers in 1805, a member of their party wrote with astonishment of the "large quantities of sammon" [sic] being harvested by native people. Before and since that historic expedition, salmon have played an integral role in the commerce, recreation and cultural identity of the people of the Pacific Northwest. Salmon are an economic mainstay for coastal communities, a focal point for tribal life and an important food source for a broad range of birds, mammals and other fish.

For these and other reasons, salmon present one of the biggest management challenges of any fish or wildlife species in North America. Nearly 300 indigenous salmon populations and nearly 200 hatchery stocks return to Washington's waters every year, each with its own biological and legal requirements. Management of these fish is shared between WDFW and treaty tribes, which are legally entitled to catch up to 50% of all harvestable salmon in usual and

customary fishing areas. As in previous years, WDFW worked in conjunction with tribal fisheries managers to determine annual run sizes, establish harvest levels and develop management plans for this shared resource.

Looming over these and other management decisions was the 1999 listing of seven additional groupings of naturally spawning salmon and steelhead populations – including Puget Sound chinook – under the federal ESA. Although state and tribal co-managers had been working for years to protect and recover depressed wild runs, the new listings brought a new level of complexity to the job of managing salmon populations and fisheries. Under the ESA, the co-managers were required to seek federal approval for any activity – including fisheries, hatchery operations or research – that may affect even one member of a listed population. For hatcheries, alone, WDFW filed 128 Hatchery Genetic Management Plans with the National Marine Fisheries Service detailing the potential impacts of

specific programs on listed populations and laying out plans to minimize these impacts.

In these and other activities, WDFW worked to fulfill its legislative mandate to “preserve, protect and perpetuate” the resource while also maintaining the stability of the commercial fishing industry and maximizing recreational fishing opportunities for the general public. To meet these objectives, state and tribal co-managers carried out a number of new initiatives discussed in this and other sections of the report.

- Mass marking of hatchery salmon prepared the agency to implement selective fishing on a broad scale. Anglers could retain marked hatchery fish, but were required to release unmarked salmon in certain areas. (See section titled “Salmon Harvest.”)
- State hatcheries produced millions of fish for harvest, while continuing to restructure their operations to help recover wild salmon populations. Several recovery projects showed significant results in the 1999-01 Biennium. (See section titled “Hatcheries.”)
- WDFW played a key role in a statewide effort to restore salmon habitat by providing scientific and technical assistance to Lead Entities, Regional Fisheries Enhancement Groups (RFEs) and other local salmon-recovery organizations. (See section titled “Habitat.”)
- Research focused on new methods of marking and identifying salmon from various runs. New types of selective commercial fishing gear were tested that appear to significantly reduce the mortality of released salmon. (See section titled “Salmon Research.”)
- WDFW established a Marine Division to improve enforcement of new fishing regulations, including selective fishing rules. (See section titled “Enforcement.”)



A female chinook salmon is captured on the Green River as a step toward measuring spawning escapement.

The 1999 salmon fishing season marked the lowest statewide catch on record – due partly to new fishing restrictions, but mostly to poor freshwater and ocean conditions that resulted in meager returns. In 2000, landings increased substantially, reflecting improvements in environmental conditions that may mark the beginning of a new period of greater productivity.

Complete catch statistics for 2001 are not yet available, but runs of coho, pink and chum salmon were generally strong from Puget Sound to the Columbia River. In the spring of that year, a record run of upper Columbia spring chinook salmon yielded a catch of 26,000 fish, the largest harvest of that stock since 1973.

At WDFW, the Fish Program has an array of management responsibilities for salmon, involving staff in the divisions of Fish Management, Hatcheries and Fish Science. Fishing seasons, long-term management agreements and international treaties for salmon are negotiated by members of the Intergovernmental Resource Management, created by the WDFW director in 1999. The Department’s Enforcement and Habitat programs also play important roles in protecting and recovering salmon populations, as discussed in other sections of this report.

ESA LISTINGS and SALMON RECOVERY

In March 1999, the federal government listed naturally spawning salmon and steelhead populations in seven new areas under the Endangered Species Act (ESA), adding coastal/Puget Sound bull trout to the list in November of that year. The National Marine Fisheries Service (NMFS) also reviewed the status of seven marine fish species within Puget Sound during the 1999-01 Biennium, but none were determined to warrant ESA protection at that time. Georgia Basin Pacific hake remains a candidate species.

The March 1999 listings brought the total number of regions in Washington state where salmon and steelhead were protected under the ESA to 15, with others such as Lower Columbia/Southwest Washington coho and coastal cutthroat trout still pending. Although WDFW had been managing fisheries to protect listed stocks since 1991 when Snake River sockeye were listed as endangered, the new listings posed a major challenge for the state and tribal co-managers in the 1999-01 Biennium.

Under the ESA, federal authorization is required for any activity that might kill or injure (“take”) even one individual in a listed “evolutionarily significant unit” (ESU), a federal designation which can include a number of fish stocks in a specified



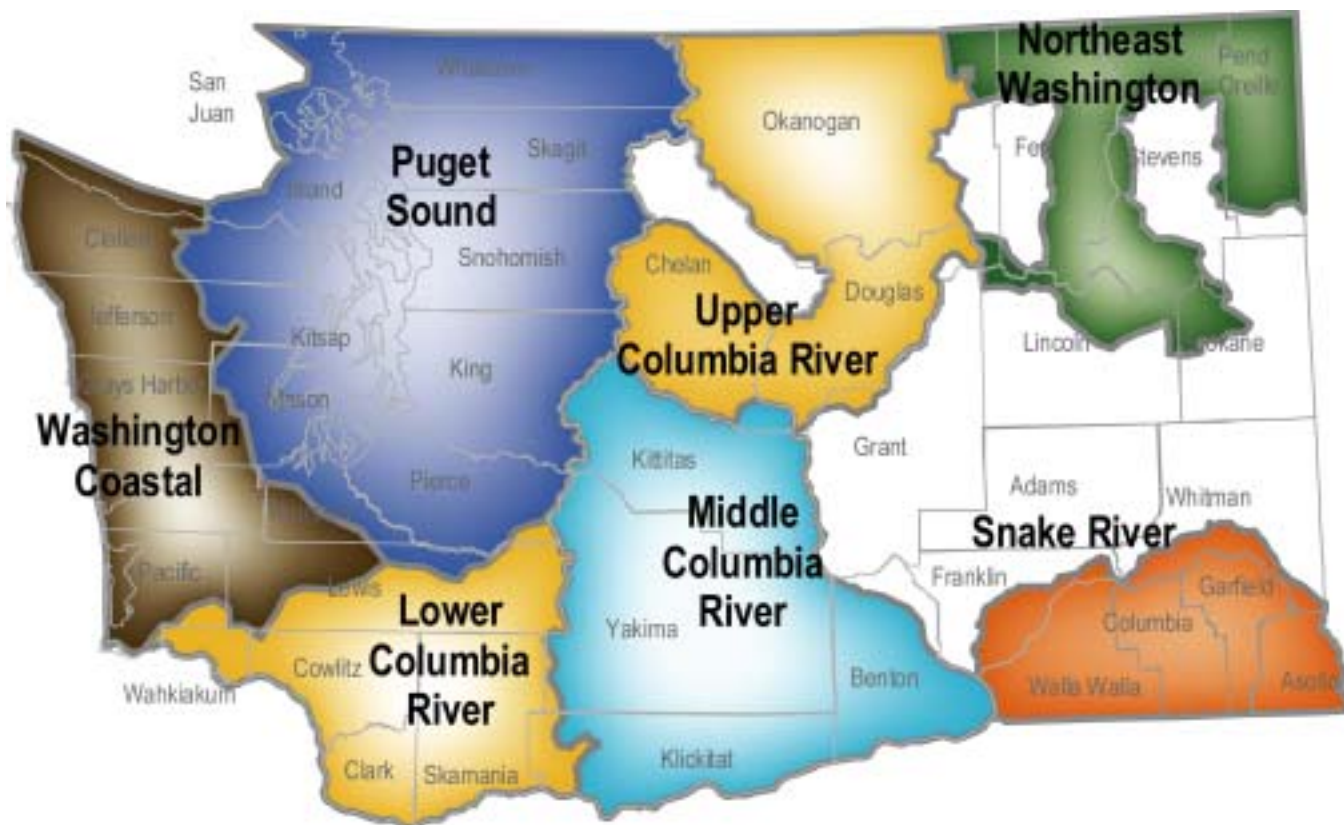
A naturally spawning steelhead takes to the air to clear a barrier at Kalama Falls.

geographical area. For state and tribal co-managers, that means demonstrating that any given fishery, hatchery operation or research activity – whether directed at healthy naturally spawning salmon, hatchery fish or other species – will not inhibit recovery of a listed population.

Nowhere was this challenge more apparent than in the Puget Sound region, where chinook salmon became the first anadromous species in the nation to be listed a major metropolitan area. Encompassing 17 major river systems, 33 state hatchery programs and multiple fisheries, the ESU for Puget Sound chinook salmon extends from the Nooksack River in Whatcom County south to the Deschutes River in Thurston County, including Hood Canal and the eastern part of the Strait of Juan de Fuca. On the Columbia River, new listings of chinook and chum salmon, as well as Mid-Columbia steelhead, left no major tributary without at least one stock listed under the ESA.

None of these listings came as a surprise to state and tribal co-managers, who had been working for nearly a decade to recover depressed stocks in these and other areas. Throughout the 1990s, fishing seasons were dramatically curtailed as co-managers imposed new time, area and gear restrictions to protect weak runs. Beginning in 1996, WDFW and some treaty tribes began mass-marking hatchery-produced salmon, setting the stage for today’s selective fisheries in which naturally spawning fish can be identified on sight and released. Hatchery operations have also been modified to reduce interactions with wild runs and a third of WDFW’s salmon hatchery programs have been redesigned specifically to facilitate their recovery.

Although “take” prohibitions did not go into effect for most of the new listings until September 2000 or later, state and tribal co-managers communicated with representatives of the National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS) throughout the biennium to determine how activities under state and tribal jurisdiction would have to be modified to comply with the ESA. While some changes in fisheries and hatchery practices were made to accommodate federal concerns in 2000 and 2001, most were an extension of efforts begun in previous years. As recovery plans progress, further changes to fisheries, hatcheries and habitat programs are expected.



Washington Salmonids and the ESA

Population groupings listed, proposed for listing, or candidates for listing as of December 2001

Chinook Salmon

- Puget Sound chinook listed as threatened 3/24/99
- Lower Columbia River chinook listed as threatened 3/24/99
- Upper Columbia River spring run chinook listed as endangered 3/24/99
- Snake River spring/summer chinook listed as threatened 4/22/92
- Snake River fall chinook listed as threatened 4/22/92

Chum Salmon

- Hood Canal/Strait of Juan de Fuca summer chum listed as threatened 3/25/99
- Columbia River chum listed as threatened 3/25/99

Sockeye Salmon

- Lake Ozette sockeye listed as threatened 3/25/99
- Snake River sockeye listed as endangered 11/20/91

Coho Salmon

- Puget Sound coho designated as candidate for listing
- Lower Columbia/SW Washington coho designated as candidate for listing

Steelhead

- Lower Columbia River steelhead listed as threatened 3/19/98
- Middle Columbia River steelhead listed as threatened 3/25/99
- Upper Columbia River steelhead listed as endangered 8/18/97
- Snake River steelhead listed as threatened 8/18/97

Bull Trout

- Coastal/Puget Sound bull trout listed as threatened 11/1/99
- Columbia River bull trout listed as threatened 6/10/98

Cutthroat Trout

- SW Washington/Columbia River coastal cutthroat proposed for listing as threatened 4/5/99

The Summer Chum Salmon Conservation Initiative

Co-managers develop comprehensive approach to salmon recovery

The Washington Department of Fish and Wildlife (WDFW) and Point No Point Treaty tribes released the “Summer Chum Salmon Conservation Initiative” in April of 2000, making it the first comprehensive regional conservation plan for a federally protected salmon population in western Washington. Summer chum stocks were listed as “threatened” under the Endangered Species Act (ESA) in March 1999, although their numbers had been increasing in recent years due to joint efforts by the state, the tribes, local citizen enhancement groups and the U.S. Fish and Wildlife Service.

State and tribal co-managers released the summer chum plan with the expectation that it would serve as the blueprint for bringing summer chum salmon on Hood Canal and the Strait of Juan de Fuca back from the brink of extinction. The plan was also sent to the National Marine Fisheries Service (NMFS), which is responsible for adopting recovery plans for salmon species listed under the ESA.

In developing the recovery plan, the state and tribal co-managers examined factors contributing to the decline in summer chum numbers, including harvest levels, hatchery practices, habitat, and other factors, and then developed specific recommendations to address each issue.

Efforts to reduce the catch of summer chum had been under way since the early 1990s, when the number of returning salmon plummeted to just a few thousand fish from as many as 75,000 in the mid-1970s. Starting in 1992, WDFW and the tribes carefully directed fisheries away from summer chum and reduced the “incidental” chum catch during other fisheries to extremely low levels.

To rebuild weak stocks and repopulate streams where summer chum are now extinct, fish are produced from eggs taken from naturally spawning stocks at five local “supplementation” projects on Hood Canal and three on the Strait of Juan de Fuca. The state and tribes have also made significant changes in hatchery practices for other salmon and trout species to avoid producing fish that might compete with wild summer chum.

To help improve habitat conditions for chum salmon, the plan recommended a variety of measures, including new restrictions on logging, bulkheads and other development, for each affected watershed. These recommendations were directed to a variety of jurisdictions, since the authority to protect and improve salmon habitat rests with a variety of local, state and federal governing bodies.

In the spring of 2001, the harvest management portion of the Summer Chum Salmon Conservation Initiative was accepted by the National Marine Fisheries Service as a recovery plan for summer chum salmon under section 4(d) of the ESA. In the fall of 2001, NMFS accorded the same ESA recovery plan status to the hatchery supplementation portion of the initiative.

As resource managers, the state and tribes exert direct control over the harvest and hatchery elements of the summer chum recovery plan. Harvests of summer chum have been substantially curtailed, with generally less than 10% of the returning fish being harvested in incidental fisheries conducted for other species. These low harvest rates have primarily resulted from time and area closures during periods of adult summer chum presence.

The resulting increased escapements have contributed to a pattern of generally increasing runsizes. Compared to the low point of 1,514 total returning summer chum in 1993, recent returns have improved substantially, with 5,103 and 10,375 fish returning in 1999 and 2000 respectively.

The supplementation of wild summer chum stocks using hatchery techniques has been extremely successful. Two supplementation projects initiated in 1992 (Big Quilcene River and Salmon Creek) are showing consistently strong returns, and a stock at high risk of extinction (Lilliwaup Creek) achieved a return of over 100 summer chum in 2001 as a result of supplementation efforts. Finally, two streams where summer chum had become extinct (Chimacum and Big Beef creeks) have been the sites of re-introduction programs, which successfully resulted in escapements of approximately 900 fish to each stream in the 2001 season.

Permitting Requirements

One major change brought about by the new listings was a significant increase in the amount of documentation required of state and tribal co-managers to conduct their respective management responsibilities. Almost all activities that affect salmonids and/or their habitat require some type of authorization from the NMFS or USFWS. The ESA provides several avenues for obtaining an incidental “take” authorization, which allows fishing for healthy stocks and minimal harvest of listed fish. All require state and tribal fishery managers to estimate the number of listed fish affected by these activities and document the results.

Below is a summary of the “take” exemptions that allowed WDFW to continue its management activities in listed waters during the 1999-01 Biennium.

- **Section 7:** Authorizations under Section 7 are available only where there is a federal government “nexus,” i.e., where a federal agency or tribal government is involved. WDFW has relied on Section 7 incidental take permits for ocean and Puget Sound fisheries established through the Pacific Fisheries Management Council and North of Falcon processes, and for Columbia River fisheries managed by joint state/tribal plans established under *U.S. v. Oregon*.
- **Section 10:** This section of the ESA allows permits to be issued for fisheries, scientific research or efforts to enhance the propagation or survival of listed species. WDFW has sought Section 10 permits to cover a number of fisheries, hatchery operations and research projects, particularly in areas with endangered listings.
- **Section 4(d):** In areas with threatened (but not endangered) species listings, this section of the ESA allows NMFS and USFWS to develop specific rules and exemptions for each listed ESU. NMFS defined 13 types of activities that can be exempted from the take prohibitions, provided certain criteria are met. These include provisions for harvest, hatchery, and research activities, as well as joint state/tribal management plans.
- **Hatchery Genetic Management Plans (HGMP):** The NMFS Section 4(d) rule identifies a take exemption for hatchery operations under an approved HGMP, which requires a thorough analysis of the effects of those operations on listed stocks. WDFW filed a total of 128 HGMPs with federal agencies during the 1999-01 Biennium, covering hatchery operations ranging from net pens in south Puget Sound to full-production facilities on the Columbia River.
- **Fisheries Management Evaluation Plans (FMPE):** The NMFS 4(d) rule also identifies a take exemption for harvest plans consistent with an approved FMPE. This approach may allow a longer-term authorization than is generally available through mechanisms such as Section 7. During the 1999-01 Biennium, WDFW submitted FMPEs to NMFS for the Lower Columbia tributaries, the Mid-Columbia tributaries and the Snake River and its tributaries.
- **Research Activities:** WDFW submitted more than 50 research projects to NMFS under this section of the 4(d) rule during the 1999-01 Biennium. Projects ranged from studies of juvenile salmon out-migration to research on how marine mammals and seabirds affect salmon populations.
- **Joint State/Tribal Resource Management Plans:** WDFW and tribal co-managers were already working on recovery plans for Puget Sound chinook and Hood Canal Summer chum salmon when those populations were listed under the ESA in 1999. The harvest components of the Summer Chum Salmon Conservation Initiative and the Comprehensive Chinook Plan for Puget Sound were approved by NMFS under the 4(d) rule during the 1999-01 Biennium. The harvest component of the Comprehensive Chinook plan was approved for a two-year interim period, through April, 2003. Additional elements of the plans, such as hatchery practices and habitat actions, have yet to be authorized by NMFS.

WDFW filed for a number of “take” exemptions based on the 4(d) rules established by NMFS in the following categories:

Local and Regional Planning

While fisheries and hatchery operations are largely the province of state and tribal co-managers, protection and restoration of salmon habitat is a responsibility shared with local governments and all of the citizens in a listed ESU. Integration of these various elements into a comprehensive recovery plan is the

focus of a number of local and regional salmon recovery efforts involving WDFW throughout the state.

As discussed in the Habitat section of this report, the Department played a key role in local recovery actions by providing technical support for Lead Entities and for established Regional Fisheries Enhancement Groups. These groups focused on habitat restoration projects within individual watersheds throughout the state.

In addition, WDFW participated in a number of forums designed to integrate these and other efforts into broad-scale, regional recovery plans. During the 1999-01 Biennium, NMFS established three Technical Recovery Teams (TRTs), responsible for developing recovery goals and monitoring standards for listed ESUs throughout the state. Comprised of six to nine scientists from both inside and outside government, the three TRTs began that process for listed populations in the Puget Sound area, the lower Columbia River and the mid- to upper Columbia River.

In developing recovery goals, TRTs are required to consider state and local strategies, and WDFW has been a major participant in that process in all areas of the state. For the Puget Sound region, the Comprehensive Chinook Plan and Summer Chum Salmon Conservation Initiative provided a starting place for the TRT's discussion about regional recovery goals as well as a roadmap for WDFW's own activities. There and elsewhere, the agency has been involved in several other regional planning efforts, also designed to dovetail with the TRTs' goal-setting mission. They include:

- **Lower Columbia Fish Recovery Board:** Created by state law in 1998, the Board include 15 representatives from city and county government, the Legislature, the Cowlitz Tribe, hydro-system operators, private landowners, the environmental community and concerned citizens. The Board's activities include assessing factors responsible for the decline of salmon and steelhead, participating in the development and implementation of the habitat portion of a recovery plan, coordinating other recovery planning efforts, and approving recovery projects and programs.

- **Puget Sound Salmon Forum:** The Puget Sound Salmon Forum is a non-profit organization created to implement the Shared Strategy for Puget Sound Salmon Recovery. The objective of the Shared Strategy is to connect existing efforts into a comprehensive recovery plan that integrates habitat, harvest and hatchery programs for the achievement of specific goals for fish populations in Puget Sound. The Strategy describes steps to be taken in development of a regional recovery plan. The Forum has been providing support and policy direction to scientists on the Puget Sound TRT and State/Tribal technical teams as they develop recovery goals for Puget Sound chinook.
- **Upper Columbia Fish Recovery Board:** Formed in 2000, the Board is working to develop a regional strategy for habitat protection and restoration in support of salmon recovery. The Board's Oversight Committee includes representation from Chelan, Douglas and Okanogan counties, the Yakama Nation and Confederated Colville Tribes. The full Board also includes cities, public utility districts, conservation districts, irrigation districts and others.
- **Snake River:** The Asotin Conservation District sponsored establishment of a Lead Entity in 1998 to develop salmon recovery project proposals for the state Salmon Recovery Funding Board. Representation includes Asotin, Garfield, Columbia and Walla Walla Conservation Districts; the Nez Perce and Umatilla tribes, the Washington Farm Bureau, WDFW, the state Department of Ecology, Regional Fisheries Enhancement Groups, the U.S. Forest Service, the Natural Resource Conservation Service, the Governor's Salmon Recovery Office and area citizens. NMFS and USFWS have also been invited to participate as work moves toward development of a regional biological strategy for habitat protection and restoration.
- **Yakima/Central Columbia:** A new Lead Entity has formed in the Yakima Basin during the 1999-01 Biennium with the support and participation of all 24 cities, three counties and the Yakama Nation. Currently, the new board is focusing on the identification and prioritization of salmon habitat projects and the development of a regional strategy for the Yakima Basin.

SALMON HARVEST

In 1999, a total of 900,000 salmon of all species was caught in commercial, recreational and tribal fisheries statewide, the lowest catch on record. Poor returns of most runs, combined with a range of new fishing restrictions designed to minimize impacts on stocks listed under the Endangered Species Act (ESA), depressed overall harvest levels in Puget Sound, the Pacific coast and the Columbia River.

In 2000, statewide harvest levels doubled to 1.75 million fish, reflecting improvements in both freshwater and ocean rearing conditions that benefitted salmon populations throughout the state. Although landings in 2000 were still well below the 1981-90 average of 8.6 million fish per year, the outlook for 2001 salmon fisheries indicated a better year ahead. Just two months before the close of the biennium, anglers harvested 26,000 spring chinook during a record return on the lower Columbia and forecasters accurately predicted the biggest run of coho off the Washington coast since 1985.

As in previous years, salmon seasons for 1999-01 were set through the North of Falcon and Pacific Fisheries Management Council (PFMC) processes, where state fishery managers work with tribal fishery managers, the federal government, other states and the public to design fisheries that achieve specific conservation and allocation goals. With the listing of seven additional salmonid regions under the ESA in March 1999, new federally approved "harvest ceilings" for listed populations placed additional constraints on fishing seasons throughout the biennium.

Tools for Selective Harvest

- Timing of seasons and openings
- Area closures
- Special area fisheries
- Size limits
- Gear restrictions (mesh size, bait, lures)
- Require release (certain species, unmarked fish)
- "New" gear types (beach seines, traps, fish wheels, tangle nets, weirs)

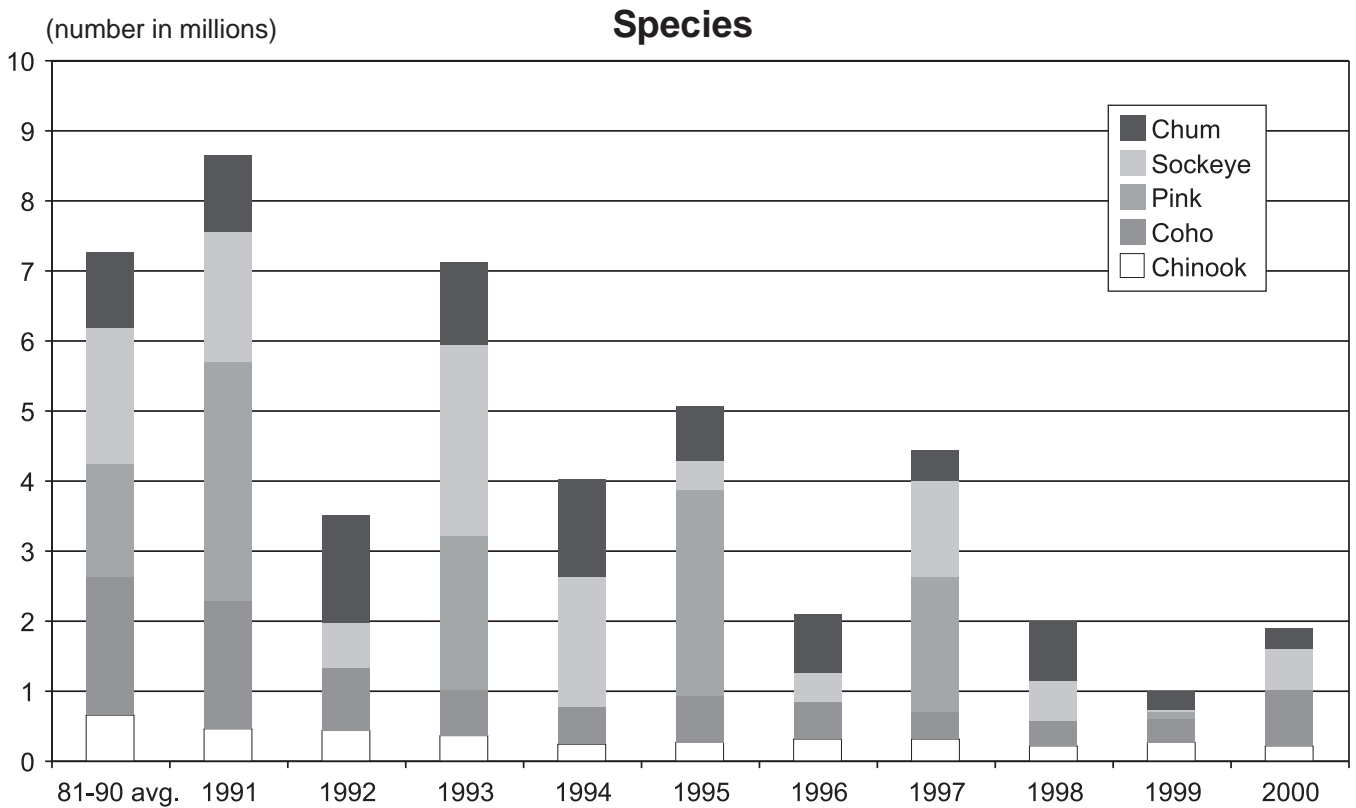
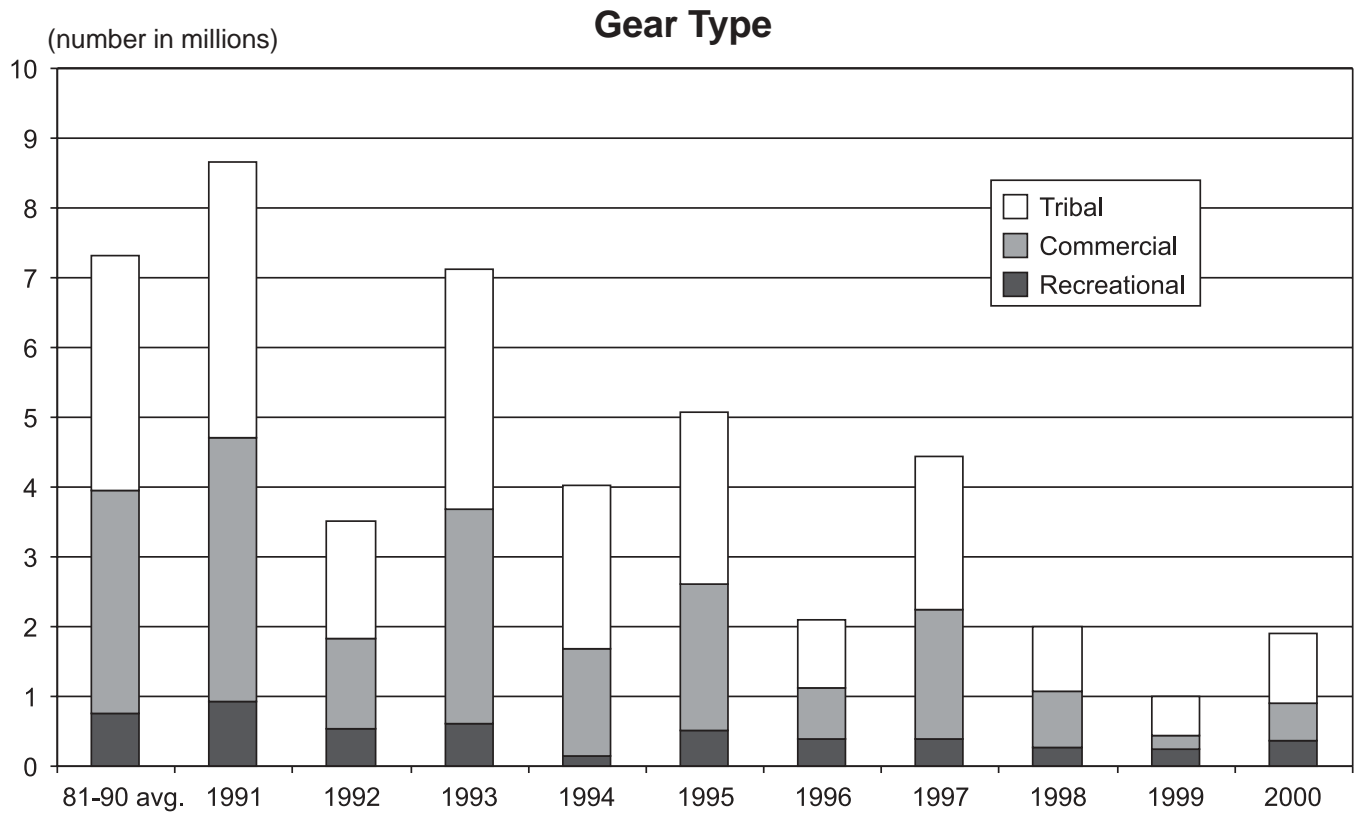


A WDFW biologist demonstrates the proper technique for using a dehooker to release an unmarked coho salmon caught in a selective fishery.

Under the new ESA harvest ceilings, harvest levels for many areas were determined by the potential effect on a listed stock, rather than the general abundance of salmon in those areas. The result was that many healthy wild and hatchery stocks could not be harvested, because the "take" of listed salmon would have likely exceeded allowable impact levels. Although the WDFW had been managing salmon fisheries to protect weak stocks for nearly two decades, the implementation of harvest ceilings for a large portion of the state's salmon fisheries had a significant effect on the overall catch.

As in previous years, WDFW took a number of actions designed to maximize fishing opportunities on plentiful wild and hatchery stocks, while allowing sufficient spawning escapement to maintain healthy runs and recover depressed stocks. New time and area closures were adopted to make fisheries more selective for healthy stocks. New gear

Statewide Salmon Harvest



restrictions were imposed and bag limits were reduced in a number of areas to reduce impacts on depressed and listed stocks, while still providing fisheries on healthy stocks.

But the biggest step toward achieving these goals came as a result of mass-marking hatchery stocks, which allowed for a major expansion of selective fisheries during the biennium. Beginning in 1996, WDFW began clipping the adipose fin of hatchery fish, making them easily identifiable to fishers on the fishing grounds. In the 1999-01 Biennium, for the first time, WDFW was able to develop regulations for a number of major fisheries requiring anglers to release any unmarked, wild salmon they caught.

By 1999, virtually all coho salmon released from state hatcheries in Puget Sound and on the coast were clipped, as were 95% of the coho and 100% of the spring chinook released on the Columbia River. During that year, the entire recreational ocean fishery for coho salmon was selective for hatchery coho, allowing anglers to target hatchery fish while releasing wild, unmarked coho. By 2000, a total of nine recreational marine fisheries and 43 freshwater fisheries had “gone selective” for coho, and the state’s first major selective chinook fishery took place in the Columbia River in the spring of 2001.

Without these selective fisheries, recreational opportunities would have been significantly restricted, affecting both fishers and local economies. Gear trials were initiated in 2000 to test the feasibility of selective commercial fisheries in future years, although expansion of the program may depend on future funding since these new types of commercial fisheries are costly to plan and execute.

Below is a summary of salmon fisheries in Puget Sound, the ocean, coastal bays and rivers, and Columbia River in the 1999-01 Biennium.

Puget Sound Salmon Fisheries

Poor returns of most species, combined with management efforts to minimize impacts on listed stocks, resulted in a record-low salmon harvest in Puget Sound in 1999. The combined catch by commercial,

Marked vs. Unmarked Salmon



A hatchery salmon (top) is easily identifiable by its missing adipose fin.

recreational and tribal fisheries that year totaled 503,500 salmon of all species, increasing to 1.3 million fish in 2000.

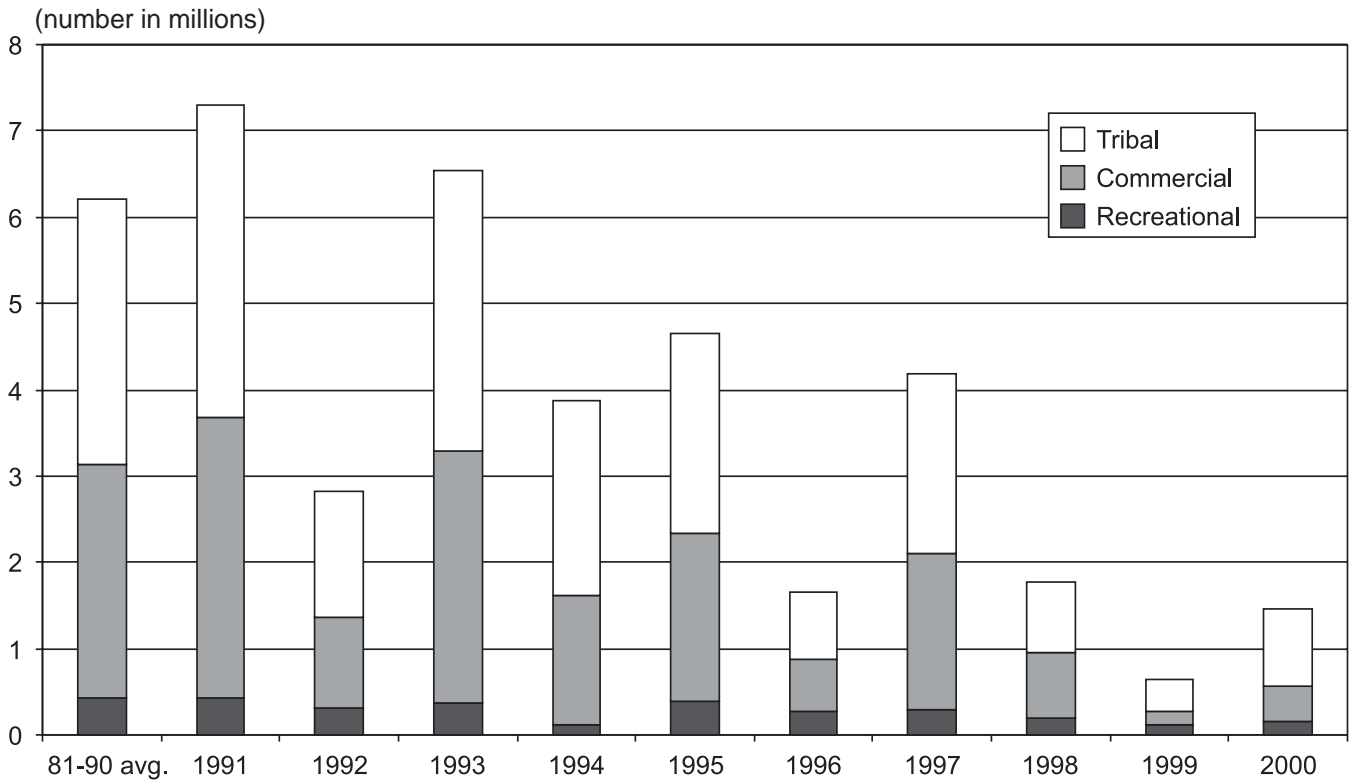
New time and area closures, gear restrictions, selective coho fisheries for anglers in the Strait of Juan de Fuca and a new catch-and-release fishery were just a few of the strategies employed by resource managers to protect depressed stocks and still provide fishing opportunities in Puget Sound. The NMFS reviewed all fishing seasons for compliance with the ESA, and WDFW monitored all commercial and recreational fisheries to the extent funding would allow.

For commercial fishers, the biggest setback of the biennium came in 1999, when an exceptionally weak run of Fraser River sockeye prompted the Pacific Salmon Commission to close the entire fishery that year. Recreational fishers had their share of setbacks, too, but there were also some bright moments. In 2000, Lake Washington was opened to sockeye fishing for only the second time since 1988, drawing thousands of anglers from throughout the region for a 13-day fishery.

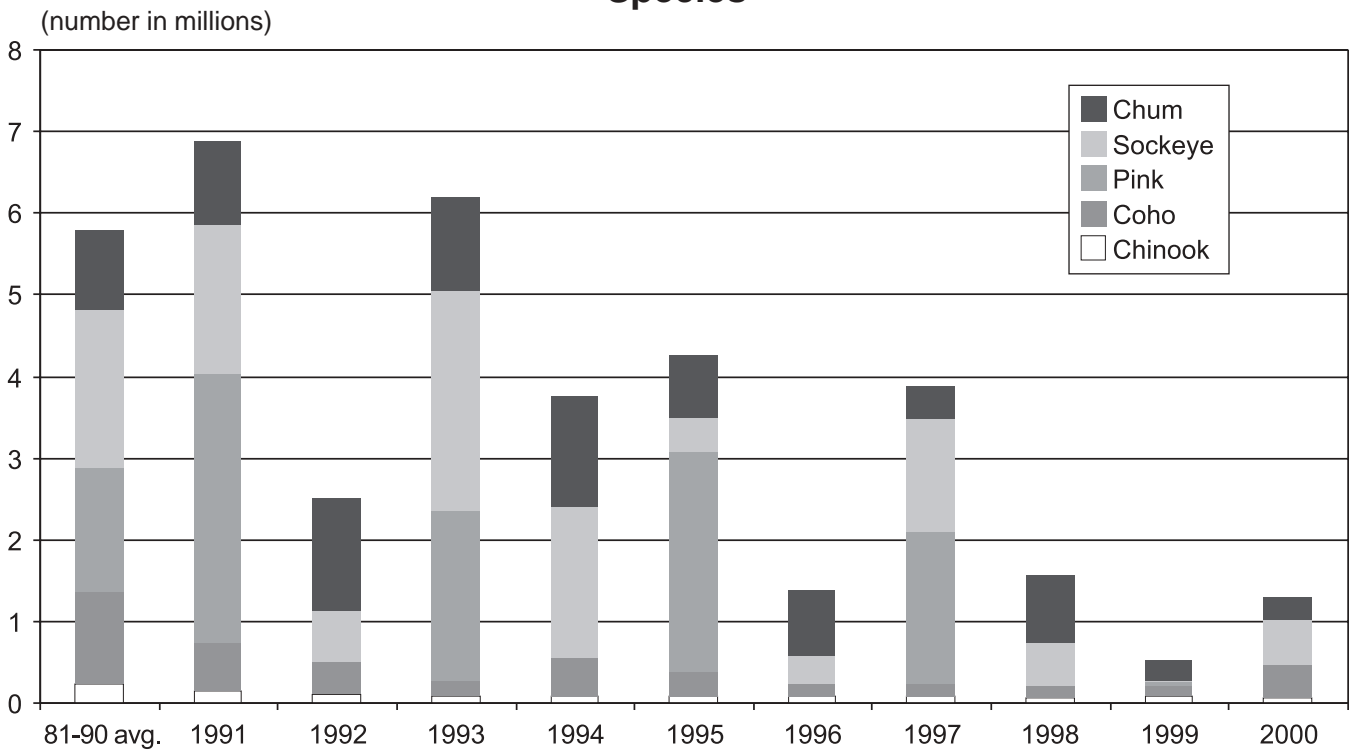
As in other areas, preliminary forecasts for 2001 suggested better prospects ahead for all types of salmon fishing, although most restrictions remained in place to protect listed species and other depressed wild stocks.

Puget Sound Salmon Harvest

Gear Type



Species



Recreational Fisheries

In 1999, anglers caught a total of 116,000 salmon of all species, rising to 207,000 fish in 2000. While run size increased for coho and most other species, fishing restrictions remained in place to protect listed chinook and summer chum stocks.

For most waters of Puget Sound, the recreational salmon fishery for each year of the biennium was compressed into two periods to avoid intercepting wild chinook. One period, in summer and early fall, was targeted primarily on hatchery coho. Another, focused on hatchery-produced blackmouth (immature chinook), was generally split between the month of November and a longer opening from mid-February through mid-April. Seasons were open somewhat longer in southern Puget Sound (Catch Areas 11 and 13) where the majority of chinook are from hatchery stocks.

In most areas, anglers were required to release any chinook caught in the summer/fall fishery. During the blackmouth season, the daily bag limit was restricted to one salmon of any species.

WDFW tried several new strategies to control fishing impacts on wild chinook. One involved limiting the amount of weight used to fish for salmon in certain areas, since chinook more frequently are found at greater depth than coho. In Marine Areas 5 and 6 (Sekiu and Port Angeles), fishing was closed within three-quarters of a mile of the shoreline, where the majority of chinook are encountered.

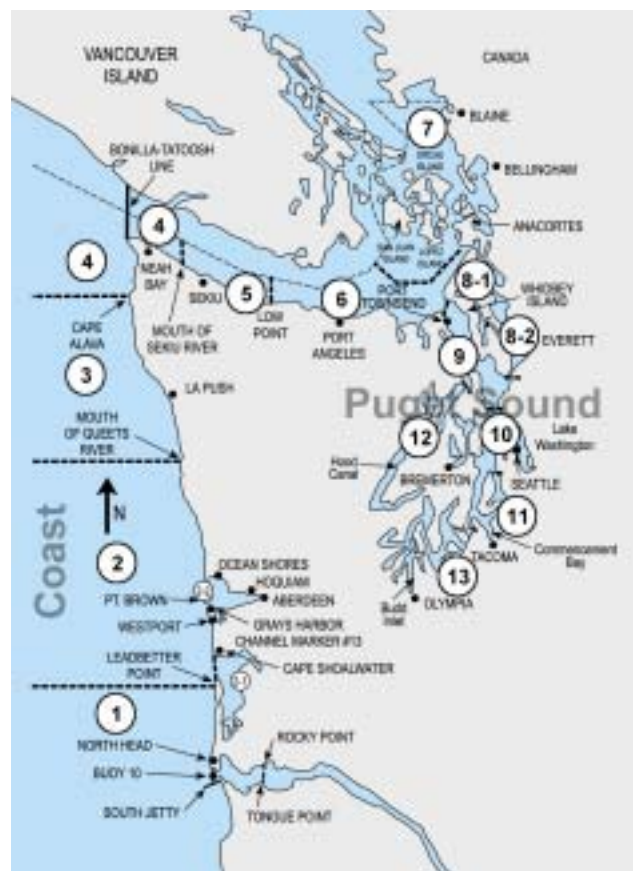
Other zonal fishing closures were timed to protect migrating adult chinook in Bellingham Bay and on the east and south sides of the San Juan Islands. Conversely, a chinook harvest zone was opened in Sinclair Inlet to take advantage of hatchery fish.

Starting in 1999, recreational coho fisheries in the Strait of Juan de Fuca became selective, requiring anglers to release any unmarked coho they caught. These fisheries were designed to reduce exploitation rates on depressed coho stocks such as the Canadian Thompson River coho run, a major issue of concern in negotiations between the United States and Canada. And, for the first time ever in Washington, a catch-and-release salmon season was established in south Puget Sound to provide angling opportunity while minimizing impacts on the resource.

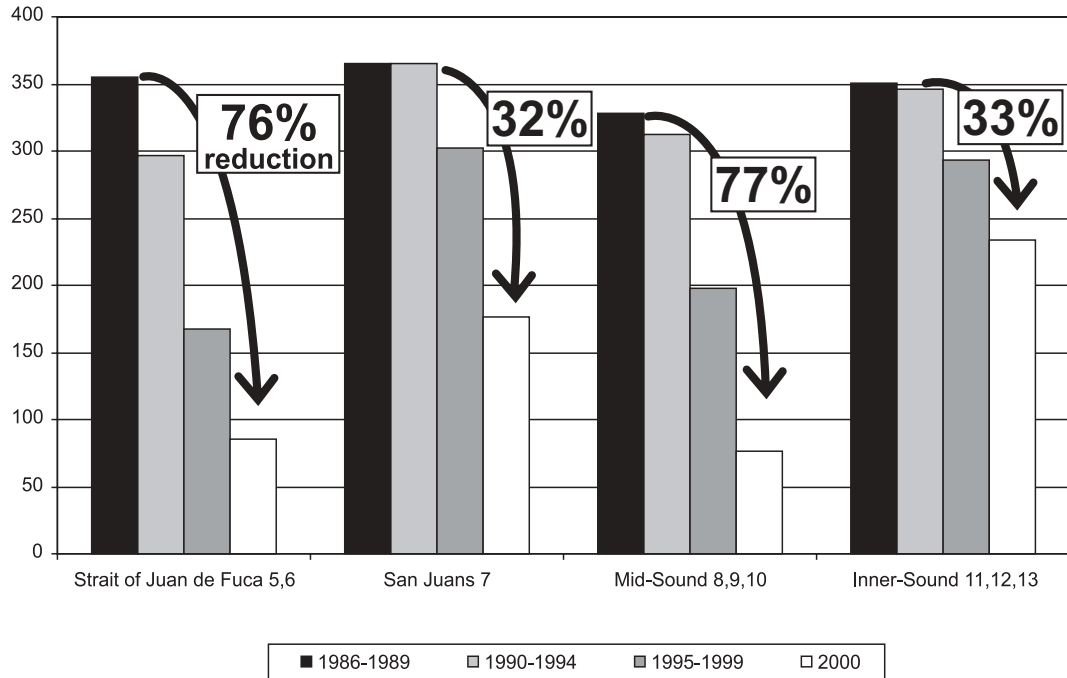
To evaluate the effectiveness of these special regulation regimes, WDFW conducted a number of special studies, involving coded wire tag data and biological indicators as well as basic scientific monitoring of the sport salmon fishery to collect species composition data. The selective fishery in the Strait of Juan de Fuca was intensively monitored to determine fishing encounter rates on-the-water, because many salmon caught in selective fisheries are not brought to the dock where they can be examined by fish checkers. A focused enforcement effort found that 98% of all recreational fishers contacted were in compliance with selective fishing rules.

In addition, a voluntary angler participation study was conducted in 1999 on the genetic origins of chinook in the San Juan Islands sport fishery to determine if there were differences by sub-areas. Another cooperative project in South Sound involved enlisting fly-fishers to maintain records of trips and catch to see if fly-fishing-only regulations in some areas might avoid adult chinook encounters.

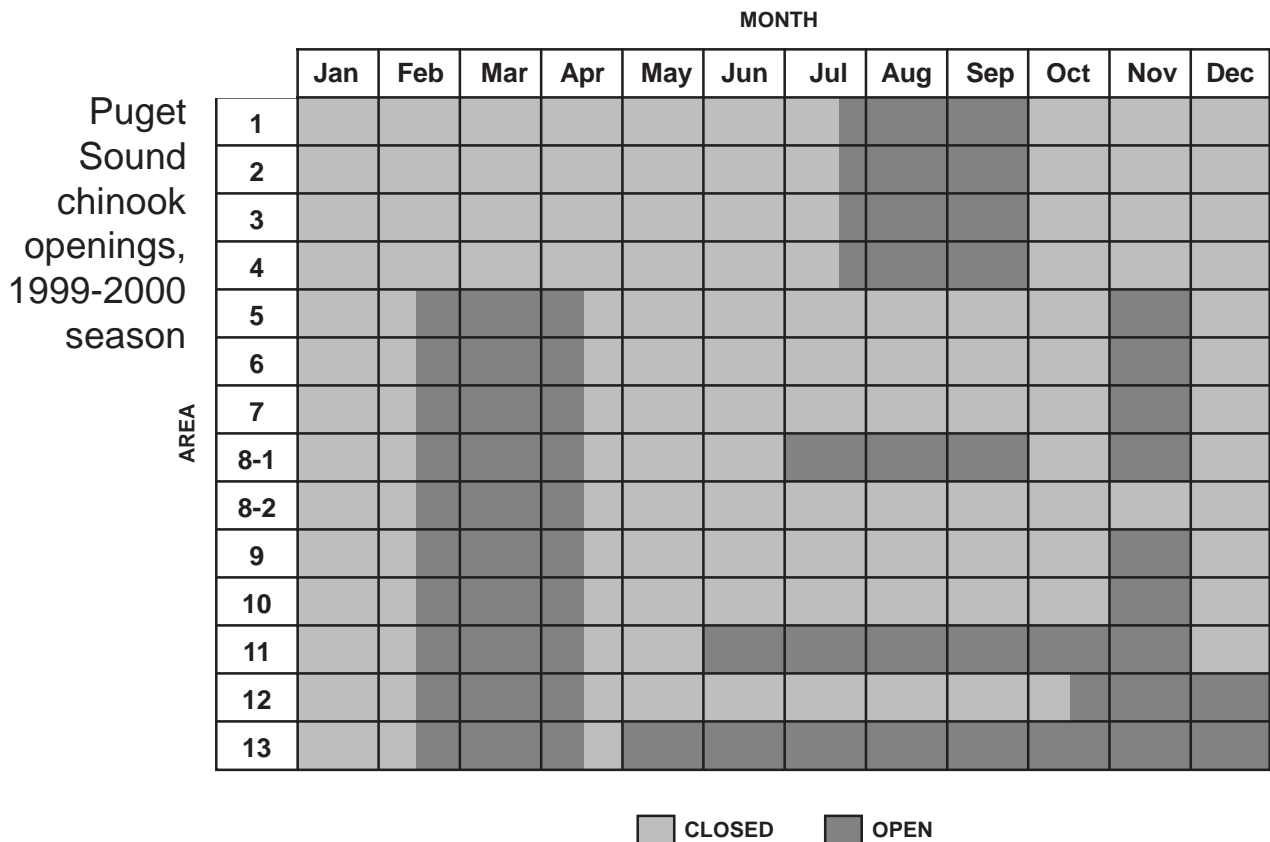
Marine Fishing Areas



Declining Recreational Salmon Fishing Opportunities in Puget Sound



Fewer days open to fishing since 1986



Commercial Fisheries

As in previous years, efforts to control by-catch of non-targeted species continued to play a major role in the management of Puget Sound net fisheries in the 1999-01 Biennium. WDFW implemented a number of new measures – from brailing requirements for seiners fishing for Fraser River sockeye and pink salmon to a ceiling on “chinook encounters” for certain areas and gear types – to minimize by-catch of wild chinook salmon by commercial fisheries during the biennium.

But the single most notable event for commercial fisheries was cancellation of the 1999 Fraser River sockeye season. When a pre-season run forecast 8.2 million Fraser River sockeye was downgraded to 3.3 million, the Fraser River Panel of the Pacific Salmon Commission (PSC) responded by canceling the fishery. Returns to the Chilko River, normally the largest component of the Fraser run, showed the lowest survival rate in 47 years.

Closure of Fraser River sockeye fishing produced a revenue loss estimated at more than \$4.8 million for the non-treaty fleet, and over \$9 million for the combined treaty and non-treaty fishing fleet. Only a small treaty sockeye catch in the Strait of Juan de Fuca occurred before the run was downgraded in size. The 2000 season in PSC waters produced a catch of 230,333 sockeye for non-treaty net fishers.

Cancellation of the Fraser River sockeye fishery was just one setback for reef net fishers, who had no salmon openings of any kind in 1999. The following year, reef netters caught 19,086 salmon, of which 17,957 were sockeye and a small number of coho and chum.

A key objective for management of 1999 Fraser River commercial fisheries was descriptive of the entire Puget Sound commercial salmon program for the biennium: “Minimize impact of chinook by-catch through avoidance of encounters where reasonable, and reduction of associated handling mortalities where practical.” WDFW employed a number of new strategies to meet that goal throughout Puget Sound.

Beginning in 1999, seiners were required to release chinook caught in all Puget Sound fisheries. In 2000, this requirement was extended to coho in most areas of the Sound. Seiners fishing for sockeye and pink

salmon in the San Juan Islands (Areas 7 and 7A) were also required to brail or dip-net their catch to minimize mortality of chinook salmon caught incidental to those fisheries.

In addition, chinook “encounter ceilings” were established for seiners and gillnetters in Fraser salmon fisheries, capping the number of chinook interceptions allowed whether or not they were retained. All net fishers involved in non-treaty Fraser Panel fisheries were required to keep logbooks of salmon by-catch by time, date and area. WDFW used this data to supplement direct by-catch monitoring efforts on the fishing grounds.

Fishing days varied from area to area during the biennium, but generally reflected the downward trend in stock abundances. Strong numbers of pink and sockeye salmon that had helped to sustain the fishery in earlier years were not evident at the close of the decade, and chum salmon catches were also down. The low abundance of chinook and some coho stocks, together with a new Fish and Wildlife Commission policy favoring recreational fisheries for these species, also reduced the commercial salmon harvest.

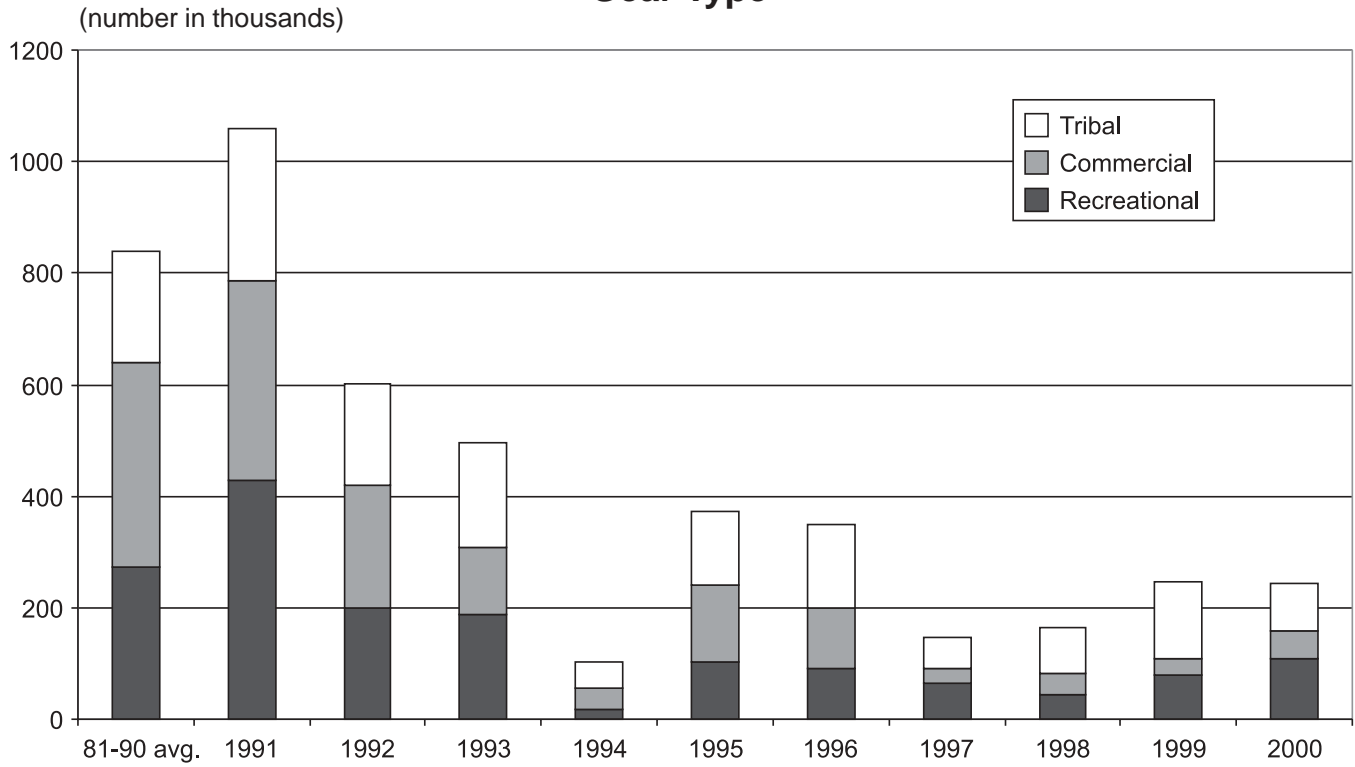
Bellingham Bay was the only area in Puget Sound with a non-treaty commercial net fishery directed at chinook salmon. Primarily a gill-net fishery, the commercial harvest is designed to catch excess fish above the number needed for broodstock at Samish Hatchery. Preliminary data indicate that 9,211 were caught in 1999 and 11,396 in 2000, respectively represent-



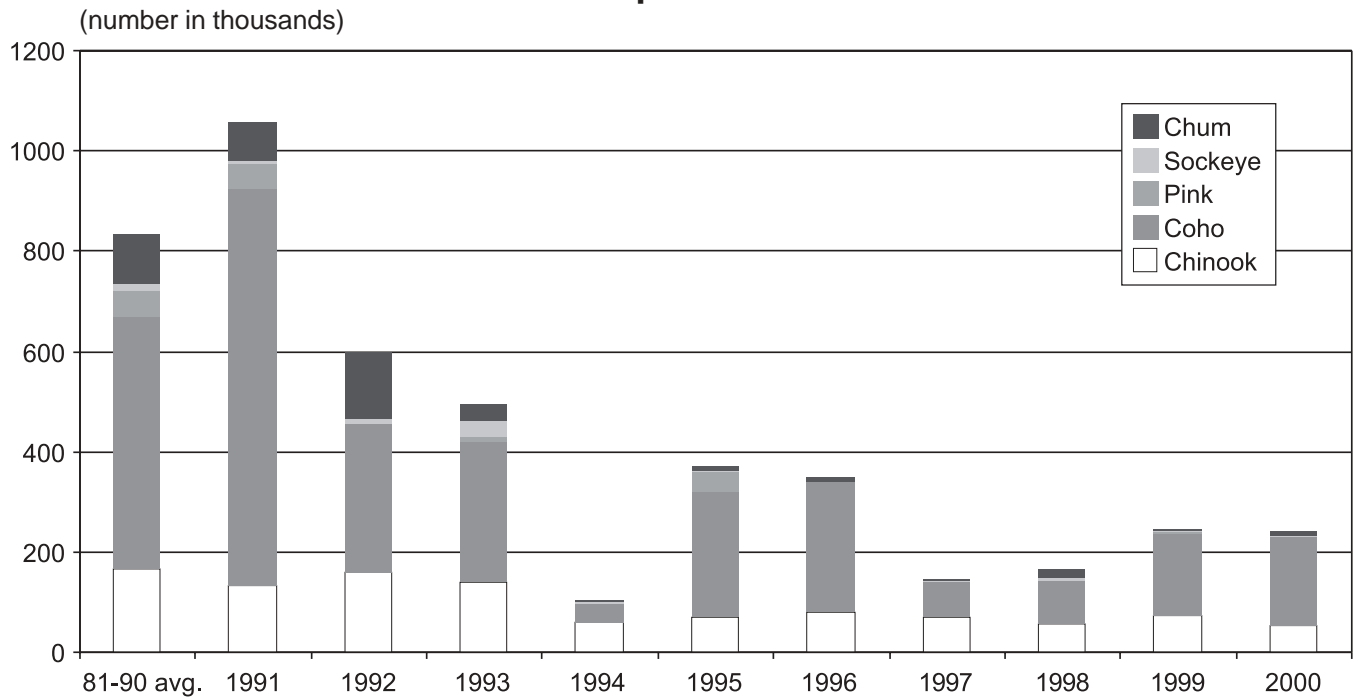
A purse seiner makes a set in Hood Canal, where low chum returns in 1999 and 2000 contributed to poor commercial salmon catches in Puget Sound. – Jon Anderson/WDFW

Ocean Catch Salmon Harvest

Gear Type



Species



ing 62% and 77% of the average chinook catch for the area over the decade. Bellingham Bay also accounted for the majority of the coho salmon harvested by non-treaty commercial fishers during the biennium, with hatchery fish comprising about three-quarters of the coho catch.

In a good year, a small group of skiff gillnet fishers who ply the shallow waters of Dungeness Bay can account for up to 15% of the total non-treaty commercial coho catch in Puget Sound. In 1999, however, this group caught only 700 fish, followed by a catch of 3,500 coho in 2000.

Compared to the average catch over the years 1991-1998, catches of chum salmon in all areas of Puget Sound were down 74% in 1999 and 71% in 2000. This decline can be attributed primarily to low returns in south Puget Sound (Areas 10 and 11) and Hood Canal (Areas 12 and 12B), which support the bulk of the commercial chum salmon catch in the Sound.

Ocean Salmon Fisheries

As in most other years since the mid-1990s, total salmon landings during the 1999 ocean fishery were very low. Catch rates for coho picked up substan-

tially in 2000, but fisheries were constrained by reduced harvest quotas designed to protect a variety of depressed stocks from northern Puget Sound to the Oregon coast.

Not until 2001, when the coho quota was triple that of the year before, did ocean fishers look forward to a truly good year. Although final catch figures for 2001 are not yet available, initial indications are that the coastwide salmon harvest for that year was the highest since 1991.

Salmon fisheries in all three years would have been even more limited if not for the coastwide implementation of selective coho fisheries in 1999. By requiring anglers to release all unmarked coho, this new policy allowed WDFW to keep recreational ocean fisheries open throughout the summer season in 1999. In 2000, the six-week season would have been reduced to a week or ten days without the protection afforded by selective fishing to weak, wild stocks.

For management purposes, ocean salmon fisheries are divided into four areas: Marine Area 1 (Ilwaco), Area 2 (Westport), Area 3 (La Push) and Area 4 (Neah Bay). Summaries of ocean salmon seasons for 1999 and 2000 follow on the next page.

Buy-back program nets 528 commercial licenses

When the Pacific Salmon Treaty with Canada was renegotiated in 1999, the federal government committed \$30 million to help offset economic losses to Washington fishers resulting from an agreement to reduce interceptions of sockeye salmon returning to the Fraser River. WDFW received \$24.5 million of that amount, plus \$2.34 million in state funds, in the 1999-01 Biennium to administer a permit buyback program for commercial fishers affected by those cutbacks.

The Department purchased a total of 528 commercial licenses during the biennium from fishers in areas including Puget Sound, the Pacific coast, Grays Harbor and Willapa Bay. In the Puget

Sound area, WDFW paid a fixed price of \$103,300 for a purse seine license, \$27,500 for a gillnet license and \$57,595 for a reef net license. Forty-one coastal trollers sold their licenses back to the state for \$7,500 each and WDFW purchased 35 charter-boat licenses for \$4,000 to \$10,000 each, based on several criteria. In Grays Harbor and Willapa Bay, 22 fishers received \$12,500 to \$25,000 for their licenses, depending on gear type and harvest history.

WDFW applied a 3% overhead charge to meet the cost of administering the program. A final installment of \$5.4 million in federal support for the program was expected in the spring of 2002.

1999 Ocean Salmon Fishery

Ocean harvest quotas for non-treaty fishers in 1999 were 50,000 chinook (21,500 sport and 28,500 non-treaty troll) and 130,000 coho (110,000 sport and 20,000 non-treaty troll). For tribal fisheries, which traditionally take a larger portion of their catch allocation in “inside” fisheries, the quotas were 30,000 chinook and 38,500 coho.

These quotas, established by the Pacific Fisheries Management Council (PFMC), reflect the general low abundance of these species and management efforts to lower fishery impacts to specific depressed stocks. For chinook, the “driving stock” (needing the most protection) was lower Columbia River wild chinook (Lewis River). For coho, the driving stocks were Queets River wild coho, Strait of Juan de Fuca wild coho and Oregon coastal natural coho. The latter stock is listed as threatened under the ESA.

All four ocean areas opened for recreational fishing on July 19. Because salmon abundance and angler effort were both low, these fisheries remained open through the season closing date of September 30. All four ocean areas were selective for hatchery coho, reducing impacts on weak wild stocks. If the recreational fisheries had not been selective for fin-clipped coho, fisheries managers estimate they would have closed in a month or less.

There were 58,200 angler trips reported for the recreational salmon fishery, with a catch of 10,800 chinook and 47,700 coho for the 1999 season. WDFW employees were placed on some charter boats to record the number of unmarked coho being released in the fishery in order to account for non-landed mortality.

The commercial non-treaty troll fishery was open from May 1 to June 15 for a chinook-only fishery and reopened on July 10 through September 30 for a chinook and coho (non-selective) fishery. The commercial troll fishery had a catch of 17,600 chinook and 4,000 coho for the season.

Tribal fisheries opened for chinook only from May through June and for all species from August 1-6 and from Aug. 10-15. In all, tribal trollers caught 27,664 chinook and 33,347 coho in 1999.

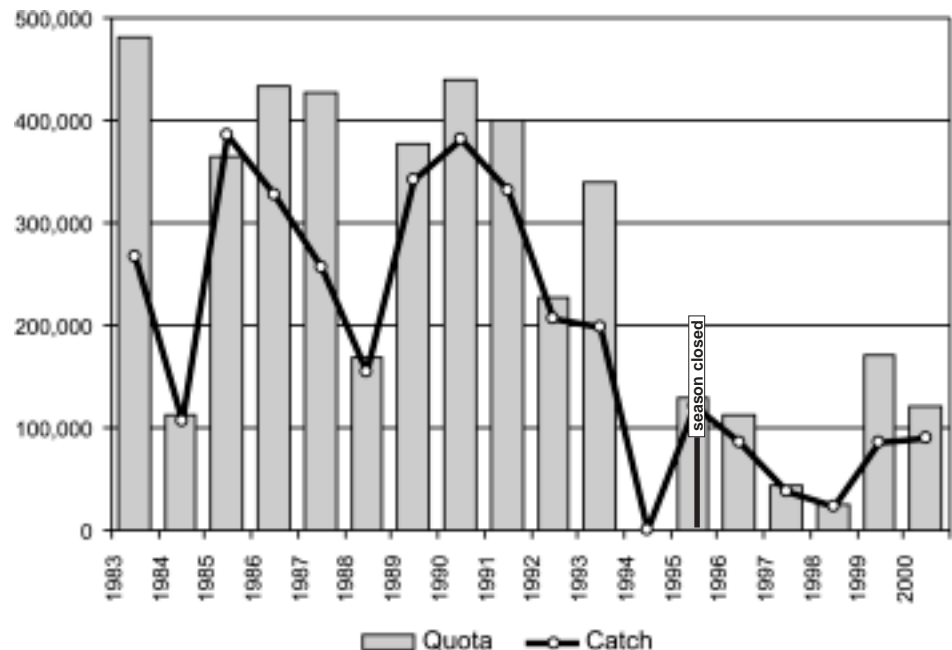
2000 Ocean Salmon Fishery

Ocean harvest quotas for non-treaty fishers in 2000 were 25,000 chinook (12,500 sport and 12,500 non-treaty troll) and 100,000 coho (75,000 sport and 25,000 non-treaty troll). For tribal troll fisheries, the quotas were 25,000 chinook and 20,000 coho.

Seasons were designed to lower fishery impacts to a number of depressed stocks. The driving stocks for chinook were lower Columbia River wild chinook (Lewis River) and lower Columbia River hatchery (Tule) stocks, both listed as threatened under the ESA. The driving stocks for coho were Queets River wild coho, Strait of Juan De Fuca wild coho, Skagit River wild coho, Stillaguamish River wild coho, Snohomish River wild coho and Oregon coastal natural coho. The latter stock is listed as threatened under the ESA.

Three ocean areas opened for recreational fishing on July 3; the fourth, Area 1 (Ilwaco), opened July 10. All four ocean areas were selective for hatchery coho, closing in mid-August after a season of approximately six weeks. If not for selective fishing requirements, fisheries managers estimate that all areas would have closed in a week to ten days.

Coastal Coho Harvest



There were 53,900 angler trips reported for the recreational salmon fishery, with a catch of 9,900 chinook and 77,500 coho for the 2000 season. Again, WDFW employees were placed on charter boats to record the number of unmarked coho being released in the fishery in order to account for non-landed mortality.

The commercial non-treaty troll fishery was open from May 1 to June 15 for a chinook-only fishery, and reopened on Aug. 4 through Sept. 5 for a chinook and selective coho fishery. This was the first year that the commercial troll fishery was selective on fin-clipped coho. The commercial troll fishery caught 12,900 chinook and 17,300 coho for the season. A logbook program as well as a ride-along program were put in place to monitor the catch.

Tribal fisheries were open for chinook only in May and June, and for chinook and coho from August 1-11.

Coastal Bays and Harbors

This section provides a brief review of salmon fisheries in Washington's coastal bays (Willapa Bay and Grays Harbor) and coastal rivers in 1999 and 2000.

Willapa Bay

Willapa Bay is one of the few areas in the state where there are no treaty fishing rights; therefore, only non-tribal commercial and recreational fisheries occur within the Bay. The 1999 season was marked by low returns and low harvest levels. In 2000, both returns and overall harvest levels increased for chinook, coho and chum salmon, although chinook still fell short of escapement goals. The 2000 fishery marked the first year under the newly developed "Willapa Bay Fishery Management Framework Plan," developed in conjunction with Bay fishers. (See next page.)

1999 Fisheries

The 1999 season was a difficult year for salmon management in Willapa Bay. Using the best available information, WDFW Fish Management staff set seasons with input from commercial and recreational fishers through the North of Falcon process, giving first priority to conservation of the resource and, secondly, to optimizing fishing opportunities for rec-

reational and commercial fisheries. Two key considerations in 1999 were: (1) the pre-season forecast for chinook of 14,900 was expected to be the lowest chinook return to Willapa Bay since 1984, and (2) an in-season estimate of chum abundance indicated that the run was returning much lower than expected and below spawning escapement needs.

Based on pre-season expectations, the traditional one-day, full-fleet commercial "chinook update fishery" in late August was not conducted. Instead the limited number of chinook available for harvest were used to maximize fishing opportunities for hatchery coho due to a significant overlap in run timing. A total of eight days (including one day of daylight only) were open to targeted coho gillnet fishing.

During the gillnet fishery, it became clear that the chinook run, then the chum run, were coming in below expectations. WDFW took several actions to reduce pressure on these stocks, while looking for ways to maintain commercial and recreational fishing opportunities. The coho fishery was confined to Area 2G west of Channel Marker 24 in an effort to minimize chinook impacts. Because early chum catches in the coho fishery were much lower than expected and Grays Harbor chum catches indicated the same trend, WDFW also closed a chum-directed gillnet fishery proposed for eight days in late October.

For recreational fisheries, regulations were designed to optimize marine and freshwater recreational opportunities to harvest chinook and hatchery coho and some chum. The only significant change from 1998 regulations was a reduction in the adult daily bag limit from 3 to 2 fish in marine waters (Area 2-1). These seasons and changes were supported by the recreational representatives at the North of Falcon meetings.

Early hatchery returns for chinook appeared much lower than expected, even given the low pre-season forecast. Fish Management staff reviewed the historical hatchery return data, which strongly suggested that chinook egg take needs would not be met. As a result, WDFW closed all freshwater areas to retention of chinook by recreational anglers by emergency regulation. The marine sport fishery inside the bay was not closed to the retention of adult chinook, both because the impacts would be low and because it

Willapa Bay Fishery Management Framework

In November 1999, WDFW representatives began meeting with key constituents of the Willapa Bay commercial and recreational fisheries to develop a regional planning process specific to Bay fisheries. The plan ultimately approved and implemented during the 2000 season not only laid the foundation for Willapa Bay fisheries in that and future years, but also provided a model for joint regional planning efforts in other areas of the state.

Management goals established under the plan for the 2000 season include:

- **Natural origin chinook:** Increase the spawning escapement by 17% over the 1996 brood escapement.
- **Natural origin coho:** Increase escapement by 25% over the 1997 parent year. This escapement objective was increased from an original objective of 20% above the brood year escapement due to the desire by recreational fishing representatives to forego harvest opportunity on wild coho and pass half of the savings from selective fisheries into escapement.
- **Natural origin chum:** Meet the wild escapement goal of 35,400.

The Fish and Wildlife Commission recognized the need for region-specific management plans in February 1999, when fishers from several areas – including Willapa Bay – raised concerns about broad harvest priorities established for various salmon species. Under those statewide priorities, chinook and coho were identified as the primary target species for the recreational fishery and pink, chum and sockeye were identified as the primary target species for the commercial fishery.

The objections stemmed from the fact that these statewide priorities did not recognize the lack

of pink and sockeye stocks in southwest Washington or the long history of directed commercial chinook and coho fisheries in Willapa Bay, Grays Harbor, the lower Columbia River and the Pacific Ocean. In response, the Commission directed WDFW to initiate a regional planning process in the year 2000.

Willapa Bay was chosen for this initial effort in 2000 for two primary reasons. First, disagreements between fishers and WDFW over pre-season and in-season management decisions in 1999 indicated the need for establishing clear management objectives and guidelines for conducting the region's fisheries. Second, WDFW saw this as an important step toward maintaining and increasing natural spawning populations, while also maintaining strong hatchery programs in Willapa Bay.

From the outset of the 2000 planning process, representatives of WDFW, the commercial fishery and the recreational fishery discussed long-term goals for Willapa Bay that would lead to more sustainable fishing opportunities, while providing ecological benefits from both natural and hatchery salmon populations in the basin. Abundant natural spawners, improvements in hatchery programs, accurate assessments of the resource and the ability to adapt to new information and new ideas – these were all elements of the long-term goals discussed by participants at the planning meetings.

An initial plan was developed and the objectives and elements of the Plan were then used in planning specific fisheries for salmon and sturgeon in the 2000 season. After the 2000 season, WDFW and the fishery representatives reviewed elements of the plan and those that needed improvement. Refinements were made to the plan for 2001 through additional meetings with key constituents, providing clear objectives and expectations for the next season's fisheries.

would be unfair to do so given the gill-net harvest opportunities for chinook in the same area and time.

Early spawning ground surveys also confirmed previous indications of a low chum run. Although the expected impacts of recreational fishing on chum were low, all freshwater areas were closed by emergency regulation to the retention of chum.

Post-season information on hatchery returns and natural spawning escapements confirmed that the chinook return was even lower than the pre-season forecast, and hatchery chinook egg-take goals were not met. Chum returns were also below the escapement goal, as indicated by the in-season information.

2000 Fisheries

The 2000 salmon season for Willapa Bay was guided by the newly developed “Year 2000 Willapa Bay



A shore-based angler plays a chum salmon, which began to decline in 1999 and 2000 from near historic levels.

Fishery Management Framework Plan,” developed in conjunction with Bay fishers. As noted on the adjacent page, the plan established specific escapement goals for chinook, coho and chum salmon of natural origin in the Bay.

Regulations for recreational fisheries were designed to optimize marine and freshwater fishing opportunities to harvest chinook and hatchery coho and some chum. As in other recent years, there was a requirement to release all wild coho in both marine and freshwater areas. Several new freshwater regulations – including requiring the release of adult chinook in non-hatchery streams – were implemented to reduce impacts to natural origin coho and chinook. In addition, a special regulation requiring constant movement of the bait or lure was enacted on the Naselle River to reduce snagging. This new approach was found to work well.

Commercial fishing seasons were established with direct input from fishers involved in the pre-season planning process. A number of different time and area strategies were implemented and evaluated in 2000 to provide fishery flexibility while meeting stock management objectives identified in the new Framework Plan. Information gained from mass marking of coho in previous years indicated an earlier run timing for hatchery fish than previously thought, allowing fisheries managers to design a fishery that targeted hatchery coho while meeting natural coho spawning escapement objectives.

A total of 21 days of commercial gillnetting directed at salmon occurred in 2000 (including two days of daylight only), with no changes to the pre-season schedule based on in-season information.

Post-season information indicated that the total chinook run into Willapa Bay returned at 81% of the pre-season forecast and lower than in-season information indicated. For the third year in a row, total chinook egg-take needs for on-station releases were not met for the Willapa Bay hatcheries. Hatchery egg take needs were approximately 70% of the amount necessary to meet on-station release goals. The return of natural origin-chinook (produced by natural spawners) was 80% of expectations, and the estimated escapement of these 2,303 fish was only 7% over the brood escapement. By comparison, the goal established by the Framework Plan was a 17% increase over the 1996 brood escapement.

Coho returns were above pre-season expectations for both hatchery and natural runs. The estimated natural escapement was 24,100, exceeding both the interim natural escapement goal of 13,090 and the goal established under the Framework Plan (25% over the 1997 escapement).

The chum return of 46,720 fish was only 68% of the pre-season prediction of 69,188. The estimated wild chum escapement was approximately 40,000, which met the wild escapement goal of 35,400.

Grays Harbor

Following the same pattern as Willapa Bay and most other state waters, salmon landings were extremely low in Grays Harbor in 1999, followed by a somewhat higher catch in 2000. Both treaty and non-treaty fisheries occur within Grays Harbor and its tributaries. The Quinault Indian Nation exercises treaty fishing rights in the marine area and in the Chehalis and Humptulips rivers. In addition, members of the Chehalis Tribe, a non-treaty tribe, have fishing rights on the Chehalis River within the boundaries of their reservation. In 1999, a federal court decision held that catches by the Chehalis tribe count against the non-treaty share of harvestable fish, which affected catch allocations for non-treaty commercial and recreational fisheries in 1999 and 2000.

1999 Fisheries

Recreational and commercial fisheries in Grays Harbor and its tributaries in 1999 were limited by the expected low return of fall chinook to both the Humptulips and Chehalis River basins. In addition, Humptulips wild coho were expected to return below the spawning escapement goal.

Anglers were required to release any adult fall chinook caught in marine waters (Area 2-2) and freshwater areas. As in 1998, a selective fishery for hatchery coho was in place for the Humptulips River recreational fishery to protect returning wild fish. Beginning in 1999, a fishery targeting hatchery coho returns from net pen releases was established in the Ocean Shores boat basin to provide additional recreational fishing opportunity. This fishery was similar to the one in place for many years in the Westport boat basin. An estimated 275 chinook, 4,570 coho and 24 chum were taken by anglers in 1999 in Grays Harbor and its tributaries.

The commercial gillnet fishery was open for a total of four days targeting coho salmon and resulted in catches of 87 chinook, 1,674 coho and 37 chum.

2000 Fisheries

In 2000, both the chinook and wild coho runs destined for the Chehalis River were expected to provide limited numbers of fish available for harvest. Recreational and commercial fisheries were designed to harvest Chehalis River wild coho available to the non-Indian fisheries.

On the Humptulips River, where wild coho were again expected to return below the spawning escapement goal, selective fishing rules required anglers to release all wild coho, as well as adult chinook. In the marine area (Area 2-2) and Chehalis River tributaries, anglers were restricted to only one adult wild coho as part of their daily limit. According to preliminary estimates, recreational fishers caught approximately 1,850 chinook, 5,245 coho and 375 chum salmon in Grays Harbor and its tributaries in 2000.

The commercial gillnet fishery was open for six days (including one day of daylight only) and resulted in catches of 1,318 chinook, 4,995 coho and 387 chum.

North Coastal Rivers

In-river fisheries on the Quinault, Queets, Hoh and Quillayute river systems as well as some smaller independent tributaries are managed for recreational and tribal fisheries. As in previous years, WDFW worked closely with each tribe during the biennium to maximize fishing opportunities as warranted by the strength of each salmon stock and the conservation needs for each year.

- **Quinault River:** Fishing was restricted to jacks only from July through October as in previous years. Anglers caught three fish in 1999 and 135 in 2000.
- **Queets River:** The mainstem Queets River above the Quinault Reservation flows through Olympic National Park land. As in previous years, WDFW worked closely with parks staff, who establish regulations for salmon on the Queets. There is also a very small portion of land along the Salmon River, a Queets tributary that

is not part of the Quinault Reservation. A selective fishery for hatchery coho was implemented in 1999 and for chinook and coho in 2000. The combined recreational catch for the Queets/Clearwater/Salmon River fishery, including jacks, was 273 salmon in 1999 and 402 in 2000.

- Hoh River:** Low returns of wild spring/summer chinook restricted fishing opportunities throughout the biennium. In 1999, fishing below Highway 101 was limited to jacks only during a season that ran from June through August. In 2000, anglers were also allowed to retain any straying hatchery chinook they encountered as well as early returning coho. Beginning in 1999, WDFW opened the area upstream of Highway 101 to provide additional recreational fishing opportunities for harvestable fall chinook and coho. This area previously had been closed to the taking of adult salmon for a number of years. The total recreational catch of salmon, including jacks, in the Hoh River was 907 fish in 1999 and 861 in 2000.
- Quillayute River System:** The Quillayute River and a portion of the Sol Duc River were open for adult and jack salmon from March 1 through November 30 in 1999. Portions of the Bogachiel and Calawah Rivers were open from July 1 through November 30 that year. In 2000 a selective fishery for hatchery coho and hatchery chinook was implemented on all the rivers open for salmon to protect low returns of wild summer coho and wild summer chinook expected that year. The total recreational salmon catch, including jacks, for the Quillayute River system was 2,370 fish in 1999 and 2,444 in 2000.



Anglers line the shore below Bonneville Dam for the 2001 Columbia River spring chinook fishery.

started with the largest harvest of upper Columbia spring chinook since 1973, followed by the highest coho forecast in two decades.

Total catch figures for 2001 are not yet available, but it appears that most runs were very strong, as indicated by WDFW's pre-season forecast. While still well below the 1981-1990 average of 493,600 salmon, total landings by all fisheries in the mainstem Columbia were expected to be the highest since the early 1990s.

Salmon management on the Columbia and Snake rivers is virtually unparalleled in its complexity, shaped by numerous governmental bodies and individual salmon stocks – six of which are listed under the ESA. One major breakthrough during the 1999-01 Biennium was the adoption of a multi-year plan designed to rebuild Snake River spring and summer chinook, Upper Columbia spring chinook and Snake River sockeye. The plan establishes conservation goals for all four population groupings, with provisions to adjust harvest rates to the number of fish projected to return in a given year. Signatories to the agreement include the states of Washington and Oregon, the federal government and four Columbia River treaty tribes.

Columbia River Salmon Fisheries

As in most other state waters, the total salmon harvest in all mainstem Columbia River fisheries picked up significantly after poor returns in 1998 and 1999. Led in large part by increasing returns of hatchery coho stocks, total landings by both tribal and non-tribal fisheries rose from 171,000 salmon in 1999 to 226,800 fish in 2000. In 2001, the year

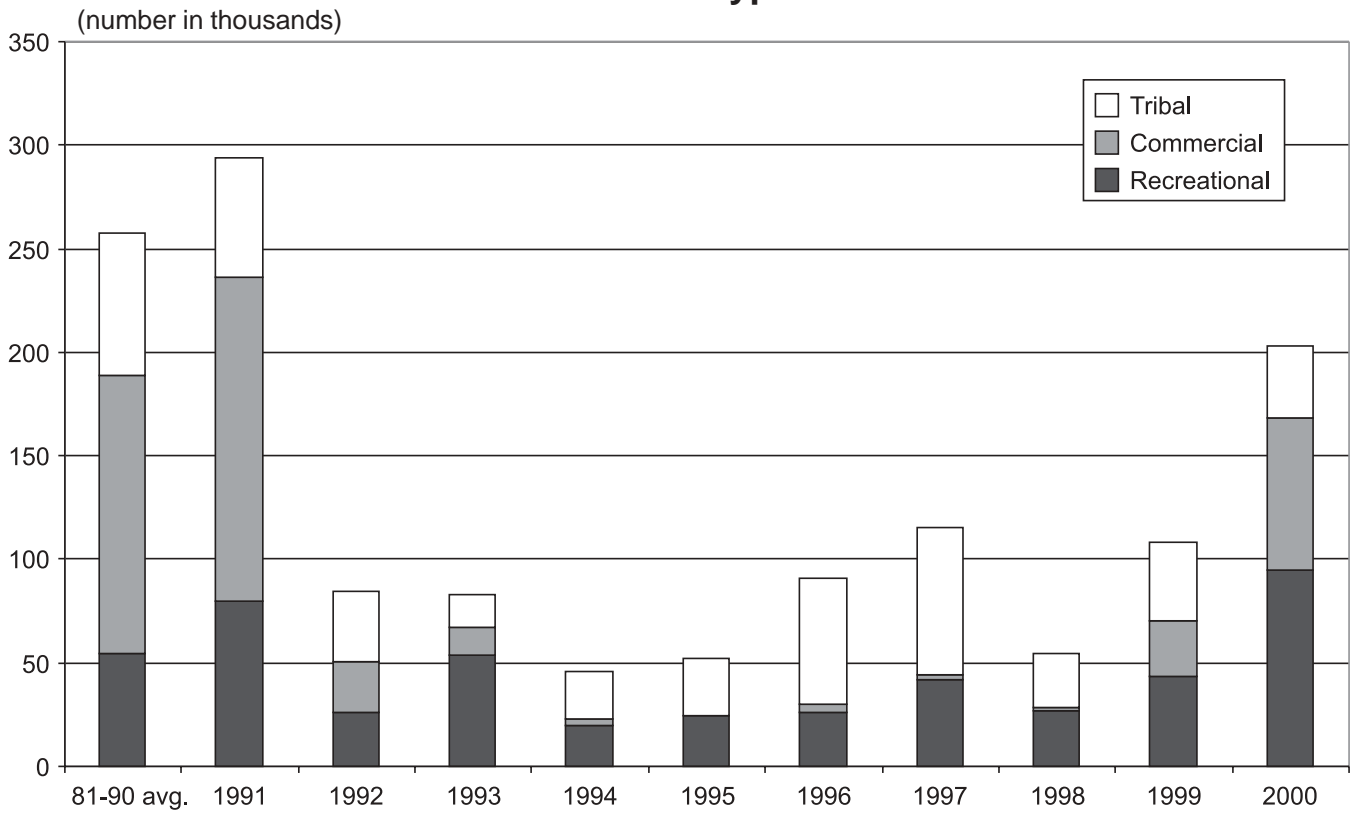
Spring Fisheries

Lower Columbia River Fisheries

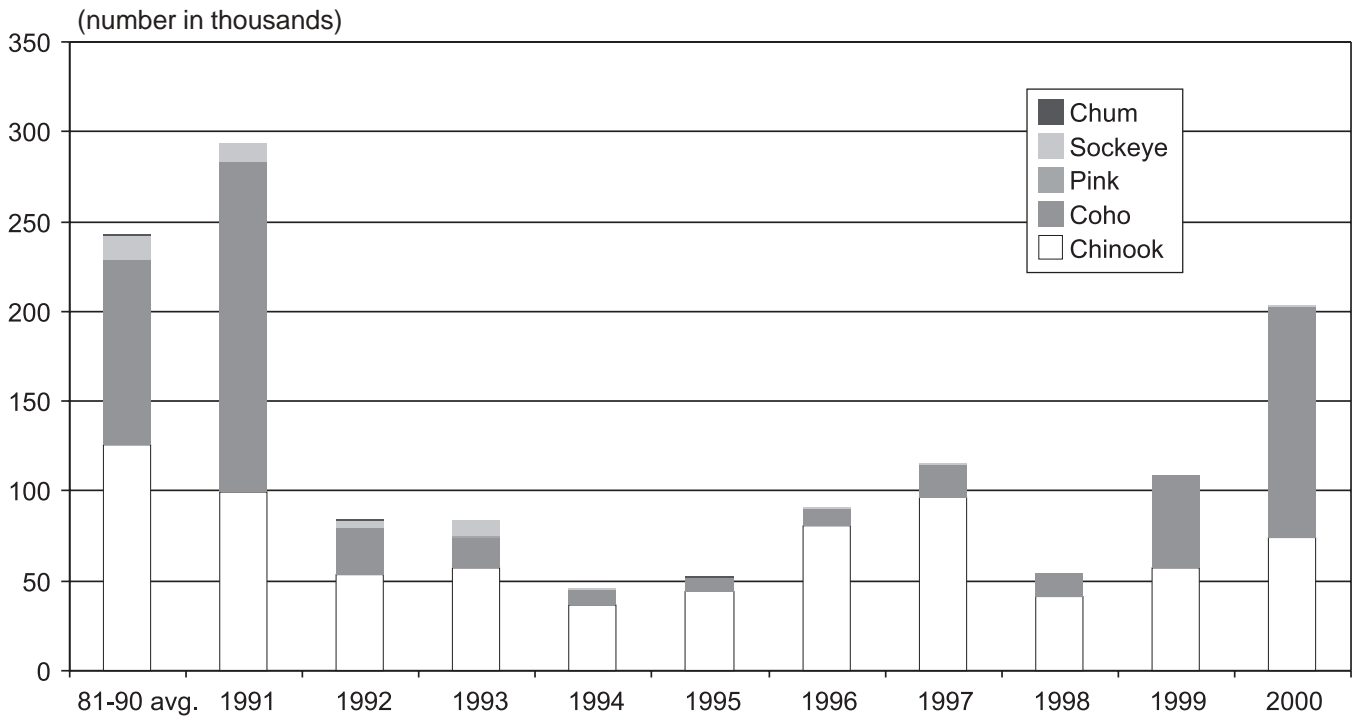
After poor returns and non-tribal landings of just a few hundred fish in 1999 and 2000, spring chinook salmon returned to the Willamette and Snake rivers in record numbers in 2001. Anticipating a run of over

Columbia River Catch Salmon Harvest

Gear Type



Species



400,000 fish, WDFW opened a recreational fishery below Interstate 5 on January 1, then opened fishing upstream to Bonneville Dam for most of April, resulting in a non-tribal harvest of 26,000 hatchery spring chinook. Anglers were required to release all chinook without clipped adipose fins, marking the first selective fishery ever held on spring chinook in the Columbia River. The 2001 spring chinook fishery produced 172,000 angler trips and the largest catch since 1973. According to estimates by the Northwest Sportfishing Association, economic benefits to local communities exceeded \$15 million. The area above the mouth of the Willamette River had not been open since the 1970s because of poor returns of upriver spring chinook.

Spring chinook returning in 2001 to federal hatcheries on the Wind River and Little White Salmon River also contributed to record sport fishery catches. The Wind River produced a catch of 11,500 spring chinook while Drano Lake (Little White Salmon River) produced a harvest of 3,100 spring chinook.

Fisheries targeting upriver spring chinook have not occurred in the Columbia River since the 1970s. Since then, both sport and commercial fisheries focused on the earlier timed Willamette spring chinook. In 1999 and 2000, the commercial fishery harvested less than 500 spring chinook each year. The sport fishery in the Columbia River in those years closed in mid-March with overall catches of less than 400 fish.

As discussed in the Salmon Science section of this report, WDFW worked with the Oregon Department of Fish and Wildlife in 2001 to test the feasibility of using live capture methods in Columbia River commercial spring chinook fisheries to facilitate the live release of unmarked spring chinook. The study focused primarily on the feasibility of using small-mesh tangle nets and onboard recovery boxes to increase survival rates for released fish. Preliminary results were encouraging and may lead to modifications to the traditional commercial net fishery in 2002.

Yakima River Spring Chinook Fishery

The first chinook salmon fishing season on the Yakima River in 40 years occurred in the upper Yakima River in June, 2000. Prompted by the largest run of spring chinook to the Yakima Basin in 17 years, an eight-day season was open on four suc-



Anglers head for their favorite fishing holes at the start of the 2001 spring chinook fishery on the lower Columbia River.

cessive weekends beginning June 10-11 and ending July 1-2. Catches were limited, but the new fishery generated a great deal of interest among anglers in the area.

The limited 2000 fishery was followed in 2001 with a much more extensive fishery, which opened the middle reach of the Yakima River beginning April 21. This popular fishery closed May 29 after an estimated 1,918 adult and 105 jack chinook were harvested.

Icicle River Spring Chinook Fishery

Early in 2000 and again in 2001, the Columbia River Technical Advisory Committee (TAC) forecast a large return of spring chinook to Bonneville Dam. These predictions were confirmed by close observation of dam passage, prompting WDFW to open sport fisheries targeting hatchery spring chinook (Carson stock) returning to the Icicle River – a tributary of the Wenatchee River from May 15 to July 22, 2000 and again May 7 to July 15, 2001. Regulations during both years allowed the harvest of two salmon per day with a non-buoyant lure rule in effect to reduce potential snagging.

WDFW conducted creel surveys on the Icicle River in 2000 and 2001 to estimate angler effort and harvest of Carson stock spring chinook and to identify any negative effects on ESA-listed steelhead and upper Columbia River spring chinook. An estimated 5,039 anglers harvested 1,606 Carson Stock spring chinook in 2000. Scale samples and coded wire tags (CWT) indicated that all the chinook originated from the Leavenworth National Fish Hatchery. Results from the 2001 season have not been fully analyzed but results appear to be similar to those found in 2000.

Summer/Fall Fisheries

Lower Columbia River Fall Fisheries

Fall fisheries in the mainstem Columbia River have been limited by potential impacts to Snake River wild fall chinook. This stock was listed under the federal ESA in 1992, and only a small incidental harvest is allowed on this stock in other fisheries. Non-Indian and tribal fisheries must share the limited allowable takes of listed fish. Sport fisheries in 1999 and 2000 were closed early to hold harvest levels within ESA limitations and commercial fisheries had minimal catches of fall chinook while targeting coho and sturgeon.

Upper Columbia Summer Chinook Fishery

The upper Columbia summer chinook returns for 2000 and 2001 were estimated to be among the strongest returns in recent history, greatly exceeding hatchery and wild brood stock spawning needs. Since this stock is stable and NMFS found that a fishery was “not likely to have a negative impact to ESA listed fish,” WDFW opened a sport fishery for summer chinook returning to the Columbia River upstream of Priest Rapids Dam from August 10-October 31, 2000.

This fishery opened more than a month earlier than the traditional fishery for summer/fall chinook fishery above Priest Rapids Dam from September 16 through December 31. By moving the season forward, anglers were able to target healthy Upper Columbia River summer chinook stocks in 2000. The season was timed to start after the ESA-listed spring chinook cleared the mainstem Columbia River and prior to the arrival of most of the ESA-listed Upper Columbia steelhead.



As in most other state waters, salmon fishing in the Columbia River improved substantially during the 1999-01 Biennium.

Most angling effort in 2000 occurred in the river reaches below Wells and Rock Island dams and near the confluence of the Columbia and Wenatchee rivers, and in the forebay of Priest Rapids Dam. Throughout the summer chinook fishery, WDFW fish biologists, enforcement officers, and hatchery personnel conducted creel surveys designed to collect information on angler effort and harvest. Survey forms and signs requesting voluntary reporting by anglers on effort and catch were placed at each river access area.

Yakima River Fall Fishery

Fall fisheries in the Yakima River target hatchery returns of fall chinook and coho from releases by the Yakama Nation. In both 1999 and 2000, the Yakima River downstream of Prosser Dam was open for salmon fishing from late September through the end of October. Before 1998, this fishery had not been open since 1966. Catch data for 1999 indicates that 207 fall chinook were harvested in the lower Yakima River. Fishing effort in 2000 was nearly twice that estimated in 1999, resulting in an estimated harvest of 255 adult chinook, 22 jack chinook, 54 adult coho and 15 jack coho.

Salmon fisheries were also open from the I-82 bridge at Union Gap to 400 feet below Roza Dam from November 15 to December 31 in 1999 and again in 2000. Effort and harvest was very low in 1999, but increased slightly in 2000. Estimated harvest in the middle Yakima in 2000 was 36 adult chinook and 306 adult coho.

Hanford Reach Fall Chinook Fishery

The Hanford Reach fall chinook salmon run is the largest population of naturally spawning salmon in the state, supporting the largest salmon fishery in eastern Washington. Based on a creel survey of 5,824 boat and 235 bank anglers, WDFW estimated that 5,100 adult and 500 fall jack chinook were harvested during the fall 1999 Hanford Reach chinook sport fishery.

In 2000, anglers harvested an estimated 3,435 adult fall chinook and 676 fall jack chinook, based on survey of 2,360 boats and 396 bank anglers. This decrease in harvest between 1999 and 2000 could not be explained by escapement estimates – which were actually higher in 2000 – or by the number of angler trips in each year. Escapement estimates were 19,744 in 1999 and 19,845 in 2000. Angler trips were 29,812 in 1999 and 47,960 in 2000.

SALMON HATCHERIES

Hatcheries have operated in Washington state for more than a century, beginning with one hatchery on the Kalama River in 1895. Originally built to compensate for land use decisions that permanently altered large areas of fish-producing habitat, state hatcheries have since become an important part of the state's economy, releasing millions of fish annually for harvest by recreational and commercial fisheries. Tagging studies indicate that more than 75% of all coho and chinook salmon caught in state fisheries begin life in a hatchery facility, as do 88% of all steelhead.

The Washington Department of Fish and Wildlife (WDFW) now operates 91 hatchery facilities, of which 69 are dedicated to producing salmon and/or steelhead while the other 22 rear trout and other gamefish exclusively. (*See Freshwater Fish section of this report.*) Thirty-five tribal hatcheries and 12 federal hatcheries also contribute to the statewide salmon harvest, which contributed more than \$1 billion to the state's economy in 2000 according to estimates by the U.S. Department of Commerce.

In recent years, state hatcheries also have taken on a new, equally important role in helping to recover and conserve the state's naturally spawning salmon populations. Nearly a third of all state salmon hatcheries were involved in some aspect of wild salmon recovery during the 1999-01 Biennium, whether by rearing juveniles prior to release or holding fish through their lifespan to ensure the survival of depressed stocks. This renewed focus on wild stock recovery represents a major realignment in hatchery operations, as WDFW, the tribes, federal government and independent scientists worked to develop a comprehensive operations strategy for hatcheries in Washington.

One major milestone reached during the biennium was the mass-marking of virtually all hatchery coho salmon and nearly half of all hatchery chinook salmon released from state hatcheries. Using new, automatic fin-clipping machines, state hatchery crews marked more than 60 mil-

lion fish in each year for release from state and tribal hatcheries, allowing for easy identification of hatchery salmon on the fishing grounds. As discussed in the Salmon Harvest section of this report, mass-marking laid the foundation for a new era in selective fisheries in which fishers are required to release wild, unmarked fish.

Like all activities that can affect wild stocks, state hatcheries have come under intense review since the listing of additional salmon population groupings under the ESA. In addition to initiating its own review process, WDFW worked with federal natural resource agencies and a newly appointed regional science panel to identify ways to minimize adverse impacts of hatchery operations on depressed wild stocks. These ongoing efforts, including the Department's new Benefit/Risk Assessment Procedure (BRAP) and the development of Hatchery and Genetic Management Plans (HGMPs) for more than one hundred state hatchery programs, are discussed in the Applied Salmon Research section of this report.

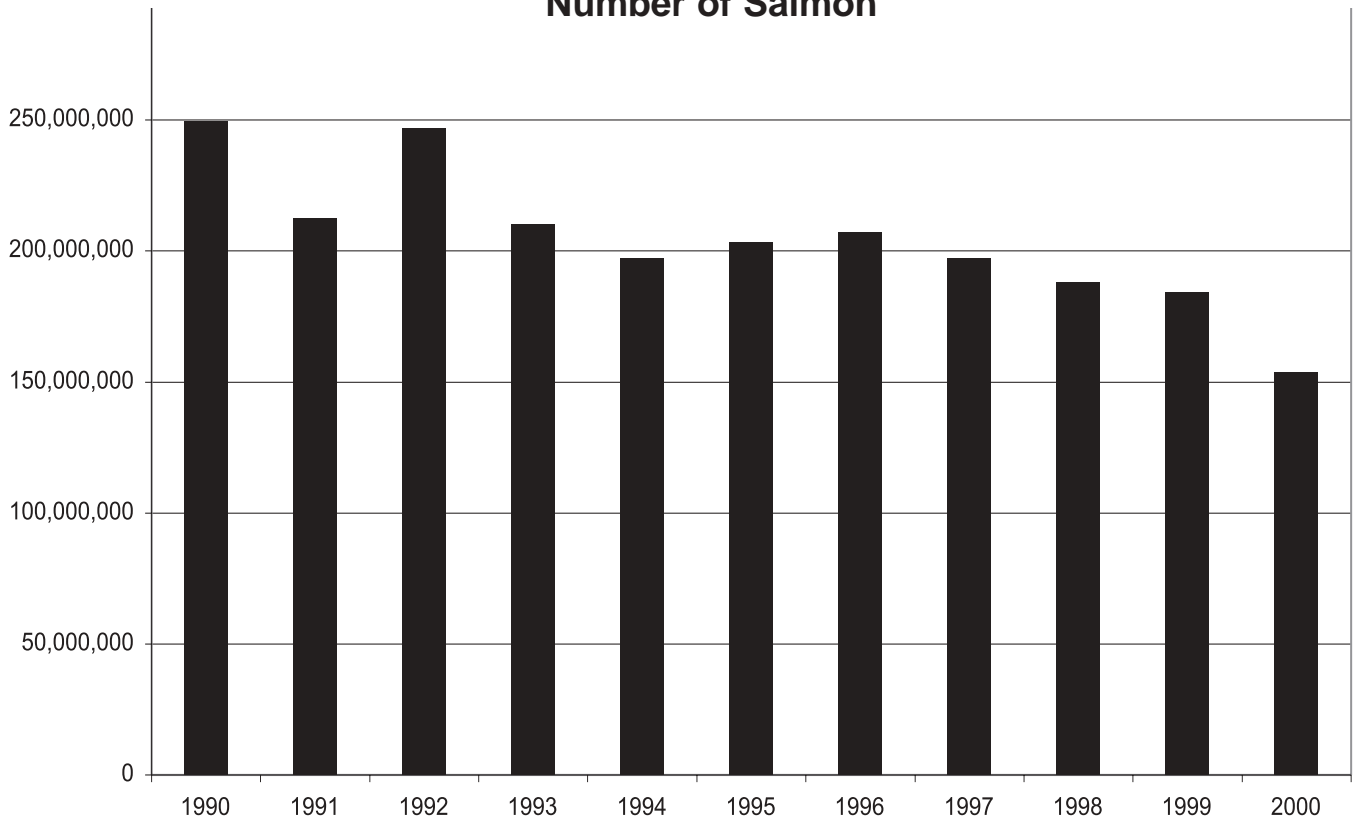
The Hatcheries Division is the largest single component of WDFW's Fish Program, with 340 FTE employees and a total operating budget of \$56.26 million during the 1999-01 Biennium, including \$17.3 million from the State General Fund. Working out of the Department's headquarters in Olympia and 17 regional complexes throughout the state, hatchery staff were responsible for fish culture, fish health, facility maintenance, hatcheries support (including activities ranging from tagging fish to securing permits) and administration.



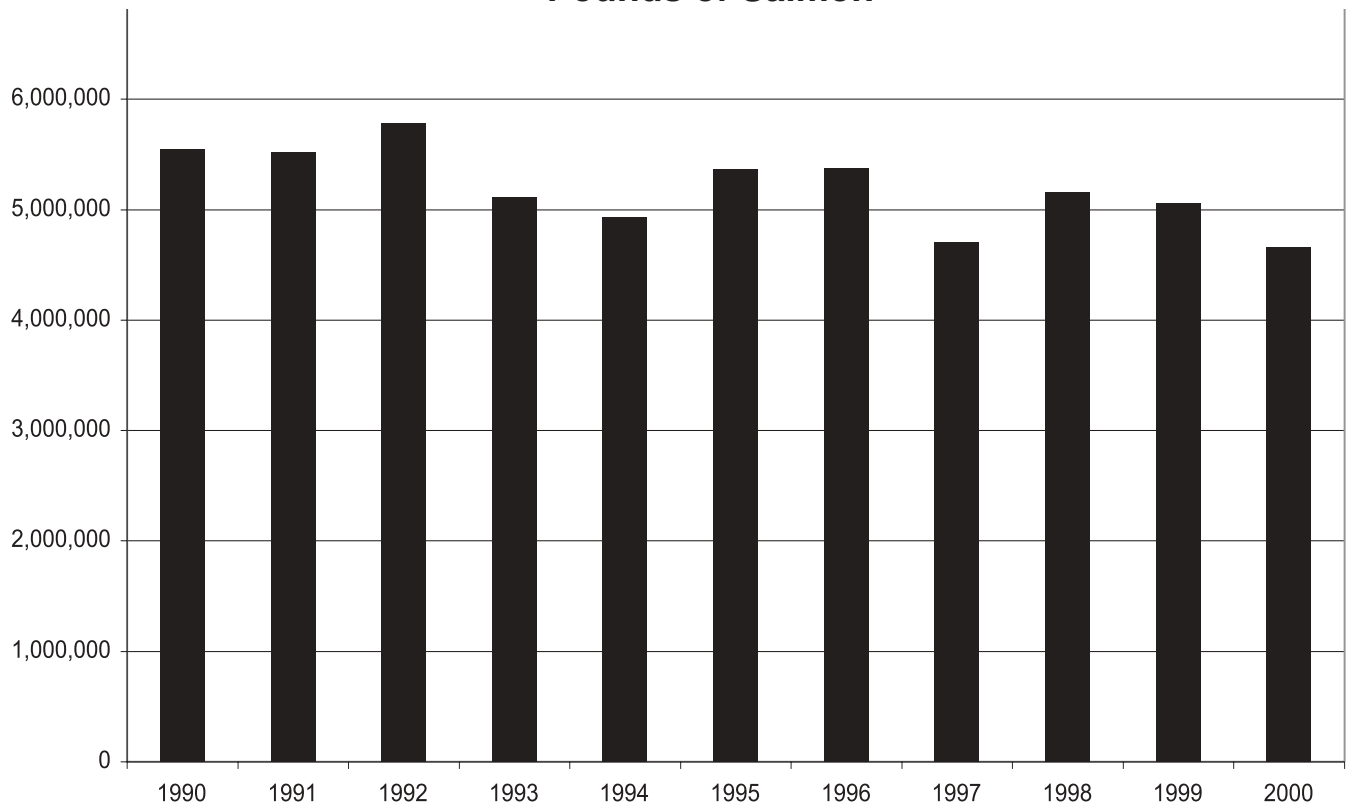
The Cowlitz Hatchery in southwest Washington is one of 91 hatchery facilities operated by WDFW. Together, these facilities represent a public investment of more than \$1 billion.

Total Salmon Production by State Hatcheries (All Species)

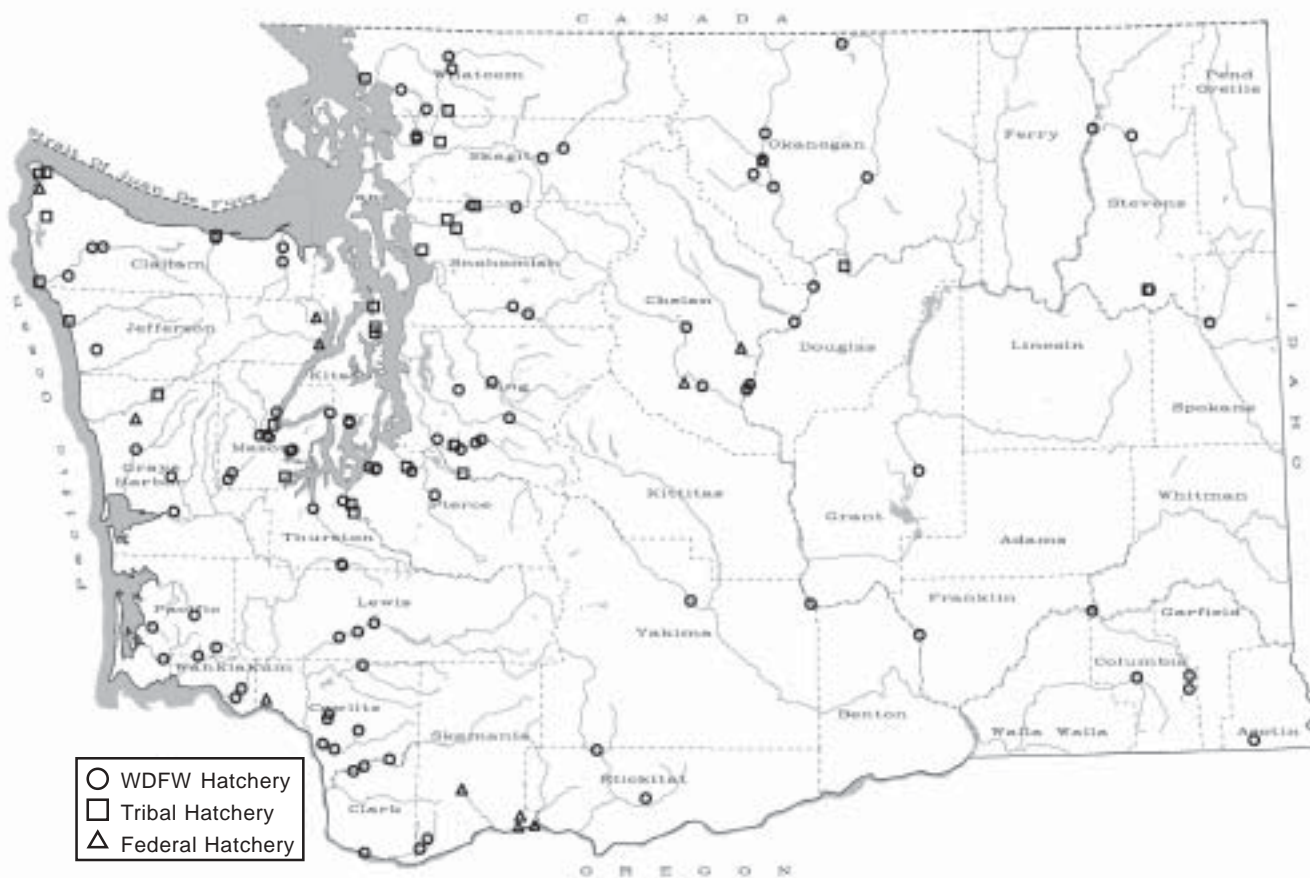
Number of Salmon



Pounds of Salmon



Hatcheries in Washington State



Hatchery Production

Hatchery production figures for 1999 and 2000 show a continuing decline in the number of juvenile salmon released from WDFW hatcheries in recent years. The decline in poundage is less pronounced, however, because fish have generally been held longer in recent years to improve their chance of survival once they are released. Returns of adult salmon should be maintained over time under this approach.

In either case, ESA-related permitting requirements have made it necessary to decrease production of specific stocks or species at certain locations. In other cases, poor ocean survival conditions reduced the number of adults returning to some hatcheries, reducing the availability of eggs. Finally, WDFW's hatchery budget has not kept pace with increasing

operating costs (especially utilities and labor costs), forcing cutbacks in some programs.

Returns of salmon to WDFW hatcheries during the 1999-01 Biennium showed typical annual variations by species and region. While hatchery return numbers offer some indication of the health of salmon stocks, it should be noted that hatchery returns can be strongly influenced by harvest rates and other factors. (Numbers have been rounded to the nearest 1,000 fish in the regional summaries that follow.)

Puget Sound

Some chinook stocks in Puget Sound showed important increases during 1999 and 2000, rebounding from their lowest return rates on record during the mid to late 1990s. Spring chinook, especially, showed increases of up to 50% in the number of adult salmon returning to key facilities, compared to 1997 and

Salmon Releases and Returns, 1999/2000

Adult returns, egg takes and subsequent releases from WDFW hatcheries

	Adult Return	Adults Upstream	Hatchery Egg Take	Egg Take Goal	Juvenile Fish ** Released
CHINOOK					
1999					
Puget Sound	80,306	9,629	46,751,443	50,715,000	42,497,830
Coast	5,917	175	5,634,500	14,665,000	6,969,816
Col. River	46,501	2,659	51,790,950	53,710,000	41,264,527
2000					
Puget Sound	56,273	10,357	47,846,515	52,365,000	36,924,619
Coast	10,466	27	10,102,400	13,165,000	4,978,489
Col. River	42,242	6,889	50,706,572	55,677,400	38,563,285
COHO					
1999					
Puget Sound	58,183	22,015	15,743,210	22,072,000	11,134,926
Coast	69,262	2,685	11,590,100	10,059,000	7,882,909
Col. River	125,019	57,990	27,462,278	18,205,000	22,466,539
2000					
Puget Sound	200,796	38,512	15,426,930	22,068,800	9,470,907
Coast	78,141	4,185	8,690,500	9,100,000	6,482,384
Col. River	211,223	90,449	22,698,168	23,415,000	16,751,542
CHUM					
1999					
Puget Sound	60,286	10,782	40,365,500	43,675,000	40,571,247
Coast	646	351	271,000	285,000	284,000
Col. River	581	433	212,681	195,000	108,711
2000					
Puget Sound	49,899	18,722	22,871,121	43,675,000	32,130,674
Coast	251	97	152,200	200,000	152,750
Col. River	272	18	190,000	190,000	197,481
SOCKEYE					
1999					
Puget Sound	6,251	745	3,090,000	20,380,000	11,024,495
Coast	None	--	--	--	--
Col. River	216	70	191,700	176,000	121,344
2000					
Puget Sound	37,446	20,844	17,171,000	20,380,000	5,051,417
Coast	3	1	None	None	--
Col. River	1,623	1,429	195,500	260,000	167,955
PINK					
1999					
Puget Sound	9,281	1,491	1,810,500	1,500,000	None
Coast	None				
Col. River	2	2	None	None	--
2000					
Puget Sound	--	--	--	--	1,632,390
Coast(Pink salmon return only in odd-numbered years)					
Col. River	--	--	--	--	--

** Tables include coop and Regional Fisheries Enhancement Projects, but do not include federal or tribal programs.

1998. These higher returns provided enough eggs to sustain recovery efforts at such hatchery facilities as Kendal Creek, Marblemount and Minter Creek, which rear chinook stocks listed under the ESA.

Fall chinook returns stayed consistent throughout the region during this time frame, averaging about 65,000 fish for all facilities. Hatcheries with large (and expected) fall chinook returns included Soos Creek, Samish and Minter Creek, all of which had average returns of 9,000-10,000 fish in 1999 and 5,000-7,000 fish in 2000.

Coho salmon returns displayed large annual variations in 1999 and 2000. Returns to the hatchery rack in 1997 and 1998 averaged 117,000 fish, then dropped sharply in 1999 to 58,000 adults before increasing to over 200,000 in 2000. Very strong returns were seen in 2000 at Soos Creek (43,000 fish), Voights Creek (41,000 fish) and Wallace River (23,000 fish).

Pacific Coast

Hatchery returns of fall chinook to coastal facilities remained consistent during the 1999-2000 time frame, averaging about 6,000 fish per year. Coho, however, showed significant increases after returns of 23,000 fish in 1997 and 40,000 in 1998. In both 1999 and 2000, the number of returning adults rose to approximately 65,000 fish.

Columbia River

As in Puget Sound, returns of spring chinook to Columbia River hatcheries were up somewhat from a



WDFW hatchery workers harvest chinook salmon eggs at the Issaquah Hatchery.

Blackmouth salmon extend Puget Sound anglers' season

The Puget Sound Recreational Fishing Enhancement Program (PSRFE) was created by the Washington Legislature in 1993 with the goal of improving recreational fishing opportunities in Puget Sound. During the 1999-01 Biennium, the program produced more than two million yearling chinook salmon for harvest in the Sound each year.

Unlike most other hatchery-reared salmon, yearling chinook salmon are held in freshwater facilities a full year beyond the time when they would normally migrate to sea. As a result, most of these fish remain inside Puget Sound once they are released, providing angling opportunities for immature chinook (blackmouth) during the fall, winter and spring months as well as augmenting the catch during the normal salmon-fishing season in summer. The 2001 spring release of yearling chinook salmon was the fourth consecutive year the program has successfully released over two million fish into Puget Sound, contributing to fisheries from Sekiu to Olympia.

Yearling chinook are produced by 12 state and private facilities from Olympia to Orcas Island, including Hood Canal. Funding for the production began in 1994 with a license surcharge of \$10 for anglers who fished for salmon in the Strait of Juan de Fuca, Hood Canal, the San Juan Islands and the rest of Puget Sound. Beginning in 1998, the Legislature changed the \$10 fee to a percentage of all fishing licenses sold by the Department of Fish and Wildlife. The new percentage system, averaging about 10% of all licenses sold, produces about \$1.4 million per year to support the PSRFE Program.

During the 1999-01 Biennium, the PSRFE Program was also active in research to grow lingcod in captivity. Through a partnership with the National Marine Fisheries Service at Manchester, the program has successfully grown lingcod from an egg stage to early adult life history. The PSRFE Program, in concert with directives in the original legislation, continues to support recovery of several Puget Sound bottomfish species.

very poor showing in the late 1990s. Returns in 1999 were about 12,000 fish and 10,000 in 2000, compared to just 7,000 fish in 1998. While low by historical standards, this increase was good news, because all of these stocks are listed under ESA.

Fall chinook returns were stronger than those for spring chinook, but still showed the decreasing trend of the late 1990s. In 1997, 31,000 fish returned to Columbia River hatcheries, followed by 34,000 in 1998. In 1999, returns increased to 41,000 fish before dropping to 22,000 fish in 2000. The Priest Rapids Hatchery continues to have the strongest returns of fall chinook on the Columbia River, with returns of 15,000 fish in 1998, 23,000 in 1999 and 7,000 in 2000.

Coho salmon returns to Columbia River hatcheries increased from 47,000 fish in 1997 to 58,000 fish in 1998, then to 102,000 fish in 1999 and 184,000 fish in 2000. The largest returns in the last two years were seen at Cowlitz Salmon Hatchery (34,000 fish in 1999 and 41,000 in 2000) and Lewis River Hatchery (32,000 fish in 1999 and 61,000 in 2000).

Wild Stock Restoration

During the past two decades, the number of state hatcheries involved in some aspect of wild salmon recovery has increased from two to 21. Hatcheries are now viewed by fishery scientists and policy makers as integral tools for the restoration of wild runs that have dwindled because of habitat degradation or other factors. Fifteen of the 18 stocks included in recovery actions during the 1999-01 Biennium were listed under the ESA.

Hatcheries play several different roles in sustaining wild stocks. For stocks such as Methow River summer chinook and Dungeness River pink salmon (fall run), adults are captured and spawned each year and the resulting progeny are reared and released as juveniles. The purpose of these efforts, called "supplementation," is to maximize egg fertilization and fry survival and thereby increase the number of outmigrating smolts.

For other stocks, such as Dungeness spring chinook and White River spring chinook that are at dangerously low population levels, juveniles were main-

Volunteer programs also raise millions of salmon and trout

While most hatchery-raised fish begin life at state, federal or tribal facilities, volunteer programs typically account for nearly 10% of all salmon released into state waters each year.

During the 1999-01 Biennium, WDFW worked with school districts, volunteer organizations and individuals on more than 1,000 projects designed to help restore depressed salmon runs and to produce fish for harvest. In all, these projects – ranging from backyard egg boxes to large-scale net pens – produced an estimated 15 million juvenile salmon in each year of the biennium.

More than 1.5 million catchable-size trout were also produced each year by 39 volunteer projects supported by WDFW.

Major participants included classrooms involved in the agency's Salmon in the Classroom Program, the state's 14 Regional Fisheries Enhancement Groups (RFEG), members of the Volunteer Cooperative Program, Trout Unlimited and many other organizations and individuals. For more information on these efforts, see the Public Outreach section of this report.

tained in a hatchery for their entire life to ensure the stock's survival – a practice known as "captive brood." While this process can often take years to show results, efforts by WDFW to bolster depleted runs paid off at a number of facilities during the 1999-01 Biennium.

The captive brood program for Dungeness spring chinook is a prime example. Starting in 1992, approximately 2,000 wild juvenile salmon were captured each year for five years and held at three facilities: the Hurd Creek and Dungeness hatcheries and the South Sound Net Pens. Since then, the number of outmigrating smolts was increased from an estimated 20,000 to 30,000 naturally produced smolts per year to more than 1,000,000 in 1997-2000.

Wild Stock Restoration Projects

Currently, restoration efforts are taking place on the following stocks.

(* = Type of restoration efforts; Both = captive brood and supplementation.)

Species/Stock	County	ESA listed/year	Type*
Spring Chinook			
White River (Puyallup system)	Pierce	Yes/1999	Both
Wenatchee River	Kittitas	Yes/1998	Supplementation
Tucannon River	Columbia	Yes/1992	Both
Nooksack River	Whatcom	Yes/1999	Supplementation
Skagit River	Skagit	Yes/1999	Supplementation
Chiwawa River	Chelan	Yes/1998	Supplementation
Twisp River	Okanogan	Yes/1998	Both
Chewuch River	Okanogan	Yes/1998	Supplementation
White River (Wenatchee system)	Chelan	Yes/1998	Captive Brood
Dungeness River	Clallam	Yes/1999	Captive Brood
Fall Chinook			
Snake River	Columbia	Yes/1992	Supplementation
Summer Chinook			
Methow River	Okanogan	Yes/1998	Supplementation
Similkameen River	Okanogan	Yes/1998	Supplementation
Skykomish River	Snohomish	Yes/1999	Supplementation
Summer Chum			
Salmon Creek	Clallam	Yes/1999	Supplementation
Sockeye Salmon			
Lake Wenatchee	Chelan	No	Supplementation
Cedar River (Lake Washington)	King	No	Supplementation
Pink Salmon			
Dungeness River (Fall run)	Clallam	No	Supplementation

The resulting adult returns from the project increased from an average of 167 fish from 1986 to 1999 to 218 in 2000 and 453 in 2001 – the highest number since surveys began in 1986. WDFW’s partners in the project included the Jamestown S’ Klallam Tribe, the Olympic National Park, NMFS, the U. S. Forest Service and volunteers from Olympic Outdoor Sportsmen’s Association, Wild Olympic Salmon and the North Olympic Salmon Coalition.

The White River chinook salmon restoration project on the Puyallup River system is the oldest recovery effort involving hatchery facilities in Washington, setting the standard for similar efforts up and down the West Coast. Begun in the late 1970s by the former Washington Department of Fisheries and still con-

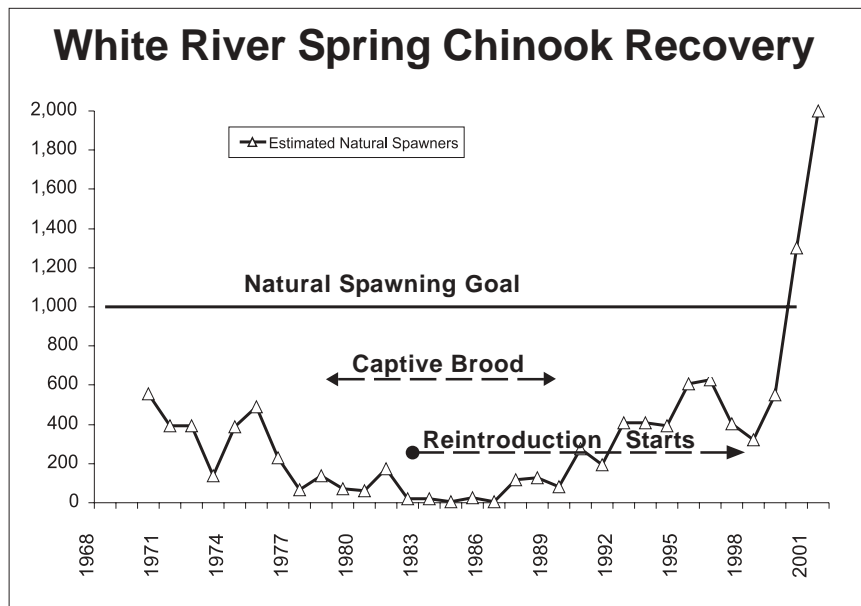
tinuing, this project has used supplementation, captive brood, habitat restoration and harvest restrictions – as well as dam relicensing and water withdrawal agreements – to bring this unique stock back from the brink of extinction.

Working in cooperation with the Puyallup Tribe, the Muckleshoot Tribe, the U.S. Army Corps of Engineers, the U.S. Fish and Wildlife Service and NMFS, WDFW has helped to build the White River chinook salmon population – listed as “threatened” under the ESA in 1999 – from fewer than 20 returning adults in the early 1980s to 553 adult returns in 1999 and an estimated 2,000 fish in 2001. Prospects for recovery of this stock are now considered good and the project has become a model for successful stock restoration.

Hatchery facilities involved include Hupp Springs, Minter Creek, South Sound Net Pens, the Muckleshoot Tribal Hatchery on the White River and a number of rearing ponds provided by the Puyallup Tribe.

In addition to supplementation and captive brood recovery projects, WDFW used its hatchery facilities to protect and nurture wild salmon runs in other ways during the 1999-01 Biennium:

- Mass Marking:** Perhaps the single biggest change in salmon fishing during the last biennium was the expansion of selective coho fisheries to include the Washington coast and many inland waters. To make it possible for fishers to distinguish between hatchery and wild coho, WDFW crews started clipping the adipose fins of hatchery coho in 1996, including nearly all of those produced in the 1999-01 Biennium. It also allowed fisheries managers to better assess hatchery/wild stock composition in various fisheries as well as stray rates into natural spawning areas. Significant selective fisheries were allowed in 1999 and again in 2000 (from juveniles clipped in 1997 and 1998), protecting wild stocks, while providing for the harvest of healthy hatchery runs.
- Nutrient Enhancement:** Research over the past decade in Washington, British Columbia and Alaska has demonstrated the critical role salmon play in transporting nutrients from the Pacific Ocean to aquatic and terrestrial ecosystems of the Pacific Northwest. The Hatcheries Division worked aggressively with Regional Fishery En-



hancement Groups and other local organizations, primarily volunteers, to distribute the carcasses of adult salmonids used for broodstock at WDFW hatcheries back into watersheds. Beginning in 1996 with 14 projects and 4,747 carcasses, the program grew to include 123 projects that distributed more than 160,000 carcasses into streams across the state in 2000. These projects range in size from 20 carcasses for Barnaby Slough (Skagit watershed) to 10,000 carcasses into the Kalama River. Additional projects were approved for 2001, when more than 200,000 carcasses were expected to be distributed. Because the movement of fresh carcasses between watersheds has limitations due to the risk of spreading fish pathogens, WDFW has taken a leadership role in international conferences dealing with the development of approved alternatives such as processed carcasses (pasturized briquettes) or fertilizers to replace the lack of nutrients in streams with poor adult returns.

	1999		2000		2001*	
	Coho	Chinook	Coho	Chinook	Coho	Chinook
Puget Sound	7,641,334	14,004,541	8,025,442	20,407,326	7,172,626	22,445,581
Coastal	5,285,547	214,814	5,320,454	0	5,917,231	0
Columbia River	14,562,276	10,602,371	14,865,831	8,493,294	10,719,190	9,616,046
Totals	27,489,157	24,821,726	28,211,727	28,900,620	23,809,047	32,061,627

* 2001 release data preliminary

Hatchery Infrastructure

With the listing of large numbers of naturally produced salmon populations under the ESA, all the factors believed to play a role in the decline of a stock became subject to review, including state hatcheries. While hatcheries have become an increasingly important tool in the restoration of wild stocks, they can also present obstacles to recovery.

Some facilities, particularly those built decades ago, can present physical barriers to naturally produced outmigrating juveniles or adult fish returning to streams to spawn. Scientists also have concerns about interbreeding between wild and hatchery fish, and about predation and competition for food in streams, estuaries and the open ocean. As discussed in the Applied Salmon Research section of this report, WDFW worked to address these issues in a variety of ways during the 1999-01 Biennium, filing 128 Hatchery and Genetic Management Plans (HGMPs) with NMFS and developing a Benefit/Risk Assessment Procedure (BRAP) to help analyze the compatibility of each state hatchery with the goal of recovering wild salmon stocks.

For all these efforts, the need for additional investments in the state's aging hatchery infrastructure was identified long before the announcement of the latest round of ESA listings in 1999. In 1991, a study by the consulting firm of Dan Adkins and Associates found that most state salmon hatcheries had entered the last quarter of their expected design life and would require major renovations and repair. Based on a review of just 35% of the facilities operated by the former Department of Fisheries, the study indicated that at least \$25.3 million would be needed to meet immediate needs at those facilities alone.

Since then, funding for hatchery facilities has fallen significantly short of the amount needed to meet those basic operational needs, let alone address all the new issues raised by the ESA. From 1993 through 1997, state capital funding averaged \$5.2 million per biennium, then rose to \$7.2 million in the 1999-01 Biennium and dropped to \$2.2 million proposed for 2001-03. WDFW also allocated \$2.4 million in operating funds for hatchery maintenance and repairs in the 1997-99 Biennium, but was forced to reduce that amount to \$1.3 million in 1999-01 and to \$770,000 proposed for 2001-03 to meet other priorities.

New legislation: Salmon carcasses and aquaculture

The Washington State Legislature approved two pieces of legislation during the 1999-01 Biennium that have a direct bearing on hatchery operations.

- **Salmon Eggs (ESHB 1286):** The bill, titled "An Act Relating To the Use of Viable Salmon Eggs," prohibits WDFW from destroying salmon that originated from a hatchery for the purpose of destroying viable salmon eggs that would otherwise be useful for replenishing fish runs as determined by the department and Indian tribes with treaty fishing rights.

The new law also specifies a prioritized order for distribution of salmon eggs, and directs the Department to allow more hatchery-produced salmon to spawn naturally in areas where progeny of hatchery fish have spawned before. The Department is drafting rules consistent with this legislation and will produce annual reports on the disposition of salmon eggs and carcasses.

- **Aquaculture (SSHB 1499):** Titled "An Act Relating to the Regulation of Marine Fin Fish Aquaculture," the bill returns regulatory authority to the Department over marine fin fish aquaculture. The Department, with the Hatcheries Division acting as lead, is in the process of drafting rules as directed by the bill covering areas of escape prevention, rapid recapture protocols and approval procedures for the species, stock and race of marine fish to be reared. It is also establishing an Atlantic Salmon Watch Program similar to that currently existing in British Columbia. Draft rules were prepared for the 2002 Legislature.

Faced with difficult choices, WDFW prioritized its capital funding to focus on projects that reduce hatchery impacts on wild fish. The final phase of a major renovation project at Issaquah Hatchery was begun

with provisoed funds, but needed screening and fish-passage work was delayed at the Minter Creek Hatchery and a number of other facilities. To fund renovation of incubation facilities at the Marblemount Hatchery, the Department secured \$285,000 from the Seattle Public Utility District in 2001.

WDFW regularly monitors the discharge from all hatcheries to comply with federal water quality standards. However, a number of state facilities did not comply with these standards during the biennium, due to insufficient funding for needed renovations.

The state's hatchery system represents a public investment of approximately \$1 billion. Built as compensation for lost natural habitat, state hatcheries produce millions of fish for harvest every year, supporting fisheries and local economies from northern Puget Sound to the Columbia River. For an increasing number of depressed wild stocks, hatchery programs offer the best chance of survival. During the 1999-01 Biennium, WDFW worked to protect the public's investment in state hatcheries and make the changes necessary to ensure they will continue to provide these benefits in the 21st century.

NATURALLY SPAWNING SALMON RUNS

The long-term decline of Washington's naturally spawning salmon populations was cast into the public spotlight in 1999 when they were listed for pro-



Of the 294 naturally spawning salmon stocks identified in the Salmonid Stock Inventory (SaSI), 151 were classified as "healthy," 78 as "depressed," 11 as "critical," one as "recently extinct" and 53 as "unknown."

tection under the federal ESA in seven additional regions of the state – including Puget Sound. Although many wild stocks had been declining since the early part of the 20th century, the new listings demonstrated both the risks to wild salmon and the sacrifices necessary to provide for their recovery.

For the Washington Department of Fish and Wildlife (WDFW) and other resource managers, no other single issue has commanded so much attention in recent years as the protection and recovery of Washington's native salmon populations. Habitat restoration, selective fisheries, supplementation programs at hatcheries – these and other efforts to protect and restore wild salmon runs are discussed in various sections of this report. (See Habitat, Salmon Harvest and Hatcheries.) The focus of this section of the report is on the wild stocks themselves.

There are six indigenous species of Pacific salmon (*oncorhynchus*) in Washington state, including chinook, coho, chum, pink and sockeye. (Steelhead are also a member of the *oncorhynchus* family, but have a different spawning history and are discussed in the Freshwater section of this report.) Salmon of the same species returning to discrete spawning areas, known collectively as a "stock," have genetic and behavioral characteristics that distinguish them from stocks returning to other spawning areas. This genetic diversity – a result of natural selection – is one of the primary differences between wild salmon and the more genetically homogenous hatchery fish.

Naturally spawning salmon that are genetically adapted to their environment have several advantages over introduced stocks: They are generally more productive, more resilient to environmental changes and exhibit a broader range of individual characteristics, such as run timing, age at return and adult size. Although hatcheries have succeeded in their primary purpose of supplementing naturally spawning salmon runs and providing additional salmon for harvest, hatchery fish are not a substitute for naturally spawning stocks which are better adapted to survival in the wild.

In 1993, a total of 438 salmon and steelhead stocks indigenous to state waters were identified through a joint effort by the Washington Department of Fisheries, the Washington Department of Wildlife and western Washington treaty tribes. Of the 294 salmon stocks identified, 151 were classified as "healthy,"

78 as “depressed,” 11 as “critical,” one as “recently extinct” and 53 as “unknown.” The Salmonid Stock Inventory (SaSI), as it is now known, also evaluated the status of 144 steelhead stocks, and has since been amended to include assessments of bull trout, Dolly Varden and cutthroat trout stocks. (See Freshwater Fish section of this report.) WDFW worked throughout the 1999-01 Biennium to complete an update on all stocks, scheduled for release in 2002.

This type of assessment presents a major challenge, since the long-term condition of a stock cannot be determined by simply comparing the number of fish returning in one time period to another. Ocean conditions, flooding, drought and a variety of other factors can cause major fluctuations in the number of salmon returning in any given year – and even for a decade or more. For that reason, the fact that most stocks – both wild and hatchery – returned in greater numbers each year from 1999 through 2001 should not be interpreted to mean that all these populations are on the road to recovery.

Returns of naturally spawning salmon in 1999 and 2000 are summarized below and on the next page by species and by area. Estimates of total run size include both the number of fish returning to their spawning grounds (“escapement”) and those caught in various recreational, commercial and tribal fisheries. While salmon harvested in fisheries are documented in catch reports, WDFW draws on a variety of data – including stream counts, weir counts, fishway counts and tag recoveries – to determine the annual escapement. As part of this process, 7,000 miles of spawning grounds are visually surveyed each year by WDFW staff to determine the number of naturally spawning salmon returning to certain stream areas. These estimates provide a baseline for managing the resource from year to year, and also serve as a starting point for assessing the long-term condition of individual stocks.

Puget Sound

All but one of the five salmon species that spawn in the Puget Sound area returned in relatively low numbers in 1999 and 2000. Returns of Puget Sound chinook salmon dropped sharply in 1999, then picked

SaSI Stock Status Classifications by Species

Ratings done in 1992-93, with update for bull trout, Dolly Varden, coastal cutthroat.

	Healthy	Depressed	Critical	Unknown	Extinct	Total
Chinook	54	35	5	14	0	108
Chum	48	3	2	18	1	72
Coho	37	34	1	18	0	90
Pink	9	2	2	2	0	15
Sockeye	3	4	1	1	0	9
Steelhead	36	44	1	60	0	144
Bull Trout/ Dolly Varden	14	2	6	58	0	80
Coastal Cutthroat	1	7	0	32	0	40
Total	202	131	18	203	1	555

up the following year. This annual variation can largely be attributed to environmental factors, which have little bearing on the long-term decline of naturally spawning chinook stocks listed in 1999 as “threatened” under the ESA. Adverse freshwater and marine conditions also appear to be the primary cause of low returns of coho, chum and pink salmon in many areas of Puget Sound, although this appears to be due largely to a cyclical phenomenon rather than a sign of long-term decline.

Wild coho in south Puget Sound are a particular concern, because marine survival rates and run sizes have been chronically depressed since the mid-1990s. The strong sockeye return to Lake Washington in 2000 was a bright spot in Puget Sound salmon runs during the 1999-01 Biennium.

Chinook Salmon

There are 17 indigenous populations of chinook salmon in the Puget Sound area, all of which have been in decline for more than three decades. In 1999, amid growing concern about the long-term viability of these stocks, the National Marine Fisheries Service (NMFS) listed all naturally spawning stocks as a single “threatened” Evolutionarily Significant Unit

(ESU) under the ESA. Ongoing efforts to restore these stocks have led to major changes in harvest management, habitat stewardship, timber practices and other activities discussed in this report.

The long-term decline in naturally spawning stocks is not readily apparent from estimates of total chinook salmon runs to Puget Sound over the past three decades. Supported by steady production of hatchery salmon, total annual returns fluctuated between 100,000 and 200,000 adults from 1968 through 2000, depending on environmental conditions and other factors. The main change during that time was the abundance of wild chinook, which declined from 30% to 50% of the annual run in the late 1960s through the 1970s to between 20% to 30% since the early 1990s.

The abundance of wild chinook salmon in Puget Sound dropped sharply in 1999, after extreme flooding in the 1995 brood year. The 1999 run of 13,892 fish was only half the size of the previous year, although returns of wild chinook increased to 29,060 fish in 2000 and 29,622 fish in 2001. As with most other salmon species, improvements in those years were most likely due to favorable freshwater and ocean conditions, although changing harvest practices have also reduced the incidental “take” of wild chinook salmon.

While fishing pressure on Puget Sound chinook stocks has been significantly reduced over the past decade, wild populations still face continued loss of habitat suitable for spawning and rearing. Continuing growth in the human population, and the demands



Smolt traps like these are a common sight on the Skagit River, where WDFW has used them to measure freshwater production of juvenile salmon since 1990.

it puts on the region’s natural resources, remain the greatest challenge to naturally spawning chinook populations in the Puget Sound area.

Coho Salmon

In 1999, record low returns of both wild and hatchery coho populations occurred throughout western Washington, southern British Columbia, and Oregon. Puget Sound coho populations were no exception. The decline in survival rates was particularly acute for South Puget Sound origin stocks, as evidenced by the less than 1% marine survival observed for the Deschutes River wild coho indicator stock in 1999. By comparison, approximately 20 % of Deschutes River wild coho returned in the 1983-92 return year period, followed by a survival rate of 4.4% in 1994-98.

The Voights Creek hatchery on the Puyallup River also reported a marine survival rate for coho of about 1%, and the Minter Cr. Hatchery, a major South Sound coho production facility, failed to meet escapement needs that year. North Sound coho marine survival rates, while low, did not experience the same precipitous decline in this period as the South and Central Puget Sound stocks.

A pilot study to identify the causes of the particularly poor return rates of coho to South Puget Sound in the late 1990s was conducted in 2000 by a multi-agency panel from WDFW, the Northwest Indian Fisheries Commission, the state Department of Ecology and other organizations. (*Fishing For Answers: Analysis of ecosystem dynamics, trophic shifts, and salmonid populations in South Puget Sound, WA, 1970-1999*). Preliminary findings suggest that abnormally poor production at the base of the regional food web and strong competition for food between naturally spawning coho and hatchery fish were major factors in this decline in returns.

Total run size estimates for Washington coho are not yet available for the 1999-2001 time period, due to their heavy contribution to mixed-stock fisheries. However, information from coded wire tags does provide an indication of wild stock spawning escapement and marine survival on a regional basis for those years.

- **South Puget Sound:** The escapement of naturally spawning fish for this region was at a record low level in 1999, largely a reflection of the record low marine survivals observed for South

Sound hatchery and wild origin coho in this time period. Escapements rebounded significantly in 2000. Recent sampling by WDFW has confirmed a significant portion of the natural South Puget Sound coho escapement consists of hatchery-origin fish from extensive net pen projects and other hatchery programs in the region, so natural spawning trends in this region are heavily influenced by hatchery origin coho abundance. South Puget Sound is currently primarily managed for hatchery coho production.

- **North Puget Sound:** The combined natural escapement to the major north Puget Sound river basins that are actively managed for wild coho (Skagit, Stillaguamish, and Snohomish River basins) was slightly below the aggregate escapement goal in 1999. There was a considerable improvement in the total escapement levels in the year 2000, as occurred elsewhere in Washington. Marine survival rates for these stocks, although low to moderate in relationship to historical levels, did not reach the critically low levels observed in South Puget Sound stocks. As with other Washington coho stocks, it is important to note that greatly reduced Canadian and other mixed-stock coho fisheries in the mid to late 1990s have resulted in much lower harvest rates for most Washington coho stocks.
- **Strait of Juan de Fuca and Hood Canal:** Although the 1999 escapement of Hood Canal naturally spawning coho was below the 21,500 goal, the 2000 escapement of 26,500 fish exceeded that goal. Similarly, the natural escapement to Strait of Juan de Fuca streams fell short of the 12,800-fish goal in 1999, but exceeded it in 2000 with an escapement of 19,000 fish.

Chum Salmon

Puget Sound fall chum salmon have been extremely successful over the last two decades. In the 21-year span between 1978 and 1998, Puget Sound wild chum runs exceeded 1 million fish 11 times, peaking in 1994 at just under 1.8 million fish. For this same period, Puget Sound wild chum escapements averaged 141,900 fish, and total wild run sizes averaged 838,000 chum. These levels compare favorably with past run sizes, and a 1997 chum salmon review conducted by NMFS concluded that Puget Sound chum salmon were “at or near historic levels.”

However, because of recent changes in conditions in the north Pacific Ocean, local chum salmon runs were significantly lower in 1999 and 2000 than the exceptional returns of the last two decades. Averaging 458,600 fish each year, returns in 1999 and 2000 may represent a shift to a period of lower overall productivity for this species. This decline in run size may relate to a recent drop in sea surface temperatures and food production in the region of the north Pacific Ocean used by chum salmon during their ocean life. This shift in ocean conditions and the relationship with changing chum salmon production follows a long term pattern (back to the early 1900s) of decadal length variation.

Accordingly, this recent contraction in Puget Sound chum salmon run sizes can be considered to be a normal part of the long term cyclic abundance of regional stocks, and should not be viewed as a decline to a depressed status. In fact, chum returns were generally very strong in 2001, breaking the pattern of the previous two years.

Summer chum salmon stocks in the Hood Canal and Strait of Juan de Fuca region are a separate issue – and a matter of continuing concern for WDFW and tribal co-managers. During the 1980s, summer chum returns declined from tens of thousands to an all time low of less than 800 spawners in 1990. In March of 1999, NMFS listed these summer chum as a threatened species under the ESA. Since 1992, WDFW has worked with the Point No Point Treaty Tribes, USFWS and NMFS to restore these stocks, with gradual success. Summer chum returns to Hood Canal were 4,526 fish in 1999 and 9,389 fish in 2000. Returns to Strait of Juan de Fuca were 577 fish in 1999 and 986 fish in 2000. While over 90% of these stocks now escape to spawn, some individual populations are still experiencing very small run sizes and escapements.

Pink Salmon

The pink salmon of Puget Sound are the southernmost stocks of this species in North America. They are abundant in most of the region’s larger streams on odd-numbered years (e.g., 1999 and 2001), and are represented by a single, small population (Snohomish River) during even-numbered years.

Puget Sound pink salmon are almost entirely naturally spawning fish, with small hatchery programs in Hood Canal and on the Dungeness River. Like



Sockeye salmon spawn naturally in two Washington lakes: Baker Lake and Lake Washington. The latter had a banner run in 2000.

chum salmon, the region's pink salmon have been abundant since the mid-1970s. For the 12 odd-numbered years between 1977 and 1999, five returns were over one million fish, and for one year (1995) returns exceeded two million pink salmon. During these same years, Puget Sound wild pink salmon escapements averaged 846,500 fish, and total wild run sizes averaged 1,197,400 pinks. These run sizes compare favorably with past returns, and a 1996 NMFS coast-wide review concluded that Puget Sound odd-year pink salmon were "close to historic levels."

The 1997 and 1999 returns of Puget Sound wild pink salmon averaged 658,800 fish, and may represent a drop to a lower overall productivity range for this species. This decline in run size, if it continues, is most likely related to the changes in the rearing conditions in the north Pacific discussed above for chum salmon. As with Puget Sound chum salmon, these changes should be considered to be a normal part of the pattern of cyclic abundance of local pink salmon stocks, and should not be viewed as a change in population status.

Sockeye Salmon

Two watersheds in the Puget Sound region support sockeye salmon populations: the Baker River (Skagit basin) and Lake Washington.

The Baker sockeye population is heavily influenced by the operation of two hydroelectric dams on the river, and as a result, spawning and egg incubation occurs in an artificial spawning beach. This run has had a variable production history, however, over the last ten years Baker sockeye have returned in good numbers (an average of 6,325 fish). Returns in 1999 and 2000 were 4,654 and 4,942 sockeye respectively.

Lake Washington sockeye display great variability in annual run sizes, in large part caused by winter flooding levels on the Cedar River. In years of extreme flooding, streambed erosion causes excessive losses of incubating sockeye eggs and alevins, resulting in poor production and run sizes four years later. The 1999 return was very poor, most likely as a result of severe flooding during the winter of 1995. This particular sockeye run has developed a pattern of large runs every four years, including one in 2000 with an estimated return of 460,000 fish. Thousands of anglers and tribal fishers participated in a successful fishery that year.

Washington Coast

Most coastal salmon populations met escapement goals in 1999 and 2000, although run strengths varied widely for each river and bay. Wild coho escapements have clearly improved since the mid-1990s, under new harvest restrictions imposed on U.S. and Canadian fishers. Ozette River sockeye, listed under the ESA as a "threatened" population, have also gained strength through active recovery efforts by the Makah Tribe.

Coastal Chinook

Coastal chinook include 10 major natural stock groupings returning to the Quillayute, Hoh and Queets rivers, as well as to Grays Harbor and Willapa Bay. These stocks include both spring/summer and fall run timings. While coastal chinook stocks are not listed under ESA, management of these stocks has been directed at achieving minimum escapement goals. Historical trends have exhibited wide fluctuations. After high abundance levels in the late 1980s, run sizes fell to more "normal" levels throughout the 1990s.

Coho Salmon

Natural coho escapement for all major wild populations on the north coast of Washington (Quillayute, Hoh, and Queets Rivers) were within the established goals or higher in 1999 and 2000. Escapement levels have been relatively high since the mid-1990s, due in part to reductions in Canadian interceptions and increased restrictions on U.S. fisheries designed to meet conservation needs for various wild stocks. The Grays Harbor combined natural coho escapement was below its goal in 1999

and 2000, while Willapa Bay was near goal in 1999 and above its goal in 2000.

Chum Salmon

The major coastal river systems all support wild chum salmon populations, although relative abundance levels vary widely. Chum returns to north coast streams (north of Grays Harbor) range from medium runs of a few thousand fish to very small runs of less than 100. Because of these small run sizes, no efforts are made to enumerate the populations north of Grays Harbor. Chum returns to the south coast were strong through the 1980s and early 1990s, but have declined in recent years. Run sizes for Grays Harbor chum salmon were below average in 1999 and 2000, with returns of 15,200 and 10,400 fish, respectively. Willapa Bay chum showed somewhat better performance in 1999 and 2000, with run sizes of 26,400 and 47,000 fish. As with Puget Sound chum, these shifts in abundance may be related to long-term climate changes.

Sockeye Salmon

Three stocks of sockeye salmon originate from Washington coastal watersheds. The Ozette and Quillayute stocks are very small, averaging less than 2,000 returning fish per year. The Ozette sockeye, which are listed under the ESA as a “threatened” population, have increased in recent years as a result of active recovery efforts by the Makah Tribe. Returns in 1999 and 2000 were 2,076 and 4,399 fish, respectively. The remaining coastal sockeye run returns to the Quinault system. Quinault sockeye returns over the last ten years from 1991 to 2000 have averaged 36,700 fish, but in 1999 and 2000 were substantially below average at 7,236 and 18,415 sockeye, respectively.

Columbia River

Most Columbia River salmon populations benefited from improving ocean and freshwater conditions in 2000 and 2001 – some spectacularly so. Fall chinook populations jumped to 1.3 million fish in 2001, while coho returns to the Yakima River were strong enough to permit the first coho fishery on that river in decades. Wild coho populations on the lower Columbia River also showed improvement, although the stock is still being considered for listing under the ESA.

Chinook Salmon

Columbia River chinook include 47 managed natural spawning stocks. Major groupings are distinguished by spawning areas and entry timing, returning in spring, summer and fall. Upriver “brights” are a component of the fall run, with a database that began in 1980. With the exception of large returns of fall chinook in the mid-1980s, abundance has been relatively stable for all stocks, with total abundance normally ranging from 500,000 to 700,000 adults. Returns jumped to 1.3 million chinook in 2001, due primarily to favorable ocean conditions.

This recent increased abundance should not diminish the concern for ESA listed fish and the continued trend of lower natural production. Mainstem and tributary dams have eliminated access to historic habitat and reduced survival of migrating juveniles and adults. Past hatchery practices of cross-basin transfers and mitigation efforts have also genetically homogenized many stocks. Today there are very few genetically distinct chinook populations, and many natural spawning chinook are first-generation hatchery chinook. Self-sustaining, native populations are rare in lower and mid-Columbia waters and non-existent in upper Columbia and Snake River.

On the Yakima River, a major tributary to the Columbia, spring chinook runs rebounded in 2000 and 2001 with the two largest runs in recent history. After dropping to a near-record low in 1995, spring chinook populations benefitted from a combination of high ocean survival and good freshwater flow conditions, generating very strong runs in the 1999-01 Biennium.

Coho Salmon

Most coho returns to the Columbia basin currently are from hatchery production. The majority of this production originates below Bonneville Dam, although there are small to moderate hatchery programs in the mid-Columbia Basin to meet in-river treaty fishery needs and other objectives. There is some natural production remaining in the basin, originating largely from lower river tributaries. The extent of natural production in this region, and its relationship to the hatchery populations, is under review.

Chum Salmon

The chum salmon of the lower Columbia River have been depressed since a population decline in the 1950s. Only two small populations remain: one stock

in Grays River and a second stock using several small streams just downstream of Bonneville Dam. The average run size for Columbia River chum from 1991 to 2000 was 2,520 fish. Returns in 1999 and 2000 were of average magnitude, with 2,400 and 2,500 chum salmon respectively.

Sockeye Salmon

The Columbia River Basin supports three sockeye populations: the Snake, Wenatchee and Okanogan river stocks. Snake River sockeye, which spawn in Idaho, were the first Pacific Northwest salmon population listed under the ESA. The population suffered a complete collapse, and annual run sizes between 1989 and 1998 ranged from 1 to 18 sockeye. The 1999 run size was only 19 fish, although the 2000 return jumped up to 447 sockeye – the largest annual return since 1977. This improvement is a direct result of recovery activities, including hatchery supplementation and protective fishery regulations.

The upper Columbia River sockeye spawn in tributaries to Lake Wenatchee and in the Okanogan River system. Like other sockeye populations in Washington, the abundance of upper Columbia sockeye can vary greatly from year to year. Over the last three decades these two sockeye populations have varied from a low of under 10,000 fish returning (1995) to a high of nearly 200,000 sockeye (1985). The 1999 and 2000 upper Columbia sockeye returns also displayed highly variable rates of return, with just under 18,000 fish in 1999, followed by a run of over 93,000 sockeye in the 2000 season.



A screw trap measures downstream migration of chinook and coho salmon on the Deschutes River.

APPLIED SALMON RESEARCH

Scientific research has long provided the foundation for salmon management in Washington state, never had that work been more critical than in the 1999-01 Biennium. With the listing in 1999 of seven new salmon and steelhead populations under the federal Endangered Species Act (ESA), virtually every management decision – from season openings to hatchery operations – rested on the ability of resource managers to determine the outcome with some measure of scientific certainty.

To meet that challenge, WDFW built on research and management protocols developed over more than three decades to improve understanding of issues ranging from hatchery straying to run timing. Data collected from coded-wire tags, a technology developed in the early 1970s, allowed WDFW to continue refining its forecasts of chinook and coho runs throughout the biennium. Analysis of otolith markings and DNA studies provided additional information on migration pathways, habitat preferences and harvest rates for specific salmon populations.

At state hatcheries, WDFW scientists drew on years of research in salmon culture to sustain and propagate depleted runs of wild salmon, while carefully assessing the impact of hatchery fish on wild runs. On the fishing grounds, selective fisheries became possible for the first time on a broad scale because of newly developed fin-clipping technologies. And in test fisheries conducted in Puget Sound, the Columbia River and Willapa Bay, two new types of commercial gear showed promise in dramatically reducing mortality among released fish.

Throughout the biennium, the Science Division of the Fish Program played a leading role in ensuring that agency management decisions were based on solid science and monitored to verify the results. Major new and ongoing scientific initiatives are discussed on the next page.

Marking Technologies

Mass-marking is a critical component of WDFW's efforts to conduct selective fisheries, allowing fishers to target hatchery-produced salmon while releas-

ing wild stocks. Department scientists also use marking techniques to assess compliance with ESA requirements, impacts of hatchery fish on wild stocks, and the life histories of salmon. Some new applications of marking techniques used during the biennium are listed below:

- **Otolith marking:** Thermal marking otolith of chinook in the Snohomish river basin demonstrated that local tribal fisheries largely target hatchery fish and can be opened without significant impacts on wild chinook. An ongoing marking effort, conducted by WDFW and the Tualip Tribe, also determines the extent of natural spawning by hatchery fish.
- **Otolith strontium:** WDFW scientists used otolith strontium, a naturally occurring element far more abundant in seawater than in most freshwater areas, as a tool to discriminate between the progeny of anadromous females and freshwater resident females. Studies conducted at Baker Lake have demonstrated that the summer “kokanee” fishery actually targets anadromous sockeye. In Lake Washington, WDFW collected otoliths from spawning sockeye in Bear Creek from 1998 through 2000 to determine whether salmon originating from the Cedar River Hatchery were straying into the creek. After decoding 1,200 otoliths, WDFW found no evidence of straying.
- **Scale sampling:** Using natural growth patterns on scales, unmarked/untagged coho were sampled in the Columbia River commercial net fishery from 1999 through 2001 to estimate the hatchery/wild composition of that portion of the harvest.
- **VIT identification:** Department scientists helped to develop a new marking technology called the visible implant tag (VIT), which provides researchers with a quick, benign and unambiguous way to identify the origin of sampled

An otolith, the calcified tissue from a fish's inner ear, displays a distinctive pattern similar to the rings on a tree.



Using a radio telemetry device, a WDFW biologist monitors the migration of tagged adult salmon upstream.

fish. The VIT, made of biocompatible material with fluorescent coloring to make it highly visible, is inserted into adipose tissue and remains there throughout the life of the fish.

- **DNA testing:** WDFW significantly expanded its DNA laboratory and is now using this technique to identify and characterize stocks, determine population interrelationships, evaluate reproductive success and guide hatchery operations.

Hatchery Research

The new listings of salmon and steelhead populations in 1999 brought a new level of scrutiny of hatchery operations in Washington state, even as WDFW worked to realign its facilities with the goal of wild salmon recovery. During the 1999-01 Biennium, the Department filed 128 Hatchery and Genetic Management Plans (HGMP) with NMFS to demonstrate compliance with the ESA, worked with a new science panel created to Congress to prioritize funding needs and developed a new process for ensuring that supplementation and wild stock recovery programs carried out at state hatcheries do not negatively affect native fishes. Key initiatives include:

- **Benefit/Risk Assessment Procedure (BRAP):** WDFW developed this diagnostic tool to help analyze the compatibility of each state hatchery with the goal of recovering wild stocks. The procedure focuses on the presence of naturally spawning stocks, quality and availability of spawning habitat and other factors to

Tests find experimental gear improves salmon survival

Two new types of commercial fishing gear tested by WDFW in 2000 and 2001 appear to give salmon a much better chance of survival after they are returned to the water than traditional gillnets. Both types of experimental gear, known as the “tangle net” and the “floating box trap,” could help sustain commercial fisheries in a new era of selective fishing.

In a series of test fisheries conducted in Puget Sound and Willapa Bay from June through December of 2000, WDFW found that only 55% of the chinook and 75% of the coho salmon caught with a standard gillnet were still healthy enough to swim away from the boat after release. By comparison, about 80% of the chinook and coho salmon released from a tangle net, first introduced in British Columbia, still appeared healthy. Using the floating box trap, the survival rate at the time of release was virtually 100%.

The primary advantage of the tangle net is that it is designed with a smaller, looser mesh (3.5 to 4.5 inches) to capture salmon by the head or teeth, allowing them to respire while in the net. Gillnets, which can have a mesh size of up to 8 inches, usually catch salmon by the head, which can compress their gills and suffocate them. In addition, unlike standard gillnets, the tangle net seldom leaves net marks on the body of the fish, potentially increasing their market price.

Left to fish for the same amount of time, tangle nets used in the test fishery caught about half as many chinook but just as many coho salmon as the gillnet in most areas. The floating box trap, which captures salmon by funneling them into a small webbed chamber, had the highest survival rates of any gear but also caught the fewest fish. Tested only in Willapa Bay, the floating box trap caught a total of 36 salmon, 34 appeared healthy at the time of release.

A second round of tests conducted in 2001 on the Columbia River showed improved results. This time, WDFW also tagged and monitored salmon released from the tangle net in an effort to estimate long-term survival.

In a test fishery conducted under contract with the Bonneville Power Administration, WDFW estimated that 91% of the spring chinook salmon caught in a tangle net survived to move on to other fisheries, hatcheries and spawning grounds. That compares to a survival rate of just 50% of the fish released from a conventional gillnet. This time, the tangle net caught as many spring chinook as the gillnet.

Implementation of tangle nets and careful fish handling will provide increased fishing opportunity for the commercial gill net fleet. Future experiments with selective gears will verify the post-release survival for spring chinook, evaluate the post-release survival for coho and explore other possible gear types.

A report on last year’s test fisheries involving the tangle net is posted on WDFW’s website at <http://www.wa.gov/wdfw/fish/commercial/selective/tangleprogress1.htm>



A chinook salmon is pulled from the small, loose mesh of a tangle net during a WDFW test fishery.

help determine the degree of risk, if any, a hatchery facility poses to depressed or listed salmon stocks. Based on those assessments, specific hatchery operations may be modified or eliminated, depending on the measured risk to listed species. In the winter of 2002, the WDFW Fish Program will develop a hatchery reform plan in response to BRAPs conducted on Puget Sound facilities.

- **Hatchery and Genetic Management Plans (HGMPs):** Developed by the National Marine Fisheries Service, HGMPs are required for any hatchery program that could potentially affect a listed species. Once a HGMP is approved by the federal government, the corresponding program is deemed to be in compliance with ESA. During the 1999-01 Biennium, 87 of 94 draft HGMPs for Puget Sound hatchery programs and 41 of 52 draft HGMPs for Columbia River hatchery programs were completed and submitted to NMFS. These HGMPs are currently undergoing tribal and NMFS review. HGMPs for approximately 60 coastal programs are scheduled to be completed by December 2002. Once ESA authorization is attained, HGMPs remain in effect until the program significantly changes. Programmatic review is expected every three to five years.
- **Hatchery Scientific Review Group (HSRG):** The Puget Sound and Coastal Hatchery Reform Project was created by Congress in 2000 to conduct a systematic review of how effectively hatcheries achieve the goals of helping to recover natural populations and support sustainable fisheries. Under that initiative, a nine-member panel of independent scientists – the HSRG – was appointed to make recommendations to Congress and to the co-managers on hatchery improvements for use in prioritizing projects along with necessary state and federal funding. Those recommendations, along with WDFW actions, will be included in the agency’s hatchery reform plan in 2002.
- **Salmon interactions:** In the most comprehensive program of its kind in the world, WDFW scientists

monitored the status and health of wild salmon populations to see if hatchery supplementation is beneficial or detrimental to wild salmon. Test results detected no impacts, but monitoring will continue for at least 30 years to make sure this is not the result of naturally occurring variations in fish populations.

- **Rearing pond tests:** Beginning in 1996, agency staff added inexpensive, floating and submerged structures at the Sol Duc hatchery to create a more natural rearing habitat. Preliminary results show the coho reared with in the modified raceways had a better survival rate than those reared in the standard containers. At the Elochoman Hatchery, agency scientists examined the differences in survival and physiology of salmon reared in a semi-natural rearing pond compared to those reared in a conventional hatchery pond. Fish from the semi-natural pond were larger at migration but the survival differential between the two groups was not as great as expected.
- **Genetic comparison:** In 2001, WDFW researchers completed the second year of a nine-year study at Minter Creek Hatchery comparing the genetic fitness of wild-spawning hatchery and native fish. The study will determine if the fitness of the hatchery fish is equal to that of the wild fish and if fitness changes over several generations.



A technician tags a smolt as part of the Yakima Klickitat Fisheries Project involved in salmon recovery work in the Columbia River Basin.



Salmon smolts, marked with new visible implant tags (VIT), are ready for release.

Habitat Research

WDFW has examined the effects of habitat alterations on salmonids over a number of years, focusing attention on the effects of piers and docks in marine and freshwater areas in the 1999-01 Biennium. These and other projects during the 1999-01 Biennium are summarized below.

- **Over-water structures:** The Department conducted a survey that found an average of one over-water structure per 150 feet of Lake Washington shoreline. Findings indicate that docks and other over-water structures provide hiding places for bass to prey on juvenile salmonids. The Department's goal is to identify ways to improve siting and design of docks to reduce predation of young salmon.
- **Puget Sound salmon interactions:** Collaborative research was initiated with the University of Washington in the spring of 2001 to determine the food competition and predation interactions between wild and hatchery-reared juvenile salmon in the nearshore waters of Puget Sound – the most altered marine habitat in the state.
- **Spawning studies:** WDFW led a multi-agency team studying the migratory behavior of maturing adult chinook spawning in the Lake Washington watershed. The team found that water temperatures around Ballard Locks and in the Sammamish River were critical to spawning

chinook. Efforts are underway to provide cool water refuges in key areas for chinook during their migration to spawning grounds.

- **Priest Rapids Dam:** As part of a multi-agency protection plan negotiated with the Grant County PUD, WDFW staff gathered and analyzed data to test specific hydroelectric operational strategies at the Priest Rapids Dam. Dam operations cause rapid fluctuations in river flow that strand rearing fall chinook. WDFW is assessing actual fish and wildlife impacts and will use this information to help design a long-term operations plan.

Salmon Research Publications

Berejikian, B.A., E.P. Tezak, L. Park, E. LaHood, S.L. Schroder, and E. Beall. 2001. Male competition and breeding success in captivity reared and wild coho salmon (*Oncorhynchus kisutch*). *Can. J. Fish. Aquat. Sci.* 58: 804-810.

Bumgarner, J., L. Ross, and M. Varney. 2000. Tucannon River spring chinook salmon hatchery evaluation program. 1998 and 1999 annual reports. WDFW Annual Report FPA00-17. 48 p.

Fresh, K.L. and G. Lucchetti. 2000. Protecting and restoring the habitats of anadromous salmonids in the Lake Washington Watershed, an urbanizing ecosystem, pp 525-544. *In* E.E. Knudsen, C.R. Steward, D.D. MacDonald, J.E. Williams, and D.W. Reiser (eds). *Sustainable fisheries management: Pacific Salmon*. CRC Press (Lewis Publishers) Boca Raton, FL.

Fuss, H. and J. Byrne. 1999. Evaluation of a Semi-Natural Rearing Pond for Coho Salmon. WDFW Progress Report prepared for the National Marine Fisheries Service, Columbia River Fisheries and Development Program. Portland, OR. 14 p.

Seiler, D., L. Kishimoto, and S. Neuhuaser. 2000. 1999 Skagit River wild 0+ chinook production evaluation. WDFW contract report to Seattle City Light. Seattle, WA. 76p.

Shaklee, J.B., T.D. Beacham, L. Seeb, and B.A. White. 1999. Managing fisheries using genetic data: Case studies from four species of Pacific salmon. *Fish. Res.* 43:45-78.

Vander Haegen, G., L. LeClair, and E. White. 2001. Evaluate tangle nets for selective fishing. Semi-annual Progress Report, February 1, 2001.

Volk, E.C., A. Blakley and S.L. Schroder. 2000. Otolith chemistry reflects migratory characteristics of pacific salmonids: Using otolith core chemistry to distinguish maternal associations with sea and fresh waters. *Proceedings of the second international symposium on otolith research and application*, Bergen, Norway, June 1998. *Fisheries Research* 46: 251-266. ■

FRESHWATER FISH

THE WASHINGTON DEPARTMENT OF Fish and Wildlife (WDFW) manages an estimated 8,000 lakes and more than 90,000 miles of streams for fish and wildlife. The Freshwater Fish Unit manages these waters for resident native fish, warm water (spiny ray) fish, steelhead, freshwater shellfish and sturgeon. In all, the unit manages more than 65 species of fish and hundreds of species of aquatic invertebrates with the goal of perpetuating healthy populations and providing angling opportunities.

Freshwater fisheries provide the most angling opportunities in the state. In fiscal year 2000, nearly 729,000 anglers were licensed for freshwater fishing. By the following year, the number increased to nearly 1 million. Assuming that half of all two-day licenses were purchased for freshwater fishing, these license sales generated an estimated \$12.5 million for the Wildlife Fund in the first year of the biennium and more than \$18 million in the second year. These anglers fished an estimated 16.1 million days during the 1999-01 Biennium. These activities provide essential income to many small local communities that depend on tourism, and contributed substantially to the state economy.

Approximately 17 million freshwater fish are harvested by anglers each year. Much of this harvest is from natural production, but WDFW also has substantial hatchery stocking and lake rehabilitation programs. Last biennium over 55 million freshwater fish (4.5 million pounds) were stocked in lakes and streams with fish produced at 34 hatcheries operated by WDFW. This included cold water species (e.g., trout and kokanee), warm water species (tiger muskies, channel catfish) and steelhead. Hatchery production contributed to a diversity of fishing opportunities ranging from walleye in eastern Washington to trout in high ("alpine") lakes. Well over 90% of the steelhead harvested statewide were produced at hatcheries in Washington, Oregon and Idaho.

An important management tool traditionally used by the Freshwater Fish Unit has been lowland lake rehabilitation. Twenty-two lake rehabilitations were conducted in eastern Washington during 1999 and

2000 to remove undesirable fish and maintain quality trout and warm water fish fisheries. A moratorium was placed on rehabilitations in 2001 while a comprehensive health and safety review of the program was undertaken.

Freshwater fish and aquatic species play an important part in maintaining healthy ecosystems as well as providing recreational fishing opportunities. But the health of freshwater species is under increasing pressure due to population growth and other factors which have impacted fish habitat and water quality. In 1998 and 1999, bull trout were listed by the U.S. Fish and Wildlife Service (USFWS) under the Endangered Species Act (ESA) throughout their entire five-state range. Department staff participated on the USFWS's multi-state bull trout recovery group to begin the first step toward recovery of the species. Steelhead in the middle Columbia River were also listed as "threatened" in 1999, and several other populations were petitioned for listing, including Issaquah Creek kokanee, coastal cutthroat in southwest Washington and green sturgeon. The Department currently is working with the USFWS on issues related to the listing petitions.

As part of its efforts to protect critical freshwater fish habitat, the Fresh Water Fish Unit during the past biennium continued its efforts to map the distribution of freshwater species. Information from this



Michael Skriletz, 12, holds a 7-pound walleye he caught in 1999 fishing in the lower Columbia River near Cathlamet.

activity is entered into various department databases and utilized by state, federal, local and tribal governments when making decisions on how to protect critical habitat for freshwater fish species.

The sections that follow cover staff activities directed at stewardship of the resource and providing freshwater fishery opportunities. Three major highlights for the 1999-01 Biennium included:

- **Youth Sport Fishing Program:** The program conducted 15 fishing events involving 8,900 young anglers and 680 volunteers throughout the state. A Youth Sport Fishing plan was developed and funded by the Legislature. The program's eventual goal is to interact with 24,000 kids annually.
- **Triploid Trout:** The Legislature authorized the Department to purchase up to \$400,000 worth of sterile (triploid) rainbow trout from private growers for stocking into lowland lakes. The Department purchased 44,000 fish in 2000, and 84,000 in 2001. Over 80 lakes throughout the state were stocked. The fish were large (averaging 1.5 lbs), drawing considerable interest by anglers. This program is expected to continue during the 2001-2003 Biennium at a slightly reduced level.
- **Meseberg Warm Water Fish Rearing Facility:** The first warm water fish rearing facility in the state received dedicated funding from the Legislature. Staff was hired to operate the Meseberg Hatchery/Rearing Facility, and im-



Nearly a thousand young people attended the WDFW Fishing Kids event in Vancouver during the summer of 2001.

provements were made to make it a fully operational hatchery, a milestone in providing fishing opportunities for warm water anglers.

RESIDENT/NATIVE FISH

The Resident/Native fish program unit is responsible for the management of resident trout, non-game fish species and freshwater shellfish. The resident trout program includes management of the lowland lake trout program, including landlocked salmon fisheries for kokanee, the high lakes trout program, and commercial crawfish harvest. Biologists also are involved in recovery planning efforts for weak and listed native resident fish stocks such as bull trout.

Trout Program

During the 1999-01 Biennium, WDFW's trout program provided recreational opportunity for at least a half million licensed anglers each year and an unknown number of anglers under the age of 15 who are not required to purchase a license. Those opportunities included lowland lakes fisheries, trout (including kokanee) fisheries, resident trout stream fisheries, high lakes trout fisheries and coastal cutthroat fisheries.

Lowland Lakes Trout Program

There are over 4,700 lowland lakes and reservoirs in Washington and about 400 of them are managed under WDFW's trout program. According to a 1995 angler preference survey, the lowland lakes trout program is the state's most important freshwater fishery in terms of both trips and participants. The survey estimated that nearly 36% of total days fished in inland waters occurs in lowland lake trout fisheries.

The lowland lakes season opener, the last Saturday of April, is historically one of the most popular outdoor events held each year in Washington state. Each year, approximately 200,000 to 300,000 anglers, including juveniles who do not need a license, participate in this fishery, and the 2000 and 2001 openers were no exception. Fishing effort was high and anglers enjoyed catch rates averaging over three fish per person. The daily limit is five.

The total number of catchable trout, seven inches or larger, stocked into lowland lakes increased from

2.3 million in 1999 to 3 million in 2001. Also, 16.5 million trout fry were stocked during the spring of 2000 for the 2001 trout fishery. As previously noted, triploid trout, planted by WDFW for the first time with funding provided in the 1999-01 operating budget, also proved to be a major draw for anglers.

During the off-season, WDFW worked to improve the growth and survival of stocked trout fry by eliminating undesirable fish species that compete for space or food, or prey on them. In 2001, the Department undertook a comprehensive review of its rehabilitation program to address potential health and permitting issues, and the program has temporarily been put on hold until the review is completed.

Lake rehabilitation is typically undertaken with the use of rotenone, a natural pesticide which is applied in specified amounts to kill undesirable fish species. Trout fry stocked into a lake after it has been treated with this plant-derived chemical have high growth and survival due to the lack of competition from other species. The alternative to lake rehabilitation is to stock larger fish, 8 to 10 inches long, close to the season opener. These fish are not affected by competition and are large enough to avoid becoming prey.

Between July 1, 1999 and June 30, 2001, twenty-two lowland trout lakes with a total of 1,300 surface acres were rehabilitated to enhance trout fisheries. The treated trout lakes included: Marshall in Pend Oreille County; Warden, South Warden, Index, Quincy, Burke,



An angler plays a Dolly Vardon on the north fork of the Skokomish River, the largest river emptying into Hood Canal.

North Teal, South Teal, Beda, Brookie, Herons, Falcons, Goldeneye, Coot, Lenice, Merry, and Nunnally lakes in Grant County; Herman, Lyle, and Quail in Adams County, Hatch in Stevens County; and West Medical Lake in Spokane County.

Undesirable fish species in these lakes included yellow perch, pumpkinseed sunfish, brown bullheads, carp, stunted largemouth bass, bluegill and goldfish. Re-entry of undesirable fish from other waters into the drainage was the most common reason why these lakes required rehabilitation. In Marshall Lake, for example, the illegal placement of yellow perch and largemouth bass required that lake to be treated. The

Triploid trout a big hit in lowland lake fishery

Triploid trout were a major topic of conversation among freshwater anglers in 2000, when WDFW first starting stocking them in lowland lakes. Forty percent of those surveyed had heard about them and 10% said they were a significant factor in their decision to purchase a fishing license.

Voracious feeders, triploid trout are sterile rainbows that grow to an average size of 1½ pounds each. The 1999 Legislature authorized the department to purchase up to \$400,000 worth of “triploids” from private growers for stocking into lowland lakes and they proved to be a highly popular addition to the fishery.

In 2000, approximately 44,800 triploid trout were stocked into 43 lowland lakes, fished by an estimated 21,500 anglers. Preliminary information indicates the fish were easily caught and anglers reported high satisfaction with the new stock. In 2001 approximately 84,000 triploid trout were stocked in 77 lowland lakes around the state. Changes were implemented during 2001 to include lakes with restrictive gear regulations and reduced bag limits to provide better conditions for second-year survival of the fish. The Department plans to continue the popular fishery during the next biennium at a slightly reduced level.

Anadromous Fish Releases and Returns

WDFW Hatcheries 1999/2000

STEELHEAD (Summer Run)

	Fish Return	Fish Upstream	Egg Take	Egg Take Goal	Fish Released (**)
1999					
Puget Sound	1,449	973	590,000	300,000	373,798
Coast	457	0	338,500	325,000	157,472
Col. River	13,058	9,051	4,546,120	5,737,600	4,135,924
2000					
Puget Sound	801	122	811,500	890,000	294,456
Coast	1,640	0	445,000	315,000	174,630
Col. River	17,254	9,760	4,248,321	6,033,200	3,231,684

STEELHEAD (Winter Run)

	Fish Return	Fish Upstream	Egg Take	Egg Take Goal	Fish Released (**)
1999					
Puget Sound	816	175	1,556,980	2,810,000	2,025,960
Coast	3,972	613	3,558,000	2,130,000	752,216
Col. River	7,600	5,490	2,785,096	2,935,000	2,004,942
2000					
Puget Sound	1,095	253	1,955,330	2,821,000	1,838,763
Coast	2,428	713	2,378,500	2,421,000	1,386,933
Col. River	8,347	5,873	1,190,246	3,025,000	2,081,765

SEA-RUN CUTTHROAT

	Fish Return	Fish Upstream	Egg Take	Egg Take Goal	Fish Released (**)
1999					
Puget Sound	268	268	None	None	--
Coast	156	143	38,000	40,000	36,099
Col. River	10,393	814	385,400	585,000	376,596
2000					
Puget Sound	264	259	None	None	--
Coast	None	--	--	--	--
Col. River	15,851	1,212	864,000	675,000	345,486

last, and only other, time Marshall Lake required rehabilitation was in 1953.

High Lakes

Anglers have been traveling to the high elevations of the Olympic Peninsula and the Cascade Mountains for more than 100 years to fish in Washington's high lakes, also known as alpine lakes. There are approximately 1,600 lakes in western Washington at

elevations of at least 2,500 feet above sea level. East of the Cascades, nearly 950 lakes lie above 3,500 feet, which qualifies them as high lakes. A survey of freshwater anglers in 1995 indicated that 175,000 anglers spend 1.35 million days fishing in high lakes each year. Angler use at present is believed to be equal or higher to the 1995 estimate.

The Department coordinates closely with constituent groups to stock high lakes and maintain fisher-

Freshwater Fish Releases and Returns

WDFW Hatcheries 1999/2000

	Egg Take	Egg Take Goal	Fish Planted **
RAINBOW TROUT			
1999			
Puget Sound	2,322,883	2,650,000	2,929,942
Coast	None	--	70,264
Col. River	15,399,228	15,880,000	5,854,639
2000			
Puget Sound	3,398,100	2,650,000	2,805,089
Coast	None	--	75,615
Col. River	14,665,612	15,880,000	7,172,785

	Egg Take	Egg Take Goal	Fish Planted **
CUTTHROAT TROUT			
1999			
Puget Sound	654,050	650,000	599,179
Col. River	1,671,025	1,791,000	720,284
2000			
Puget Sound	948,775	850,000	537,523
Col. River	1,860,678	1,791,000	1,057,657

	Egg Take	Egg Take Goal	Fish Planted **
BROOK TROUT			
1999			
Puget Sound	None	--	19,256
Col. River	1,075,995	900,000	239,269
2000			
Puget Sound	None	--	27,247
Col. River	309,628	900,000	310,622

	Egg Take	Egg Take Goal	Fish Planted **
BROWN TROUT			
1999			
Puget Sound	None	--	105,022
Col. River	1,619,256	1,000,000	558,375
2000			
Puget Sound	None	--	73,000
Col. River	2,161,929	1,000,000	547,425

	Egg Take	Egg Take Goal	Fish Planted **
GOLDEN TROUT			
1999			
Puget Sound	22,900	10,000	10,110
2000			
Puget Sound	None	10,000	18,348
Col. River	None	--	3,488

	Egg Take	Egg Take Goal	Fish Planted **
LAKE TROUT			
1999			
Puget Sound	None	--	1,015
Col. River	None	--	87,875
2000			
Col. River	None	--	85,606

	Egg Take	Egg Take Goal	Fish Planted **
TIGER TROUT			
2000			
Col. River	--	--	3,269

	Egg Take	Egg Take Goal	Fish Planted **
KOKANEE SALMON			
1999			
Puget Sound	14,662,542	13,650,000	7,083,891
Col. River	181,200	None	2,528,110
2000			
Puget Sound	11,072,148	13,650,000	7,825,286
Col. River	180,000	5,425,000	3,783,574

(*)= data for 2000 are preliminary.

(**)= Fish Released originate from the previous year's egg take.

ies. In each year of the biennium, approximately 40 volunteers helped to carry fingerlings into high lakes to be planted. Stocking has focused on maintaining the health of the lake ecosystems either by stocking at low densities, not stocking every lake, or avoiding stocking that could result in self sustaining populations. During the 1999-01 Biennium, approximately 400 lakes were stocked with more than 400,000 fish. This level of stocking has remained relatively constant over the last 10 years.

Native Nongame Freshwater Fish

In addition to such better-known species as rainbow trout and steelhead, Washington is home to 31 species of native freshwater fish that are not considered "game fish." And while such species as sculpins, chub, suckers and lamprey may not attract the attention of anglers, they do often play an important role within their various ecosystems. Some are an important source of food for other fish and animals; oth-

Status of Washington's Native Freshwater Gamefish Stocks

Very few native resident fish stocks are monitored due to limited resources. One exception is bull trout. Currently, it is the only resident fish species in Washington that is listed under the federal ESA, although petitions have been submitted to the U.S. Fish and Wildlife Service (USFWS) for Issaquah Creek kokanee, Southwest Washington/Lower Columbia coastal cutthroat, and green sturgeon. WDFW staff are actively engaged in recovery activities for bull trout and are working with the USFWS on issues related to the other petitions.

Bull Trout

In June of 1998, the U.S. Fish and Wildlife Service (USFWS) listed the Columbia River Distinct Population Segment (DPS), which includes all Washington's bull trout populations in the Columbia River Drainage, as a threatened species under the federal ESA. This action was followed by a listing of Washington's coastal populations in November of 1999. Presently bull trout are listed throughout their U.S. range, which includes Washington, Idaho, Oregon, Montana and Nevada.

There are 175 populations included in the listing, of which more than 80 are in Washington. The status of 72% of Washington's stocks is unknown due to a lack of resources to monitor them. However, nearly 18% of the total stocks are believed to be healthy, 3% depressed and 8% critical.

During the 1999-01 Biennium the Department participated in the following actions to address bull trout recovery/management:

- Participated in USFWS's multi-state agency recovery planning effort.
- Established seven recovery planning groups and initiated planning efforts for Washington bull trout populations.



Eight percent of Washington's bull trout populations are believed to be in critical condition. The status of most stocks is unknown due to a lack of resources.

- Conducted spawner surveys in 24 drainages, a threefold increase over the previous biennium.
- Carried out life history studies using radiotelemetry in the Tucannon and Touchet systems.
- Implemented numerous fishing regulations to protect the species.

These efforts appear to be having a positive effect, at least in some areas. Surveyors in the Lewis River system estimated 540 bull trout in 2000, nearly 100 above the previous, best count. Surveyors in the Touchet and Walla Walla systems saw increased bull trout redds in those systems during the past two years, and increased numbers of bull trout in the Skykomish system were reported. Bull trout numbers in the Yakima system appeared to be relatively stable; in 2000, Indian Creek bull trout redd counts were the highest since 1984.

Kokanee

The early-run Issaquah Creek kokanee population reached critically low population levels and was petitioned for listing as endangered under ESA in March 2000. Less than 10 kokanee were observed in the last two spawning seasons (1999 and 2000). A determination of listing is pending federal review. In a cooperative effort between WDFW, the Muckleshoot Tribe, King County, City of Issaquah, USFWS, and the King Conservation District, planning and implementation of a supplementation program for Issaquah Creek's early-run kokanee was initiated this past biennium with funding from the conservation district.

Cutthroat Trout

Both species of Washington's native cutthroat species were petitioned for listing as threatened under ESA. The USFWS determined that a listing for the westslope cutthroat was not warranted. The listing decision for Southwest Washington/Lower Columbia coastal cutthroat is expected in June of 2002. Coastal cutthroat distribution investigations began in Southwest Washington in May of 2001. During the last two months of the 1999-01 Biennium, 32 sites on the Cowlitz, Lewis, White Salmon and Washougal rivers were surveyed to determine the presence or absence of coastal cutthroat. Cutthroat were found at four of those sites. The 32 sites were all located in headwater areas.

WDFW staff has been working with USFWS to develop an ESA rule proposal for the Southwest Washington/Lower Columbia coastal cutthroat DPS should they be listed. This will allow important fisheries for other species to continue should a listing occur.

ers play an important role in mosquito control. Many are clearly visible in lakes and streams, adding to our appreciation of the outdoors.

Recognizing the value of these species to the natural environment, the Nongame Fish Unit worked during the 1999-01 Biennium to determine their distribution, habitat preferences and stock status. Two WDFW fish biologists sampled 154 different stream and lake sites to help develop distribution maps for each of the 31 species. The maps will be included in the second edition of the book *Inland Fishes of Washington*, along with a new identification key, developed by staff, to the 10 freshwater sculpins of Washington.

One nongame fish species, the Olympic mudminnow, was added to the state's list of "sensitive" species during the 1999-01 Biennium, joining the pygmy whitefish and the margined sculpin. The Washington Fish and Wildlife Commission approved the Department's proposal to list the mudminnow as a state-sensitive species because of its limited range (southeast Olympic Peninsula), and because of the loss of much of its primary habitat-lowland wetlands over the years.

Five species of native nongame fish presently are listed as "state candidate" species. The Umatilla dace, river lamprey, leopard dace, lake chub, and mountain sucker are all listed under this category. WDFW continued efforts to locate these species during the 1999-01 Biennium, and their status is still under review.

All nongame fish distribution data is compiled and is stored in WDFW databases. This information is made available to WDFW biologists as well as municipalities and other state and federal entities that need to evaluate the impacts of various projects on fish, wildlife and their habitats. Work was also initiated during the biennium on a nongame fish web page to make the information more accessible to governmental agencies and the general public.

Commercial Crawfish Fishery

WDFW manages a commercial fishery for crawfish in cooperation with treaty tribes in western Washington. Currently the commercial crawfish fishery is small relative to historical records. Fishing participation was down from the previous five-year av-



Gold Hill Lake, a high lake in Yakima County, is known for producing cutthroat trout.

erage (1994-1998). There were four active fishers in 1999 and 2000 compared to the five-year average of six. Total landings reported were 7,137 and 7,553 pounds for 1999 and 2000, respectively, up 8.9% and 15.2%, respectively, from the five-year average. Low market price may be a reason for the low participation. Prices reported on crawfish receiving tickets for 1999 and 2000 ranged from 75 cents to \$2.25 per pound.

STEELHEAD

Washington steelhead offer a unique fishing experience, attracting anglers from throughout the state, the nation and the world to catch one of the Northwest's premier sport fish. Major fisheries are conducted each year on rivers in the Puget Sound area, along the Pacific coast and on the Columbia River and several of its tributaries. Most river systems in these areas have annual returns of both hatchery and wild fish, with runs during both summer and winter months.

WDFW manages steelhead stocks in cooperation with federally recognized treaty Indian tribes, working with tribal co-managers to estimate run sizes, determine escapement objectives and establish harvest allocations. Harvest opportunities are shared between tribal and non-tribal fishers, in accordance with the federal court decisions. Exceptions are streams south of Grays Harbor and tributaries to the lower Columbia where there are no recognized treaty rights.

Between August 1997 and March 1999, the National Marine Fisheries Service listed four naturally spawning steelhead populations on the Columbia and Snake rivers under the federal ESA. Listed populations include:

- Lower Columbia River steelhead, listed as threatened March 19, 1998
- Middle Columbia River steelhead, listed as threatened March 25, 1999
- Upper Columbia River steelhead, listed as endangered August 18, 1997
- Snake River steelhead, listed as threatened August 18, 1997

In all areas of the state, steelhead fisheries are designed to maximize harvest of hatchery fish, while ensuring that spawning requirements for wild fish are met. On the Columbia and Snake rivers, WDFW worked closely with federal, tribal and other management entities to develop recovery strategies for listed populations. Fisheries were curtailed – not only for steelhead but also for trout and whitefish – to minimize impacts on depressed runs. The use of bait was also prohibited in areas of both rivers to reduce impacts on wild steelhead.

An estimated 90,000 anglers fished for steelhead in each year of the 1999-01 Biennium, an increase from 1997 when 86,700 anglers participated in the fishery. However, participation levels were still well below those in the 1960s and 1970s, when up to 160,000 anglers fished for steelhead each year. This overall decline in angler participation is due to a number of factors, including the closure of some waters to protect listed populations. In addition, ocean conditions during the 1990s were generally poor for steelhead, resulting in low returns. However, as with many salmon populations, returns of many steelhead populations showed a significant increase, marking the start of a possible upward cycle in steelhead abundance in many areas of the state.

Steelhead Hatchery Production

Angler catch records indicate that more than 90% of all steelhead harvested statewide were produced at hatcheries in Washington, Oregon and Idaho. Since the mid-1980s, all steelhead produced in Washington hatcheries have been marked by clipping their adipose fin to facilitate identification by anglers and fish managers. During the 1999-01 Biennium, 20 state hatchery facilities produced steelhead for har-



A WDFW employee holds a returning steelhead at the Kalama Falls Hatchery, where the Department has been studying the interaction of wild and hatchery fish.

vest and six of them also operated “supplementation” programs designed to facilitate the recovery of depressed wild populations.

State facilities involved in recovery efforts on the coast and in Puget Sound include those on the Hamma Hamma River and Lake Washington. Those involved in steelhead recovery on the Columbia River include those at the Tucannon River, the Touchet River, the Cowlitz River and the mainstem Columbia above Priest Rapids Dam. Hatchery fish returning to the upper Columbia River have been listed under the ESA as an essential component of wild steelhead recovery in that area.

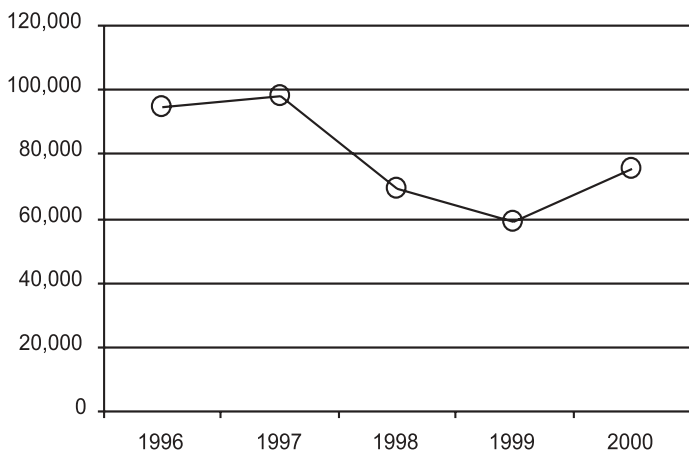
From 1994 through 1998, steelhead smolt production by agency facilities and volunteer cooperative projects averaged 7.4 million fish. In 1999 and 2000, smolt production increased to approximately 7.8 million fish.

Abundance and Harvest Trends

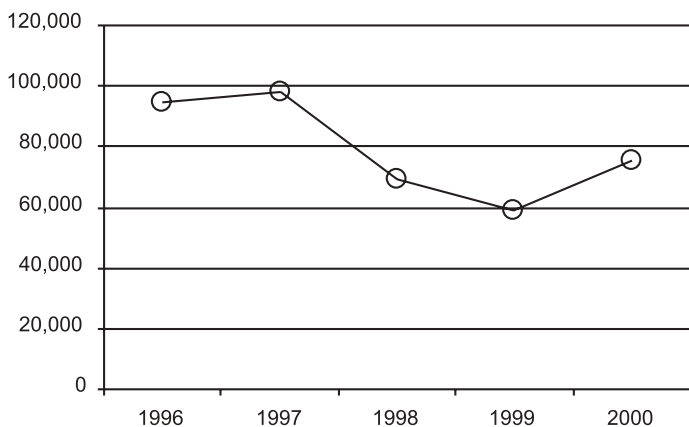
Overall steelhead abundance and harvest trends varied significantly by region during the 1999-01 Biennium. In 2000, wild stocks dropped unexpectedly

STEELHEAD HARVEST

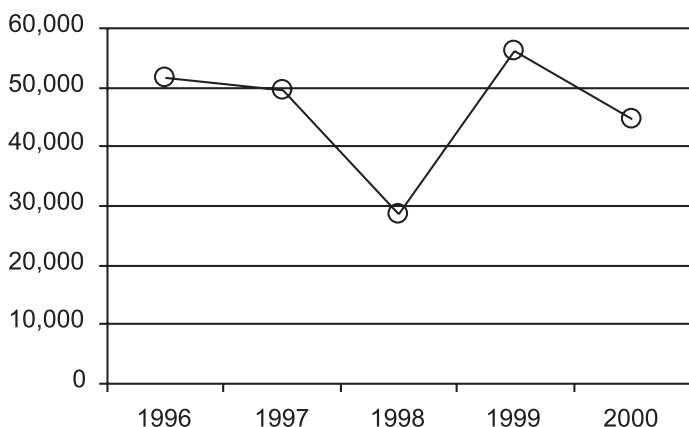
Sport Catch by Region



Statewide Sport Total



Statewide Tribal Total



in Puget Sound, but remained healthy on the coast and showed some improvement on the Columbia River. WDFW took emergency action on a number of rivers during the 2000-01 season in response to low returns in Puget Sound.

Statewide, sport fishers harvested 58,700 summer and winter steelhead in 1999 and 76,250 summer and winter steelhead in the year 2000. Of those totals, approximately 8.4% of the fish taken in 1999 were wild, declining to 5.3% in 2000. Tribal fishers harvested 56,250 steelhead in 1999 and 44,525 in 2000. Since the 1995-96 season, the catch by non-tribal anglers has averaged 79,400 fish and the catch by tribal fishers has averaged 46,350 fish. Below is a summary of wild steelhead abundance and area harvest trends for each of the three steelhead management regions.

Puget Sound Region: The status of wild steelhead stocks returning to tributaries of Puget Sound, including the Strait of Juan de Fuca and Hood Canal, declined from generally healthy to depressed during the biennium. Wild run sizes in North Puget Sound crashed unexpectedly in 2000, prompting WDFW to close some areas to fishing by emergency order and require the release of wild steelhead in others. In 2001, spawning escapement estimates for wild steelhead indicated North Puget Sound run sizes would be from 40% to 80% of escapement objectives. Runs in South Puget Sound and Hood Canal also were depressed, although streams along the Strait of Juan de Fuca were close to escapement levels, producing harvestable numbers of wild steelhead.

In 1999, sport anglers caught 15,800 steelhead and tribal fisheries took 3,700, for a total yearly harvest of 19,500 fish. In 2000, sport anglers caught 12,400 steelhead and tribal fishers took 3,700, for a total annual harvest of 16,100 fish.

Coastal Region: Wild steelhead stocks returning to coastal rivers remained healthy throughout the biennium. Wild run sizes in waters of the northern portion of the coast – particularly the Quillayute, Hoh, and Quinault rivers systems – produced substantial numbers of wild



A hatchery worker plants wild steelhead broodstock at the Kalama Falls Hatchery, where research is under way on supplementing wild runs.

WARMWATER FISH

The Warmwater Fish Program includes management and research activities involving 17 species commonly referred to as “warmwater” or “spiny-rayed” game fish. Both terms refer to this group’s relative tolerance to warmer water temperatures and the fact that most of these species have at least some rigid fin rays, or “spines.” The most well known and recreationally important members of this group include: largemouth bass, smallmouth bass, walleye, channel catfish, yellow perch, white and black crappie, bluegill sunfish and tiger musky.

steelhead meeting escapement objectives and providing harvest opportunities. Tributaries such as the Humptulips, Chehalis and Willapa Harbor river systems rebounded and produced run sizes that met or exceeded wild spawning objectives.

In 1999 sport anglers caught 10,200 steelhead and tribal fishers caught 35,600 for a total harvest of 45,800 fish. In 2000, sport anglers caught 14,600 steelhead and tribal fishers caught 20,000 for a total harvest of 34,600 fish.

Columbia River Region: While hatchery steelhead returns to the Columbia River basin have improved in recent years, wild stocks remained depressed in 1999 and 2000. Increased water flows during smolt out-migration and improved ocean survival helped to boost returns of all stocks, but not to the levels required to meet escapement objectives for wild steelhead. However, preliminary data for 2001 indicated marked increases in wild steelhead returns that year.

In 1999, recreational anglers caught 32,700 steelhead and tribal fisheries took 16,900, for a total annual harvest of 49,600 fish. In 2000, anglers caught 49,200 steelhead and tribal fishers took 20,800, for a total harvest of 70,000 fish.

None of the species in this group are indigenous to the State of Washington. All were introduced over a period spanning from the late 1880s, to as recently as the late 1980s. Most of these species were imported to Washington from the mid-western region of the country by the United States Fish Commission, acting on behalf of the region’s early settlers, who longed for fish species that were more familiar and reminiscent of home.

Fishing for warmwater fish is very popular in this state and has increased steadily until it is the second largest recreational fishery for game fish. There are many clubs and organizations focused on warmwater fish and fisheries including Walleyes Unlimited and B.A.S.S. The number of warmwater anglers is expected to continue to increase in the future and managing these species will become more important.

A major boost to warmwater fish management occurred in 1996 when the Legislature authorized a \$5 license to fish for bass, walleye, crappie, channel catfish and tiger musky. Senate Bill 5159 created the Warmwater Fish Enhancement Program (WFEP) and has provided more than \$1 million annually from license fees to fund projects to improve warmwater fish populations and fisheries.

Warmwater Fish Stock Status

Rarely do freshwater fish populations remain stable for an extended period without some form

of management intervention. When the predator-prey relationship is in an unbalanced condition, fishing opportunity and catch decline. Through periodic population surveys, assessments and management intervention, it is possible to prevent and/or reduce the length and severity of these swings in population balance, and thereby produce dramatic increases in opportunity and catch from existing fisheries. This approach is successfully employed by every state and provincial fish management agency in North America to improve fishing for warmwater fish species.

Since the establishment of the WFEP, a total of 49 warmwater fish population surveys have been completed. Approximately 30% of the lakes surveyed were in a balanced state regarding predator/prey relationships. During the last biennium, a total of 19 warmwater fish population surveys were completed.

Growing Popularity

Collectively, warmwater species comprise one of the most economically valuable and recreational important fish resources in Washington. A survey of gamefish anglers fishing in Washington in 1995 estimated that more than half fished for warmwater species. Warmwater angling accounted for an estimated 3.48 million days of recreation, or nearly a quarter of the total number of days fished for all game fish species combined in 1995.

The amount of recreation provided by warmwater species in 1995 ranked second only to that spent on lowland lake trout fisheries, and surpassed the amount of recreation provided by steelhead or salmon fishing. Approximately 25% of Washington's li-

censed game fish anglers expressed a preference for warmwater species over all other game fish. Both the level of activity and angler preference for warmwater species has increased steadily.

License simplification prior to the 1999-01 Biennium combined the warmwater license with the general freshwater license. This requires an annual survey of anglers to determine individual participation in fisheries for the seven warmwater fish species. Annual surveys of licensed anglers were completed in June 2000 and 2001. This WFEP user index closely follows user trends in the total warmwater fisheries program for the state.

The 41% increase in angler participation seen from fiscal year 2000 to fiscal year 2001 may have been due to changes in the fishing licenses structure, while the 18% increase seen between fiscal year 2001 and 2002 may be more indicative of growth of the WFEP and the total Warmwater Fish Program.

Warmwater Fish Production

During the 1999-01 Biennium, the warmwater fish production program at the Meseberg Hatchery proceeded with the propagation of black crappie, bluegill sunfish, saugeye, tiger musky, and channel catfish. All of these species need some extended rearing prior to being stocked into lakes around the state. Four additional rearing ponds have been acquired from the Ringold Salmon/Steelhead Hatchery to increase production capacity.

In addition to the production at the Meseberg Hatchery, statewide fish stocking of bluegill, black crappie, largemouth bass, tiger musky and channel cat-

fish continued from fish transfers with Idaho Fish and Game and purchases from Nebraska and California. Other production activities included collecting largemouth bass and bluegill from lakes that are overpopulated or scheduled for rehabilitation. These

Warmwater Production Summary

	1996	1997	1998	1999	2000
Walleye	267,226	664,319	292,196	510,223	0
Saugeye	0	0	0	0	2,275
Black Crappie	0	12,484	41,625	92,140	1,425
White Crappie	0	853	0	0	0
Tiger Muskie	0	5,503	3,081	1,980	6,300
Largemouth Bass	0	120,173	3,995	168	892
Smallmouth Bass	0	322	8,996	0	0
Blue Gill	0	----	22,954	115,940	36,704
Channel Catfish	12,350	75,155	45,672	38,761	21,446
Grand Total	279,576	878,809	418,519	759,212	69,042
Grand Total Production All Years					2,405,158

collected fish were transferred to waters where fish biologists have identified specific needs.

Youth Warmwater Fishing

The Warm Water Enhancement Program funded the Department's popular youth fishing program throughout the biennium. In 2000, 280 volunteers assisted more than 3,800 children at WDFW fishing events in six Washington cities. Nine youth fishing events occurred in 2001, and were attended by 5,100 children and more than 400 volunteers. With funding provided by the Legislature for a new youth fishing program, WDFW will sponsor 12 Fishing Kids events each year starting in 2002.

Warmwater Fish Enhancement Projects

The Warmwater Enhancement Projects Program acquires and improves habitat and warm water angler access statewide. Funds are also directed at maintenance and improvements at current WDFW warmwater fishing access sites. Since July of 1999, various warmwater enhancement projects have been completed, including boat ramp construction at Sprague Lake; ramp replacement at Silver Lake; aerator installation at Fazon Lake; access road and ramp improvements at Potholes and Evergreen Reservoirs, Sportsman's, Billy Clapp, Soda and Alkali Lakes; a carp barrier installation at Hutchinson and Shiner Lakes; and the purchase of property for a boat launch at Lake Kapowsin. Over 50 warmwater boat accesses were also maintained using warmwater funds.

Similar projects are currently under way including boat-loading float installations, access purchases, outlet screen installation, access road construction, fish-rearing cove construction, boat ramp improvements, warm water fish habitat projects and parking lot construction for walk-in fishing opportunities. This program continually pursues and receives hundreds of thousands of dollars in matching funds and partnerships from other state and federal agencies as well as private organizations.

Sturgeon

Two species of sturgeon exist in Washington, white and green. White sturgeon are the most abundant and support important sport and commercial fisheries. These fisheries are primarily in the Columbia River,

Willapa Bay and Grays Harbor, with small recreational fisheries occurring in the Puget Sound region. By far the largest fishery is in the lower Columbia River and is managed jointly with Oregon. As salmon fishing opportunities decreased in the 1990s, many anglers began targeting sturgeon, including charter boat operators. Catch-and-release fishing for sturgeon has also become very popular with anglers.

Sturgeon Management

One of the major initiatives undertaken during the biennium was the implementation of Fish and Wildlife Commission's management policy for Lower Columbia River sturgeon. The three-year management accord between WDFW and the Oregon Department of Fish and Wildlife was renewed. Annual white sturgeon harvest was set at 50,000 fish for 2000-2002, allocated 20% to the commercial fishery and 80% to the sport fishery. This required seasonal retention closures for the sport fishery. Staff



Agency biologists examine an "oversize" sturgeon found dead on the Columbia River. Fishing rules prohibit the retention of a sturgeon over 60 inches.

worked closely with constituents to craft these closures. The boat angling sanctuary for spawning sturgeon on the mainstem Columbia River downstream from Bonneville Dam was extended an additional two weeks to comply with the Commission's policy to reduce impacts to spawning sturgeon.

Under this management regime, Washington anglers averaged 94,500 trips, and harvested 23,200 white sturgeon per year from July 1999 through June 2001.

Stock Status

For the past 17 years, WDFW has received funding from the Bonneville Power Administration for biological studies on the impounded white sturgeon populations in the Columbia and Snake river reservoirs. The work is aimed at addressing population declines and reduced productivity due to dam construction and operation. Work within the Columbia

River tribal management zone (Bonneville Dam upstream to McNary Dam) includes supplementation of depressed populations through transplants of wild juvenile white sturgeon from the healthy Lower Columbia River population, and intensive harvest management and fishery monitoring. Other efforts include annual monitoring of white sturgeon natural production in selected Columbia and Snake river reservoirs, and participation in an experimental conservation hatchery supplementation project.

The Department is also involved with the Upper Columbia Sturgeon Recovery Team, a group comprised of researchers and managers representing U.S., tribal, and Canadian governmental entities. The focus is on developing and implementing a recovery plan for the imperiled trans-boundary white sturgeon population residing in the Columbia River from Grand Coulee Dam upstream to Keenleyside Dam in British Columbia. ■

MARINE FISH

PACIFIC SOLE, COD, HERRING, halibut, sardines – these are just a few of more than 200 species of marine fish that live their entire lives in the salt water environs of Puget Sound, coastal bays and the Pacific Ocean. Some, such as albacore tuna, are highly migratory, crossing the Pacific in large schools every year. Others, such as copper rockfish and quillback, seldom stray from a single rockpile. Pound for pound, marine fish represent the majority of all fish caught in Washington state waters, with annual landings far surpassing those for shellfish, salmon, trout and all other species combined.

In the 1999-01 Biennium, non-tribal commercial fishers landed a total of 108.8 million pounds of marine fish in Washington ports, with an ex-vessel value of \$27.6 million. Commercial fisheries on the coast and in Puget Sound accounted for about 93% of all marine fish landings, although recreational fisheries also made a significant economic contribution to the state and to coastal communities in particular. Recreational anglers and divers made more than 1.6 million trips to catch marine fish during the biennium, generating business for coastal merchants during the off-season for other fisheries.

Because of the large number of marine fish species and the wide variation in their characteristics, marine fish are divided into four categories for management purposes:

- **Groundfish:** Include such species as sole, cod, flounder and rockfish, which live close to the ocean bottom.
- **Forage fish:** Include such species as herring, anchovy, sardine, and smelt, which serve as a major source of food for other fish, seabirds and marine mammals.
- **Highly migratory species:** Include such species as thresher sharks and albacore tuna that cover great distances each year.
- **Unclassified marine fish:** Include such species as tidepool sculpins and blennies, which are typically small in size and historically have been of minimal interest to commercial or recreational fisheries.

As state and tribal fisheries have grown and expanded into new areas, many species – particularly groundfish that live near the ocean floor – have shown a dramatic decline in abundance in recent years. On the Pacific coast, the catch of such groundfish as lingcod, Pacific Ocean perch and various types of rock-



The copper rockfish has historically been one of the most common rockfish in Puget Sound. – Don Rothaus/WDFW

fish has dropped from 70 million pounds per year to about half that amount since the early 1980s. In Puget Sound, the decline in landings during that time has been even more severe, dropping 90% to less than 3 million pounds per year.

In 1999, the National Marine Fisheries Service (NMFS) considered a petition to list seven marine fish under the federal Endangered Species Act (ESA) and the U.S. Department of Commerce declared the entire West Coast groundfish fishery a “disaster” the following year. Although NMFS ultimately determined that none of the species warranted listing under the ESA, the Pacific Fishery Management Council (PFMC) imposed major reductions in the groundfish catch in federal waters beyond three miles of the coastline.

Compared to salmon and most freshwater fish, many species of groundfish are slow-growing, long-lived fish that reach reproductive age late in life. These factors make recovery of depleted groundfish stocks a long-term commitment, which was initiated through a series of actions in the 1999-01 Biennium.

To protect groundfish in state waters, the Washington Fish and Wildlife Commission took action in December 2000 to prohibit bottom trawling within three miles of the coast and adopted several new restrictions on the harvest of groundfish in Puget Sound. In all of these actions the Washington Department of Fish and Wildlife (WDFW) worked to provide state and federal decision-makers with information on stock conditions and expand scientific knowledge about marine fish and their habitat.

While groundfish conservation was the dominant issue in marine fish management during the 1999-01 Biennium, WDFW worked with the Fish and Wildlife Commission, tribal fisheries managers and others on a number of other key issues, including:

- **New marine reserves:** Two new conservation areas (no-fishing zones) and one marine preserve (most fishing prohibited) were established in Puget Sound to serve as “natural hatcheries” for marine fish of all kinds.
- **Trial sardine fishery:** Responding to dramatic growth in the abundance of sardines in coastal waters, the Commission approved a trial fishery for purse seiners in the summer of 2000 – the first such fishery in 50 years. A total of 10.8 million pounds of sardines were landed that year, followed by 24.4 million pounds in 2001.
- **Unclassified marine fish:** Prior to May 2000, the harvest of many small marine fish such as sculpins and blennies that occupy shallow water and intertidal areas was unregulated. Concerned about the growing demand for these species, the Fish and Wildlife Commission adopted daily bag limits to prevent overfishing of these near-shore marine fish.
- **Ban on live-fish fisheries:** In 1999, an increasing number of fishers approached WDFW

Landings of Marine Fish from Washington Waters 1996-2000 (Non-Treaty)
(Millions of pounds)

Year	COASTAL AREA		PUGET SOUND		ALL AREAS		
	Commercial	Recreational	Commercial	Recreational	Commercial	Recreational	All Landings
1996	41.8	1.2	3.5	1.6	45.3	2.8	48.1
1997	32.0	1.1	1.5	0.9	33.5	2.0	35.5
1998	38.6	1.8	1.8	2.5	40.5	4.3	44.7
1999	39.1	1.1	1.2	1.0	40.3	2.1	42.4
2000	42.1	0.9	1.0	1.0	43.7	1.9	45.6

about capturing marine fish live and selling them to restaurants, some of which were offering top dollar for this product. After checking with California and other states where live-fish fisheries had gained popularity, WDFW identified several problems, including increased pressure on declining groundfish stocks, competition with existing fisheries and a variety of enforcement issues. At WDFW's recommendation, the Fish and Wildlife Commission prohibited live-fish harvest of marine fish in November of 1999.

At WDFW, marine fish are managed by the Marine Resources Unit, which also has responsibility for managing shellfish within the Department's Fish Management Division. The total operating budget for the Marine Resources Unit during the 1999-01 Biennium was \$11.16 million, which includes state, federal and local funds. The unit had a total of 96.7 FTE staff, assigned to a variety of management and research responsibilities. Throughout the biennium, WDFW's Marine Resources Unit worked closely with the Fish and Wildlife Commission, tribal fisheries managers, PFMC, NMFS, fishers and other interested parties to meet the Department's goals of protecting the resource while providing fishing opportunities on healthy stocks.

Groundfish

Commercial and recreational fisheries off the coast of Washington routinely catch 82 species of groundfish, many of which are also found in Puget Sound. These species, led by Pacific whiting, arrowtooth flounder and sablefish, accounted for 78% of all marine fish landed in Washington state during the 1999-01 Biennium.

Of those species, only 23 have received formal stock assessments, due to the cost and difficulty involved in evaluating fish that live near the ocean floor over a wide geographical and bathymetric area. The status of coastal marine fish resources is determined under the leadership of the PFMC, which includes representatives of Washington, Oregon, California, Idaho, the federal government, treaty tribes and fishing organizations. For the "inside" waters of Puget Sound, WDFW focuses its monitoring efforts on such indicator species as Pacific cod, dogfish shark and copper rockfish rather than attempt to assess the status of all groundfish stocks.

Management of groundfish fisheries is shared by the state of Washington (the Fish and Wildlife Commission and WDFW), treaty tribes, the federal government (NMFS) and the PFMC, with the membership discussed earlier. The state and treaty tribes share responsibility for all fisheries within three miles of the coastline, while federal agencies have jurisdiction for those beyond that point out 200 miles.

Coastal Groundfish Actions

Throughout the 1980s and 1990s, as coastal groundfish stocks showed signs of decline, the Fish and Wildlife Commission and the PFMC imposed an increasing number of restrictions on both commercial and recreational fisheries. Reductions were made in commercial quotas and recreational bag limits, and a growing number of areas were closed to fishing both inside and outside of the three-mile line.

Despite these measures, NMFS declared in 1997 that seven coastal species were officially "overfished," defined as an abundance level less than 25% of what



Pacific cod are loaded into a tote at a fish processing plant on the Washington coast.

would be expected without fishing activity. Those seven species are lingcod, canary rockfish, yelloweye rockfish, Pacific Ocean perch, darkblotched rockfish, widow rockfish and cowcod.

In response to these findings, the PFMC implemented a conservation plan that included major reductions in the groundfish catch. For canary rockfish, a new coastwide quota was established as part of a long-term rebuilding plan for that species. The daily bag limit for recreational fishers was reduced to a combined total of two canary and yelloweye rockfish (commonly called “red snapper”), which also appear to be overfished. These and other conservation measures took effect in 2000, when the U.S. Department of Commerce declared the entire West Coast groundfish fishery a “disaster.”

While the majority of the groundfish harvest takes place in waters beyond three miles of the Washington coast, the federal action prompted concerns that more trawlers would move shoreward into state waters to escape the new federal restrictions. To prevent that from happening, and to provide greater protection for in-shore species, the Fish and Wildlife Commission voted in December 2000 to prohibit bottom trawling in all coastal waters of the state.

Protective Actions in Puget Sound

Concerns about declining groundfish stocks were not limited to coastal waters. In February 1999, NMFS received a petition to list 18 species of marine fish in Puget Sound – all but one of them groundfish (herring) – for protection under the ESA. WDFW also identified seven stocks as candidates for the state’s own list of threatened and endangered species. Puget Sound stocks identified by WDFW as being in critical condition include walleye pollock in north Puget Sound, walleye pollock in south Puget Sound, Pacific whiting in south Puget Sound, and Pacific cod in south Puget Sound.

Current Stock Status of Groundfish in Puget Sound

Stock Status	Number of Stocks	Percent of Stocks
Critical	4	10
Depressed	7	18
Average	2	5
Above Average	9	22
Unknown	18	45
Total	40	

Although NMFS ultimately determined that no Puget Sound groundfish stocks warranted listing under the federal ESA, the Washington Fish and Wildlife Commission took a number of actions to protect depressed populations.

- Marine reserves:** Two new conservation areas, where no fishing is allowed, were established at Waketickeh Creek on Hood Canal and Saltar’s Point Beach in southern Puget Sound in February 2000 to serve as “natural hatcheries” for groundfish. A marine preserve, where only salmon trolling is allowed, was established at Colvos Passage near Gig Harbor at the same time. Together with six other marine reserves, these areas protect about 20% of the known rocky habitat of Hood Canal and 8% of Puget Sound’s rocky habitat from non-tribal fisheries. WDFW worked with local governments and area tribes to plan these reserves.
- Rockfish bag limit:** The Commission reduced the recreational bag limit for rockfish to one fish per day east of Slip Point in Clallam Bay, in response to these species’ depressed status. (The previous limit was five per day in northern Puget Sound and three per day in southern Puget Sound.) The new limit was expected to reduce the total rockfish harvest by 50%. However, the Commission also increased bag limits for black rockfish in the Sekiu area to allow fishers to take advantage of harvestable quantities of that species in the western portion of the Strait of Juan de Fuca.
- Spiny dogfish:** A new commercial harvest guideline of 500,000 pounds was established in 2000 for spiny dogfish, which showed precipitous declines in 1998 and 1999. The guideline applied to all three types of dogfish gear: trawl, set net and set line.
- Sixgill shark:** Until recently, sixgill sharks were rarely caught in Puget Sound. In the late 1990s, after they were spotted by scuba divers in Elliott Bay off Seattle, they became a popular fishery for anglers. Because so little is known about this species, WDFW closed the fishery by emergency order in 2000 and the Commission made the order permanent in May 2001. WDFW is participating in a joint research program with the University of Washington, Point Defiance

Zoo and Aquarium, and the Seattle Aquarium to collect data on sixgill shark populations.

- **Lingcod:** The Commission also reduced the period of time the lingcod season is open to scuba divers from six weeks to less than four weeks. This was designed to address a growing conflict with anglers, who were required to observe size limits while divers – who cannot measure a fish before they spear it – were not. Anglers are now allowed to fish during the first three weeks of the season, before the dive season for lingcod begins.

Forage Fish

Forage fish include a variety of small finfish that serve as a major source of food for other fish, seabirds and marine mammals. Several species – including herring, anchovy, sardines and smelt – are also caught in commercial, recreational and tribal fisheries.

Herring

Herring, traditionally fished primarily for their eggs, have long been the most important species of forage fish for Washington's commercial fisheries. In the 1970s, commercial landings of herring in Puget Sound and coastal waters reached as high as 14 million pounds per year.

Since 1984, however, state and tribal fisheries managers have reduced the allowable harvest to just a fraction of that amount to protect depressed herring stocks at Cherry Point and later at Discovery Bay. In 1999 through 2001, conservation measures adopted by the Washington Fish and Wildlife Commission and WDFW have restricted herring fisheries to just 600,000 pounds each year, primarily for use as bait for other species.

With the exception of Cherry Point and Discovery Bay stocks, herring in Puget Sound and coastal waters appear to be relatively abundant. Estimates of herring spawning biomass conducted by WDFW indicate that approximately 13,000 tons (26 million pounds) of herring spawned in state waters in 2000 and 17,000 tons (34 million pounds) spawned in 2001. These numbers are comparable with results obtained in earlier years, including 1999 when approximately 16,000 tons (32 million pounds) of herring spawned in Washington waters.



A male lingcod guards an egg mass in Puget Sound. Lingcod have long been popular with both anglers and dive fishers. – Wayne Palsson/WDFW

Sardines

Sardines are small, schooling fish that inhabit coastal waters from Mexico to British Columbia. At times, sardines have been the most abundant fish species in the California current, forming the basis for a large commercial fishery along the Pacific Coast in the 1930s and 1940s. The population collapsed in the late 1940s and – until recently – the last recorded Washington landings occurred in 1951.

That changed in May 2000, when the Fish and Wildlife Commission approved the first commercial sardine fishery in Washington in nearly 50 years. Surveys showed that the sardine population in coastal waters had been growing steadily throughout the 1990s, reaching 0.4 million metric tons (882 million pounds) in 1995 and rising to 1.6 million metric tons (3.5 billion pounds) in 1999.

In response to requests from Washington-based fishers and processors, the Fish and Wildlife Commission approved a trial ocean purse seine sardine fishery for the 2000 season. Anchovy, mackerel, and squid could also be landed. WDFW issued 45 permits and 11 permit holders participated in the fishery, harvesting an average of 50,000 pounds per set. A total of 10.8 million pounds of sardines were landed into Washington (including those caught off the Oregon coast) in 2000, followed by landings of 24.4 million pounds in 2001.

Condition of Puget Sound Herring Stocks

Stock Condition	No. of stocks in 1998	No. of stocks in 2000
Healthy	7	10
Moderately healthy	3	2
Depressed	5	3
Critical	2	2
Unknown	1	1

The abundance of sardine off the coast primarily depends on two factors: population size and water temperature. The larger the population size and warmer the ocean temperature, the more abundant sardines are during the summer months. However, if ocean temperatures remain cool, then the Washington abundance could be low even though the total population size is high.

Sardine abundance off Washington is variable and subject to considerable change annually, and adopting conservative management practices at this stage in the development in the fishery was considered a prudent approach.

Anchovies and Surf Smelt

Anchovies are a schooling species of forage fish, most common along the southern Washington coast. Little is known of their abundance or changes in abundance from year to year. Anchovies are caught primarily for use as bait in small commercial fisheries. In 1999, the commercial catch was 215,600 pounds, followed by a catch of 173,400 pounds in 2000.

Surf smelt are a popular sport fish, caught using long-handled nets as they come close to shore to spawn. During the 1999-01 Biennium, recreational fisheries caught an average of 110,000 pounds of smelt each year. Commercial fishers caught 215,000 pounds in 1999 and 173,400 pounds in 2000.

Columbia River Smelt

Adult Columbia River smelt (more properly called eulachon) are found throughout the lower Columbia River system during the winter months. Like salmon, smelt spawn in fresh water and the young fish move to saltwater, where they spend most of their lives. Typically, the adult fish spawn in the lower Columbia River and tributaries between January and March. The Cowlitz River is a major spawning location and

site of much of the recreational eulachon fishing in Washington state.

Run sizes remained relatively stable from 1938 through the early 1990s, when commercial landing averaged 2.1 million pounds per year. However, landings dropped suddenly in 1993 prompting severe commercial and recreational harvest restrictions by WDFW and the Columbia River Compact. In 1999 and 2000, the commercial harvest was held to just 20,900 pounds and 25,500 pounds, respectively. Recreational fisheries, once open year around, were restricted to 14 days in 1999 and 18 days in 2000.

In 2001, the spawning run increased considerably and may be a harbinger of larger stock sizes in the future. WDFW eased fishing restrictions somewhat, allowing commercial fishers to catch 177,000 pounds of eulachon in the Columbia River and 154,300 pounds in the Cowlitz River. Fishing time for recreational fishers was increased to 22 days.

During the course of the biennium, WDFW worked with the State of Oregon to produce the Washington and Oregon Eulachon Management Plan, the first of its kind for the species. The Department also joined in cooperative studies to investigate the genetic variability of eulachon, surveyed the abundance of larval eulachon and took steps to protect spawning habitat for the species.

Highly Migratory Species

While a number of highly migratory species are found off the Washington coast, albacore tuna is the primary focus of commercial and recreational fisheries in the state. Other landings include thresher shark, blue shark and swordfish. There is not a fixed season for albacore, but fisheries generally begin in early to mid-July and continue until the tuna are no longer accessible off Washington, usually around mid-October.

Total annual landings of albacore tuna have averaged more than 4 million pounds since 1980, fluctuating from year to year with market conditions. In 1999, commercial and recreational fishers landed 4.6 million pounds of albacore, followed by a catch of 7 million pounds in 2000. These variations are most likely an indication of changes in availability, rather

than fishing effort, since the number of vessels participating in the fishery has been consistent.

The ports of Westport and Ilwaco receive the majority of landings of highly migratory species, which are fished primarily by commercial trolling vessels, albacore bait-boats, and recreational charter boats. Washington does not allow the use of setnets, drift gillnets, and purse seine gear in the Pacific Ocean.

In 1986-88, the state conducted an experimental drift gillnet fishery for thresher shark, which resulted in disapproval of the use of such gear because of high incidental catch of protected species (e.g., marine mammals and sea turtles). However, there is a directed swordfish/thresher shark drift gillnet fishery operating out of California and Oregon. In December 2001, the Fish and Wildlife Commission approved the landing of highly migratory species caught in drift gillnets south of the Washington/Oregon border at Washington ports, subject to a ratio of one thresher shark for every two swordfish. The purpose of this ratio is to discourage the targeting of thresher sharks which were overfished in the late 1980s and are currently rebuilding, while allowing fishers to target swordfish which are more abundant.

The Pacific Fishery Management Council is in the process of developing a federal fishery management plan for highly migratory species, with final approval scheduled for November 2002. Management alternatives include a federal license requirement,

mandatory logbooks, and regulations to account for and reduce the amount of bycatch occurring in commercial and recreational fisheries for highly migratory species.

Unclassified Marine Fish

Washington's coastline is home to a wide variety of small marine fish and shellfish such as sculpins and sand dollars that are often visible in tidepools and other shallow areas in Puget Sound, coastal bays and the Pacific Ocean. Until recently, WDFW did not manage these species, because they have historically attracted little interest from commercial or recreational fishers.

However, recent studies by the state Department of Natural Resources have indicated that these species may be subject to intense localized harvest pressure, resulting in a substantial loss of biodiversity in those areas. In May 2000, the Commission adopted new recreational limits for these "unclassified" species, adopting recommendations made by a committee of WDFW staff and members of communities that collect and use these organisms. (See "Marine Education" in the Outreach section of this report for more information.)

The new regulation approved by the Fish and Wildlife Commission established a daily limit of two fish per species for any marine fish not already classified and managed as a "food fish." Recognizing that sculpin species are difficult to identify in the field, the regulation limits the harvest of sculpins to two per day, regardless of species.

Marine Fish Science

Reversing declining marine fish populations and habitat damage or loss will take time and a dedicated effort. Fish Program scientists have been pursuing numerous research and monitoring projects to ensure the efforts are based on sound decisions. These projects can be grouped into three general categories: abundance or stock status assessments, habitat evaluation and pollution studies.



The tiger rockfish is one of a dozen different rockfish species found in Puget Sound.

Abundance

A key component of any resource management effort is knowing the abundance of a given species and how it has changed over time. Scientists working for the WDFW Fish Program are involved in a number of studies to improve stock assessments.

- **Black rockfish tagging study:** In 1999 and 2000, Fish Program scientists continued a multi-year mark-recapture survey near Westport that began in 1998. Westport is the principal location of black rockfish landings on coastal Washington. Mark-recapture data will be used to produce estimates of abundance, survival, and mortality for these fish in the Westport area.
- **Cape Flattery lingcod tagging study:** Over the past 15 years, WDFW has conducted annual lingcod surveys at Cape Flattery using bottomfish troll gear. The survey, involving the use of coded-wire tags, produces survival and abundance estimates needed for assessing the stock status of lingcod in that area. The Department has adopted a new survey technique – direct catch sub-sampling – that should yield abundance assessments with greater precision than the previous method, which relied on voluntary tag returns.

- **Trans-boundary groundfish survey:** WDFW staff conducted a bottom trawl survey in the eastern portion of the Strait of Juan de Fuca, including both Washington and British Columbia waters, during the spring of 2000. Staff assessed groundfish abundance and distribution, and the ways in which oceanographic features affect abundance and distribution. Preliminary results showed a greater richness of species on the U.S. side of the boundary with 70 species found compared to 49 species found on the Canadian side. Complete results of the survey will be published in early 2002.
- **Trans-generational marking:** One of the crucial questions surrounding Marine Protected Areas (MPAs) is whether larval fishes hatched from adults in the MPA survive and migrate to areas outside the MPA. A marking program will allow researchers to better quantify how MPAs contribute to fish populations in harvest areas. However, because it is impractical to mark juvenile fish by conventional means, WDFW staff began a trial program in 2000 to induce a trans-generational mark by injecting strontium chloride solutions into female parents prior to larvae extrusion. Results have shown this technique to be successful and the agency plans to continue its efforts in this area.



The F/V Chasina from Port Townsend was contracted to trawl for WDFW's surveys and studies during the 1999-01 Biennium.

Habitat

Without abundant and appropriate habitat, it is unlikely that any long-term fish recovery will be successful. The key to knowing the health of marine fish habitat is an accurate understanding of the amount and status of available habitat and how that habitat provides the elements needed for marine fish survival. Agency scientists have been working on a broad spectrum of projects designed to give an accurate illustration of the status of marine fish habitat.

- **Evaluating no-take refuges:** In 2000, WDFW continued fieldwork evaluating the potential of no-take refuges as a fisheries management tool for re-

covery of Puget Sound rockfish and lingcod. Research has shown that rockfish and lingcod survive to a larger size in protected areas. Fish densities and the number of lingcod nests are also greater in the no-take refuges compared to corresponding fished sites. This information – along with stock assessments, fishery data, refuge comparisons, and video assessments of rockfish and lingcod populations and their habitat – will be used in developing a system of no-take refuges to help manage Puget Sound rockfish and lingcod.

- **Identifying forage fish spawning habitat:** Several species of forage fish use very specific types of intertidal or shallow water areas for spawning. Because it is not yet possible to replace spawning grounds for forage fish once they are rendered unusable by human activity, identifying and protecting these spawning areas is vital to forage fish conservation. WDFW received a grant from the Puget Sound Action Team to generate maps of all known spawning grounds of Pacific herring, sand lance, and surf smelt in Puget Sound. The maps are a popular and effective resource for local governments, land use planners, developers, and environmental groups.
- **Drifting algae/seagrass habitats:** Drifting algae and seagrass – which provide an important nursery and refuge ecosystem for many juvenile fishes – were studied for the first time in a collaborative research effort between WDFW, the University of Washington, and the Olympic Coast National Marine Sanctuary. This research has provided the first data on the composition and dynamics of drifting habitats, producing important biological and ecological information on many associated species of juvenile marine fishes and food organisms. It also made a significant contribution to the genetic database for rockfish. These findings will help determine the implications of policy decisions related to surface marine waters. The information will also be very helpful in making resource damage assessments after toxic spills and the subsequent clean-up efforts.

- **Mitigating impacts of overwater structures on eelgrass:** Habitat managers have long been concerned about the impact residential-type overwater structures such as docks, piers and floats have on eelgrass – an important habitat for many finfish, shellfish, and aquatic bird species. As part of a long-term research, WDFW worked to identify ways that these structures can be built without negatively affecting eelgrass habitat. Permit applicants were asked to use building materials that allow light to reach the water beneath their overwater structures, then monitor the eelgrass beds underneath for three years after construction was completed. Survey findings led the Department to recommend approval of structures that have grating, are north-south oriented, and that are, when possible, removed from the water for part of the year. This appears to provide for no net loss of eelgrass.

Pollution

Pollution can dramatically harm the marine environment, flowing from a variety of sources that are sometimes far removed from the marine environments it contaminates. Pollution mitigation is closely linked with stock recovery and habitat restoration efforts.

- **Puget Sound Ambient Monitoring Program:** This is a multi-agency effort to monitor the ecological health of Puget Sound. WDFW's role has been to measure contaminant levels in a variety of marine fish and salmon species located in both polluted and clean environments. WDFW measurements have shown English sole from urban and near-urban areas were between two and 33 times more likely to develop liver disease than fish from clean reference areas. Herring from central and southern Puget Sound had significantly higher PCB concentrations than herring from northern Puget Sound and the Strait of Georgia. Exposure to polycyclic aromatic hydrocarbons, which come from petroleum or the combustion of fossil fuels, was elevated in herring from central and southern Puget Sound, but not in fish from northern Puget Sound. ■

SHELLFISH

SHELLFISH AND OTHER MARINE invertebrates are part of a complex and highly productive marine ecosystem that includes crab, shrimp, clams, oysters, sea urchins, sea cucumbers and dozens of other species less well known. Many of these species support major commercial, recreational and tribal fisheries, which contribute millions of dollars to the state's economy every year. As individual species and as a group, shellfish also play a fundamental role in the ecology of the marine waters beyond the state's shorelines and are an integral part of the cultural heritage of the Pacific Northwest.

Commercial landings of shellfish, exclusive of recreational and tribal fisheries, commanded an ex-vessel price of \$77.3 million in the 1999-01 Biennium, more than any other fishery in the state. Recreational and tribal fisheries contributed millions more in economic benefits, helping to sustain many small communities, including those affected by cutbacks in the timber harvest and salmon fisheries. Record landings were reported in several fisheries during the biennium, reflecting a high abundance of some species and growing participation by recreational, commercial and tribal fishers.

As with salmon and steelhead, the state's shellfish harvest is shared in common with recognized treaty tribes in Washington, a treaty right affirmed in 1994 by a federal court ruling commonly known as the "Rafeedie decision." Since then, the Washington Department of Fish and Wildlife (WDFW) has worked closely with tribal fisheries managers to develop joint strategies for managing and harvesting this shared resource.

Working together, state and tribal co-managers completed 25 shellfish management plans in each year of the biennium. These management plans establish catch allocations, fishing seasons, harvest regulations and other measures designed to protect the resource and adhere to the legal parameters set forth in the Rafeedie decision.

Since the mid-1990s, fishing pressure has increased dramatically for several species of shellfish, notably Dungeness crab, shrimp and geoduck clams. In Puget Sound, the number of recreational crab and



Landings of Dungeness crab reached record levels during the 2000-01 season in several areas of Puget Sound.

shrimp fishers nearly doubled each year between 1999 and 2001, requiring significant reductions in fishing seasons to prevent exceeding annual harvest quotas. Dungeness crab fisheries in Puget Sound and elsewhere have also been caught in a squeeze of competition between commercial, recreational and tribal fishers in recent years. In the geoduck fishery, WDFW enforcement efforts uncovered a number of instances of "high-grading," night poaching and other illegal practices.

While catch statistics indicate that most shellfish stocks were in good health, concerns about reductions in fishing time, allocation issues, the market value of the commercial catch and the deficiency of scientific stock assessments on many species prompted several changes in shellfish management during the 1999-01 Biennium. In many cases, WDFW worked to carry out policies adopted by the state Legislature and the Washington Fish and Wildlife Commission; in others, the agency took action to address emerging situations on the fishing grounds. Major initiatives were adopted during the biennium for the following fisheries:

- **Puget Sound Dungeness crab:** The first annual harvest quotas were established for Hood Canal in 2000 and expanded to other areas of Puget Sound the following year. The Commission also established allocation guidelines for recreational and commercial fishers, and required

that all recreational landings be reported on a new catch record card, as directed by the state Legislature. Beginning with the 2001 season, recreational openings for all types of crab gear – not just pots – were based on WDFW’s assessment of crab shell condition.

- **Coastal Dungeness crab:** A limit of 500 pots was established for all commercial fishers during the 1999-00 season. For the following year, the Commission established a two-tiered limit based on historical landings, which restricted some license holders to 300 pots. This action was taken in response to legislation approved in 1994, which called on the Commission to work with the industry to establish an “even flow plan” to extend fishing seasons and maximize the market value of the catch.
- **Puget Sound shrimp:** Following up on legislation approved in 1999, the Commission took action to convert the commercial fishery in Puget Sound to limited entry status on Jan. 1, 2000 and made licenses transferable in 2001. The Commission also approved allocation guidelines for state recreational and commercial fisheries that establish harvest priorities for specific areas of the Sound.
- **Sea urchins and sea cucumbers:** In 1999, the Legislature authorized a commercial license buy-back program, funded through a surcharge on license fees and an increase in the landing tax on these species. Revenues generated by these taxes and fees grew throughout the biennium and the Fish and Wildlife Commission approved rules for the buy-back program in December 2001. WDFW is expected to announce the first round of buy-backs in 2002.
- **Unclassified marine invertebrates:** In May 2000, the Commission established bag limits for a variety of marine invertebrates (e.g. shore crabs, marine snails, limpets, sea slugs) not previously regulated by the state. The Commission’s action was based on observations of large declines in the diversity of these species in heavily harvested areas of Puget Sound.

State responsibility for shellfish management is shared by multiple agencies, including the departments of Fish and Wildlife, Natural Resources,

Puget Sound Crustacean Management Regions



Management areas shown here are referenced in this section of the report.

Health, and Parks and Recreation. These agencies worked collaboratively throughout the 1999-01 Biennium to conserve the resource, protect public health, offer predictable and stable harvest opportunities and provide easy access to information the public needs to enjoy these public resources. To help meet this last objective, WDFW established a toll-free shellfish regulation hotline (866-880-5431) and expanded its website (www.wa.gov/wdfw) to disseminate information about shellfish seasons and other related issues.

At WDFW, the Intergovernmental Resource Management Group took the lead in developing new harvest management policies for shellfish, working in conjunction with treaty tribes, the federal government and other states throughout the biennium. State management of these resources are the responsibility of the Marine Resources Unit, which also manages marine fin fish within the agency’s Fish Management Division. The total operating budget for the Marine Resources Unit during the 1999-01 Biennium was \$11.17 million, which includes state, federal and lo-

cal funds. The unit had a total of 96.7 FTE employees during the biennium, assigned to a variety of management and research responsibilities.

Dungeness Crab

Dungeness crab (*Cancer magister*) gets its common name from the town of Dungeness, Washington, on the north side of the Olympic Peninsula where it was first harvested commercially in the mid-19th century. The species ranges along the West Coast of North America, from the Aleutian Islands in Alaska to San Francisco Bay in California. Still the only commercially-important crab species in Washington, Dungeness crab is also harvested by a growing number of recreational and tribal fishers in Puget Sound and coastal waters.

The Dungeness crab population is highly cyclical rising and falling in conjunction with biological and environmental factors such as water temperature and the availability of food. On the coast, harvest levels spiked during the 1999-2000 season, then dropped to around the ten-year average in 2000-01. In Puget Sound, the trend was reversed, with significantly higher landings in the second year of the biennium than in the first.

Judging from creel studies and harvest records, Dungeness crab stocks appear to be robust, with a relatively high catch-per-unit-effort (CPUE) reported in most fisheries during the 1999-01 Biennium. WDFW conducted monthly field sampling to investigate the condition of crab in certain areas, but overall stock abundance is not assessed due to the ab-



A crab pot is pulled aboard a commercial vessel in northern Puget Sound.

sence of a valid methodology and funding constraints. Rather, Dungeness crab management has long been based on the premise that male crab of a minimum size (ranging from 5³/₄ inches to 6¹/₄ inches according to area) can be harvested so long as they are not in soft-shell condition.

As discussed below, WDFW implemented several new policies designed to protect the resource and allocate the catch during the 1999-01 Biennium, ranging from harvest quotas in Puget Sound to pot limits on the coast.

Puget Sound Crab

The 2000-01 season was a record year for Dungeness crab landings in several areas of Puget Sound. After an average annual harvest of 6.55 million pounds during the 1999-2000 season, total landings by all commercial and recreational gear types jumped to 8.23 million pounds, the largest recorded harvest in the history of the fishery. The estimated ex-vessel value of the commercial catch for those two seasons, including both tribal and non-tribal landings, was \$27.6 million.

One reason for the spike in crab landing was the cyclical nature of crab stocks. Another was the rapid growth in recreational and tribal fisheries over the previous five years, when twice as many crab were harvested as in the previous 15 years.

While Puget Sound crab stocks still appear healthy, mounting pressure on the resource and the need to meet allocation commitments prompted several changes in the management of crab fisheries during the 1999-01 Biennium.

- **Harvest quotas:** Pre-season harvest quotas were established and implemented in most areas of Puget Sound for the first time in 2001 to conserve the resource, meet harvest-sharing commitments with treaty tribes and improve management of seasonal fisheries. Under the approach developed by WDFW, quotas could be adjusted up or down, depending on an analysis of early season catch and catch per unit of effort. After a frenzied season marked by early closures in 2000-01, the new quotas were instrumental in providing a full recreational crab season in most areas the following year.

Puget Sound Dungeness Crab Harvest, 1995-2000

	1995	1996	1997	1998	1999	2000
REGION 1						
Recreational	380,600	249,700	400,700	436,400	376,300	369,807
Commercial	2,151,188	1,610,065	2,080,507	1,411,693	1,398,776	1,746,366
Tribal	1,938,594	2,046,074	2,202,260	1,901,733	1,868,911	2,215,925
Total	4,470,382	3,905,839	4,683,467	3,749,826	3,643,987	4,332,098
REGION 2						
Recreational	254,500	204,000	228,000	322,200	378,095	569,219
Commercial	519,525	400,021	384,166	391,063	605,395	512,727
Tribal	358,151	680,576	594,554	699,472	900,881	1,166,605
Total	1,132,176	1,284,597	1,206,720	1,412,735	1,884,371	2,248,551
REGION 3						
Recreational	50,200	80,500	105,300	70,800	62,600	96,221
Commercial	154,854	243,927	236,186	153,542	169,706	364,458
Tribal	4,340	76,176	294,842	220,722	219,650	406,679
Total	209,394	400,603	636,328	445,064	451,956	867,358
REGION 4						
Recreational	27,500	29,500	44,800	35,900	35,800	46,000
Commercial	0	0	0	0	0	0
Tribal	13,973	11,907	52,574	27,653	37,736	41,639
Total	41,473	41,407	97,374	63,553	73,536	87,639
REGION 5						
Recreational	320,000	281,700	280,100	248,600	246,600	345,308
Commercial	0	0	0	0	0	0
Tribal	45,647	140,253	247,846	317,919	250,700	352,717
Total	365,647	421,953	527,946	566,519	497,300	698,025
REGION 6						
Recreational	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown
Commercial	0	0	0	0	0	0
Tribal	0	0	154	0	82	838
Total	0	0	154	0	82	838
Grand Total	6,219,072	6,054,399	7,151,989	6,237,697	6,551,232	8,234,509

of gear can be just as damaging to soft-shelled crab as pots, WDFW closed fishing to all types of recreational gear during molting periods in 2000. The Commission adopted this policy by permanent rule in 2001. Shell condition also became the prime determination that year for opening recreational fisheries, which previously were pegged to fixed dates. Surveys conducted by WDFW in recent years show a significant variation in molting periods from area to area, requiring more precision in setting seasons. Once additional survey work is completed, WDFW biologists hope to determine cycles for each area of the

- **Allocation guidelines:** In February 2000, the Commission established general allocation guidelines for non-tribal commercial and recreational Dungeness crab fisheries in Puget Sound. The policy generally gives priority to commercial fisheries in north Puget Sound, while managing Dungeness crab in south Puget Sound and Hood Canal “for the exclusive benefit of the recreational fishery.”(See next page.) These management priorities were based on historical harvest patterns.
- **Shell condition:** Prior to the 2000 season, recreational crabbers were allowed to fish year around with all types of gear except crab pots in Puget Sound. Pots were prohibited when the crab were in soft-shell condition to prevent unnecessary injury and wastage. Responding to recent studies that show that star traps and other types

Sound to provide greater predictability in season openings.

- **Catch record cards:** Beginning in April 2000, recreational fishers were required to report their crab landings on a catch record card (CRC), which were already used for salmon, steelhead, sturgeon and halibut. WDFW added Dungeness crab to the CRC at the direction of the 1999 Legislature, which saw the need for more accurate estimates of the crab catch to ensure equitable allocation of the resource between state and tribal fisheries. Unlike the old field-based methods for estimating the catch, the CRC system can also produce estimates for each of the different gear types as well as for the various marine areas. Although compliance with the new reporting system was too low to use CRC data during the 2000 season, it improved sufficiently to allow

Crab allocation guidelines for regions of Puget Sound

In February 2000, the Washington Fish and Wildlife Commission established general allocation guidelines for allocating the crab harvest between non-tribal commercial and recreational crab fisheries in Puget Sound. Regional guidelines, based largely on historical fishing patterns, are cited below.

- **Region 1** – Provide for an economically viable and stable commercial harvest opportunity for high quality crab consistent with state/tribal allocation constraints. Maintain a quality recreational fishery with emphasis on spring and summer seasons and recreational exclusive use areas. Seek to provide reasonable recreational fishing opportunity to recover from impacts of the treaty summer fishery.
- **Region 2** – Provide for an economically viable and stable commercial harvest opportunity for high quality crab consistent with state/tribal allocation constraints. Maintain a quality recreational fishery with emphasis on spring and summer seasons and recreational exclusive use areas. Seek to provide reasonable recreational fishing opportunity to recover from impacts of the treaty summer fishery in the western portion of this region. The state fishery in Port Townsend Bay will be managed for the primary benefit of the recreational fishery.
- **Region 3** – Provide for an economically viable and stable commercial harvest opportunity for high quality crab consistent with state/tribal allocation constraints. Maintain a quality recreational fishery with emphasis on spring and summer seasons and recreational exclusive use areas. Seek to provide reasonable recreational fishing opportunity to recover from impacts of the treaty summer fishery. The state fisheries in Discovery Bay, Sequim Bay, Port Angeles Harbor; and Dungeness Bay will be managed for the primary benefit of the recreational fishery.
- **Regions 4, 5, and 6** – The state fishery in these areas will be managed for the exclusive benefit of the recreational fishery.

WDFW to use catch-card information for in-season management in 2001.

WDFW shellfish staff conducted a series of meetings with recreational fishers throughout the state in both years of the biennium to explain proposed policies, review seasons and determine local preferences for keeping harvest levels within prescribed quotas. In Hood Canal, for example, fishing was limited to four days per week during peak summer months in 2001 to provide for a longer season. Discussions with commercial fishers also led to agreement on a new requirement that all crab buoys be marked with a new identity tag to facilitate enforcement of pot limits. The Fish and Wildlife Commission approved the new buoy-tagging requirement in December 2001.

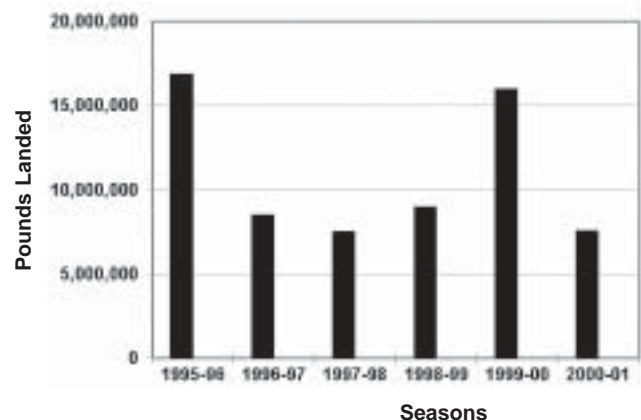
Pacific Coast Crab

Washington's coastal crab grounds extend from the Columbia River to Cape Flattery, near Neah Bay, and include Grays Harbor, Willapa Bay and the estuary of the Columbia River. While there is some recreational crab fishing on the coast, more than 99% of the catch was taken by 212 commercial vessels – both tribal and non-tribal – during the 1999-01 Biennium.

Total landings during the two-year period were 25.8 million pounds, reflecting a strong season in 1999-00 followed by an average catch the following year. The total ex-vessel value of the commercial catch for those two seasons, including both tribal and non-tribal landings, was \$50.1 million.

Crab landing data from the 1950s shows a large fluctuation in harvest, with landings ranging from a low

Washington State Coastal Dungeness Crab Harvest



of 2.5 million pounds in 1981 to a high of 21.8 million pounds in 1988. Biologists believe these fluctuations are related to water temperature, food availability and other ocean conditions.

The ex-vessel value of the commercial catch by both tribal and non-tribal fishers was \$32.6 million for the 1999-00 season and \$17.5 million for 2000-01, making a large impact on local economies. The commercial fishery is based out of the ports of Ilwaco, Chinook, Tokeland, Westport and La Push, where large seafood buying and processing facilities employ hundreds of people. The majority of the Dungeness crab fishery occurs during the winter and early spring months, long after summer tourists and sport fishers – and the dollars they generate – have left the region.

From the 1980s through the early 1990s the commercial fishery expanded to the point where half of the season's catch was being landed in the first three to four weeks of a nine-month season. In 1994, the Legislature approved a limited entry plan for the fishery and directed WDFW to work with fishers and processors to develop an "even flow plan," designed to extend the season and maximize the value of the catch.

Toward that end, the Washington Fish and Wildlife Commission approved a limit of 500 pots per vessel for the 1999-00 fishery, the first such limitation in the history of the fishery. In August 2000, the Commission adopted a "two-tiered" system, limiting license holders to either 500 pots or 300 pots depending upon historical landings.

As the biennium came to a close, WDFW staff continued to work with industry on development of a buoy tag program to strengthen the effectiveness of the pot limit. Staff also worked cooperatively with tribal co-managers and industry members to develop a harvest management plan for the 2002 summer fishery that will address potential molt of Dungeness crab before the season is closed in September.

Shrimp

Three types of shrimp are harvested in state waters by commercial, recreational and tribal fishers: pink shrimp, spot shrimp (prawns) and "sidestripe"



A WDFW biologist sorts shrimp during a study of bycatch in the fishery.

shrimp, which include a variety of species including dock shrimp (coonstripe shrimp) and humpback shrimp. All three types of shrimp are harvested in Puget Sound, and all except sidestripe shrimp are caught in commercial quantities in coastal fisheries.

During the 1999-01 Biennium, fishing pressure on shrimp varied significantly by area and by species. On the Pacific coast, a well-established commercial fleet of approximately 20 vessels landed 7 million pounds of pink shrimp and 250,000 pounds of spot shrimp during the two-year period – restrained, in part, by poor market conditions. In Puget Sound, however, competition between commercial, tribal and fast-growing recreational fisheries was so intense – primarily for spot shrimp – that WDFW fisheries managers estimate that any one of those groups could have taken each year's entire harvest quota by itself.

As with other shellfish, the shrimp harvest is co-managed by the state and treaty tribes, each le-

gally entitled to 50% of the harvest. Stocks in Puget Sound are managed on a regional basis, and appear to be healthy in all areas judging from harvest information. However, due to budget constraints, Hood Canal is the only area in Puget Sound or the coast where regular pre-season test fisheries are conducted to assess the relative abundance of spot shrimp and many areas are not surveyed at all.

As discussed below, continued growth in the Puget Sound shrimp fishery led to several policy changes in the 1999-01 Biennium, including a new limited-entry designation for the commercial fishery. WDFW, working together with the industry and treaty tribes, also helped to lay the groundwork for a "pots only" commercial fishery on the coast.

Puget Sound Shrimp

In 1995, the Fish and Wildlife Commission established regional quotas for all Puget Sound shrimp fisheries to protect the resource and to ensure an equitable allocation of the catch, as required under

the "Rafeedie decision." For the 1999-01 Biennium, WDFW and tribal fisheries managers developed 30 separate area harvest quotas each year: 17 for spot shrimp pot fisheries, six for non-spot pot fisheries and seven for trawl fisheries.

Recreational and tribal fishers mostly target the larger spot shrimp, while non-tribal commercial fishers use pot gear for spot shrimp and beam trawl gear for pink shrimp, also harvesting sidestripe shrimp with both kinds of gear. Non-tribal trawl quotas are restricted to non-spot species such as pink shrimp and coonstripe shrimp.

Fishing pressure on Puget Sound shrimp stocks has been building for a number of years. In 1977, commercial fishers severely depleted spot shrimp stocks in Hood Canal, resulting in a long period of recovery and the exclusion of the commercial fleet from the area. Since 1995, recreational fishers in Hood Canal have been restricted to one shrimp pot and seasons have been reduced dramatically to protect the resource and meet allocation requirements with treaty fisheries.

Puget Sound Shrimp Landings, 1996-2000					
(Excluding Hood Canal) - Landings in pounds					
	1996	1997	1998	1999	2000
Spot shrimp (pot fishery)					
Recreational	17,184	27,930	26,267	10,946	20,160
Commercial	41,173	60,024	60,755	50,701	56,705
Tribal	20,108	46,210	62,853	71,282	78,745
Non-spot shrimp (pot fishery) - (primarily Coonstripe)					
Recreational	2,124	3,452	5,922	3,776	4,653
Commercial	9,581	9,306	27,724	30,549	39,036
Tribal	0	0	5,503	0	314
Trawl Fishery - (primarily Pink)					
Commercial	651,848	678,455	707,292	648,965	683,931
Tribal	580,454	196,096	285,705	428,806	66,042

Elsewhere in Puget Sound, recreational fishing pressure nearly doubled each year from 1999 to 2001, prompting WDFW to substantially reduce fishing seasons to avoid exceeding area quotas. In 2001, recreational fishing time in central Puget Sound was reduced to four weeks at a time when fisheries in the San Juan Islands, the eastern Strait of Juan de Fuca and other inside waters also came under increasing pressure from growing recreational participation.

Hood Canal Spot Shrimp Fishery, 1995 - 2001						
Year	TEST FISHERY	RECREATIONAL			TRIBAL	TOTAL
	(Pounds/pot) Catch rate	Catch	#Pots*	Lbs./Pots	(lbs) Catch	(lbs) Catch
1995	5.43	183,813	35,215	5.22	13,659	197,472
1996	5.76	100,005	24,709	4.05	102,584	202,589
1997	6.24	89,900	19,284	4.66	88,404	178,304
1998	5.01	75,541	18,969	3.98	80,543	156,084
1999	4.56	71,760	16,767	4.28	72,136	143,896
2000	4.8	77,010	18,071	4.26	77,941	154,951
2001	4.64	73,900	16,779	4.4	74,400	148,300

During the biennium, WDFW addressed these pressures through a variety of in-season management actions, including reducing the number of days open to fishing each week, pot limits, depth restrictions and (with the exception of Hood

Canal) new shrimp size limits. At the same time, the state Legislature and the Commission adopted two measures with long-term ramifications for the Puget Sound fishery.

- **Limited entry:** On January 1, 2000, the Puget Sound commercial fishery was converted to limited entry, as directed by the Legislature under SB 2107. Only those fishers who held a 1999 commercial license and who were eligible to fish under the Emerging Fisheries Act qualified for a limited entry license. The legislation provided for two types of licenses: pots and trawl. In 2001, the Legislature made licenses transferrable and approved a “pot-stacking” provision, which allowed fishers who hold more than one license to increase the number of pots they can fish. Industry representatives worked with the Legislature and the Commission to develop all of these measures, which were designed to help maintain the viability of the commercial fishery after years of increasing fishing pressure.
- **Allocation guidelines:** In February 2000, the Commission established general allocation guidelines for non-tribal commercial and recreational shrimp fisheries in Puget Sound. The guidelines, based largely on historical fishing patterns, vary significantly for each Crustacean Management Region in the state.

While these policies helped to stabilize the fishery, WDFW shellfish managers recognized that additional measures may be needed in the future to protect the resource and ensure an equitable allocation of the catch. To help achieve these goals, state and tribal biologists formed a joint technical group to develop new methods of estimating shrimp abundance, review biological assumptions and assess other factors used to develop harvest quotas. In addition, WDFW formed a Puget Sound shrimp advisory panel, with representation by both recreational and commercial interests, to discuss season structure, harvest allocations and co-management issues prior to the annual season-setting process.

Pacific Coast Shrimp

Coastal shrimp were fished almost exclusively by non-tribal commercial vessels during the 1999-01 Biennium, providing a relatively stable source of income for coastal communities from Westport to Ilwaco.

Shrimp allocation guidelines for regions of Puget Sound

In February 2000, the Washington Fish and Wildlife Commission established general allocation guidelines for allocating the shrimp harvest between non-tribal commercial and recreational shrimp fisheries in Puget Sound. Regional guidelines, based largely on historical fishing patterns, are cited below.

- **Region 1** – Provide for stable and economically viable commercial shrimp trawl and shrimp pot fisheries consistent with resource conservation goals. Maintain a quality recreational fishery through use of recreational exclusive use areas where needed.
- **Regions 2 and 4** – Provide for growth of the recreational and commercial coon stripe and pink shrimp pot fisheries consistent with conservation goals. Maintain a quality recreational fishery through the use of recreational exclusive use areas where needed. For spot shrimp the department’s management intent will be to approximate a 60/40 recreational/commercial split on an annual and long term basis.
- **Region 3** – Provide for stable economically viable commercial shrimp trawl and shrimp pot fisheries consistent with resource conservation goals. Maintain a quality recreational fishery through the use of recreational exclusive use areas where needed. The state fisheries in Port Angeles Harbor and Discovery Bay will be managed for the exclusive benefit of the recreational fishery.
- **Region 5** – The state fishery in Hood Canal will be managed for the exclusive benefit of the recreational fishery.
- **Region 6** – Provide for growth of the recreational and commercial coon stripe and pink shrimp pot fisheries consistent with conservation goals. Maintain a quality recreational fishery through the use of recreational exclusive use areas where needed. The spot shrimp resource in these regions will be managed for the benefit of both the commercial and recreational shrimp pot fisheries.

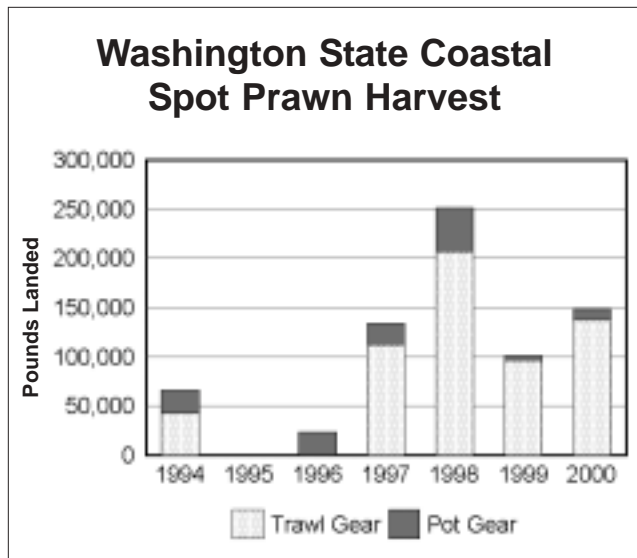
Pink shrimp makes up the bulk of the commercial harvest, although spot shrimp (prawns) has generated increasing interest by trawlers and pot fishers.

The pink shrimp fishery is well established, and is consistently open from April through October each year. The majority of the coastal Washington pink shrimp fleet is based in Westport, and delivers its catch to buyers and processors in Westport, Tokeland and Ilwaco.

During the 1999-01 Biennium, 22 active vessels landed approximately 7 million pounds of pink shrimp, with an ex-vessel value averaging 25 cents per pound. While this was a relatively poor price compared to previous years, fishers supplemented their earnings with the sale of groundfish caught incidentally to the shrimp.

Trawl landings for pink shrimp appear to be market driven, though they are also influenced by natural variations in production. Pink shrimp abundance off the coast of Washington is unknown but is assumed to be stable. Catch data is available but by itself is insufficient for assessing stock strength. Although there are no annual quotas on coastal pink shrimp, rules on trawl mesh size, season openings and allowable count-per pound are thought to provide adequate conservation protection for this species.

In contrast to pink shrimp, the commercial spot shrimp fishery is still a relatively new, developing industry. Started in the early 1990s by two Westport crabbers in search of a new fishing opportunity, the fishery has expanded to include not only pot gear but also trawlers.



Concern for the potential for over-harvest and over-capitalization of the fishery led the Department to designate the fishery as an experimental fishery under the Emerging Commercial Fishery Act in 1998. WDFW established an annual harvest quota of 250,000 pounds, and issued 15 permits based on historical catch criteria, as recommended by an industry panel of advisors. The majority of permit holders are Washington residents and most of these fishers live in coastal communities.

Fifteen vessels landed 101,000 pounds of spot shrimp in 1999 and 148,500 pounds in 2000. The highest value products are live shrimp that commanded an average ex-vessel price of \$8.00 per pound, while the average ex-vessel price for frozen "tail-only" shrimp was \$6.00 per pound. Spot shrimp (prawns) are sold in a variety of markets including dockside sales at Westport and Ilwaco and sales overseas, primarily to Japan.

The stock status of spot shrimp off the coast of Washington is unknown but assumed to be stable based on the fishery data information that has been generated. Due to the newness of the spot shrimp fishery and the concomitant lack of long term harvest data, stock assessment tools and models are still rudimentary.

The spot shrimp fishery takes place in waters beyond the state territorial sea and is evolving rapidly under the operational aspects of the Emerging Commercial Fishery Act. Due to concerns about the by-catch of other species by trawlers, WDFW worked with the coastal spot-shrimp industry during the second year of the biennium to develop a plan for converting trawl permits to pot permits. In December 2001, the Commission approved the conversion plan, which will phase out the use of trawl gear in the coastal spot shrimp fishery by Jan. 1, 2003.

Clams and Oysters

Washington's marine waters support a wide variety of shellfish, including clams and oysters. Habitat for shellfish abounds, with sandy ocean beaches, three major coastal estuaries and more than 2,300 miles of Puget Sound shoreline.

Major recreational, commercial and tribal fisheries harvest several clam and oyster species in three distinct habitats. On the coast, razor clams are abundant

in the 60 miles of sandy beaches, supporting a popular recreational fishery as well as a valuable tribal commercial fishery. Other intertidal clams, as well as oysters, are abundant along Puget Sound shorelines and are also found in the coastal bays. Giant geoduck clams are harvested on intertidal beaches and by commercial divers in subtidal habitats.

Recreational digging of intertidal clams and oysters is an extremely popular pastime in western Washington, generating more than 750,000 harvester trips during the biennium. Commercial harvest operations also contribute significantly to state and local economies. The ex-vessel value of the commercial geoduck harvest alone was more than \$30 million during the biennium, making it one of the most valuable shellfisheries on the west coast.

Intertidal clam and oyster fisheries on public lands are jointly managed by WDFW and western Washington treaty tribes under the "Rafeedie decision." WDFW's goals in managing the non-tribal portion of the harvest are to provide sustainable harvest opportunities while protecting the resource for future generations.

Razor Clams

Razor clams are the focus of a highly popular recreational fishery, drawing thousands of diggers to coastal beaches during scheduled openings. They also support tribal fisheries on the north coast and a small commercial fishery in Willapa Bay.

Washington's razor clams are found primarily on sandy beaches on the Pacific coast from the Columbia River to Kalaloch. WDFW conducts an annual coast-wide razor clam stock assessment during the late spring and summer months, with assistance from tribal governments whose members have fishing rights along portions of the coastline. Harvest quotas for upcoming recreational seasons are set based on the number of recruit clams (those over 3 inches in shell length).

Coast-wide razor clam stocks have remained relatively stable, averaging 13.3 million recruit clams for the past five annual surveys. The 1999 stock assessment produced an estimate of 13.1 million recruit clams with an average size of nearly 4.2 inches. The 2000 assessment generated an estimate of 14.9 million recruit clams with an average size of 4 inches.

Razor clam harvests are set and monitored within each of five management beaches: the Long Beach Peninsula, Twin Harbors between Willapa Bay and Grays Harbor, Copalis between Grays Harbor and the Copalis River, Mocrocks between the Copalis and Moclips rivers and Kalaloch within Olympic National Park. Fishery management plans are signed each year between WDFW and tribal governments with razor clam harvest rights.

Recreational razor clam seasons are set following a series of public meetings in the fall. These discussions allow WDFW to gather input from various stakeholders on season structure.

During the 2000 season, a total of 2.5 million clams were harvested by recreational diggers making an estimated 195,500 digger trips. Every management beach was open for harvest during portions of this period, except Kalaloch, which remained closed because of persistent high levels of the naturally occurring toxin, domoic acid.

During the 2001 season, an estimated 2.4 million clams were harvested in 178,100 digger trips. All five management beaches were opened at times during this season.

The positive economic impact generated by these razor clam fisheries makes a significant contribution to coastal economies. Razor clam diggers spend money in restaurants, motels, RV parks, gas stations and a variety of retail businesses.



Razor clam openings attract thousands of diggers to Washington's beaches, generating millions of dollars of revenue for coastal communities.

An analysis generated by the Grays Harbor County and Pacific County economic development councils estimated that the average digger spends \$25 per razor clam digging trip. Using the WDFW estimate of 371,400 digger trips made during the biennium, this equates to an economic benefit on the Washington coast of about \$4.6 million in spending by razor clam fishery participants each year.

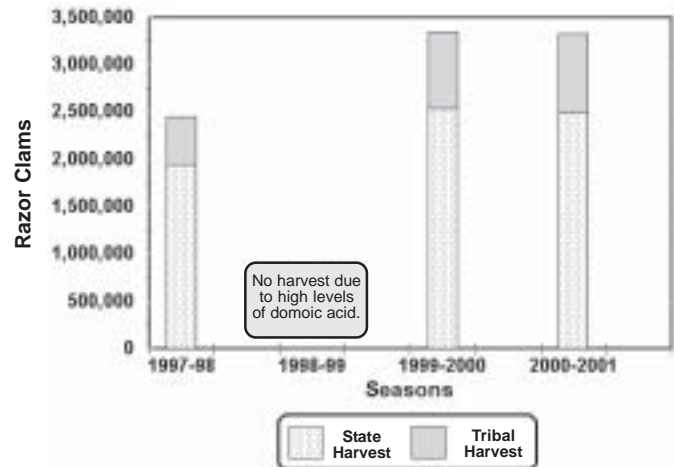
A commercial razor clam fishery has been conducted at the Willapa Spits since 1968, following the closure of ocean beaches to commercial harvest. Commercially harvested clams are sold primarily for crab bait, although those of good quality are also sold to the fresh market. The season is scheduled to open each spring after the recreational fishery ends, and generally runs six weeks pending acceptable toxin levels.

Approximately 90 harvesters participated in the commercial fishery each year of the 1999-01 Biennium, landing 130,000 pounds of clams with an ex-vessel price of \$1.00 per pound. Constant changes in the physical make-up and location of the spits and time and staff limitations preclude thorough assessment of stock abundance, which is assumed to mirror that of the coastal beaches.

Intertidal Clams and Oysters

Puget Sound is home to a variety of intertidal clam and oyster species, supporting recreational, commercial and tribal fisheries. Common species of clams found on intertidal beaches include Manila, butter, native little neck, horse, geoduck, eastern soft shell and cockles. Pacific and Olympia

Washington State Razor Clam Harvest



Intertidal Oyster and Clam Enhancement, 2001

Beaches Stock / Species	Quantity Planted	Sport Limit Equivalents
Pacific Oysters		
Birch Bay State Park	700 bags of seed 90,000 harvest ready transplants	30,000 5,000
Bay View State Park	50 bags of seed	2,500
Freshwater Bay County Park	10,000 harvest ready transplants	2,222
North Penn Cove	60 bags of seed	3,000
Cline Spit County Park	110,000 harvest ready transplants	6,111
Sequim Bay State Park	190 bags of seed 25,000 harvest ready transplants	9,500 1,389
North Sequim Bay State Park	120 bags of seed	6,000
Wolfe Property State Park	708 bags of seed	35,400
Illahee State Park	400 bags of seed	20,000
Potlatch State Park	1,200 bags of seed	60,000
Twanoh State Park	1,180 bags of seed	59,000
Penrose Point State Park	536 bags of seed	26,800
Frye Cove County Park	100 bags of seed	5,000
Tolmie State Park	40 bags of seed	2,000
Eagle Creek	65 bags of seed	3,250
Dewatto DNR 44A	62 bags of seed	3,100
Rendsland Creek	70 bags of seed	3,500
Manila Clams		
Freeland County Park	1,007,000 seed	6,293
Wolfe Property State Park	789,000 seed	4,931
Point Whitney	1,554,000 seed	9,713
Point Whitney Lagoon	1,160,000 seed	7,250
Shine Tidelands State Park	750,000 seed	4,688
Potlatch State Park	340,000 seed	2,125
Geoduck Clams		
Tolmie State Park	9,610 seed	2,563
Total		321,335

oysters are also found in varying degrees of abundance in Puget Sound. Coastal inlets, particularly Willapa Bay, support the same array of species, al-

though public access to the shoreline and the productive beds is relatively limited.

Most of the recreational clam and oyster harvest takes place on public tidelands in Puget Sound, encompassing more than 1,000 publicly owned beaches from Neah Bay through every basin of the Sound. The largest of these beaches are owned by several state agencies, including the Parks and Recreation Commission, the Department of Natural Resources and WDFW. Counties, cities and federal agencies also own beaches that are open for harvesting clams and oysters. Most commercial clam and oyster farming operations are located on private lands or on lands leased from the state, although WDFW operates a large oyster reserve in Willapa Bay that sells commercial harvest by auction.

While ownership is spread among a variety of organizations, WDFW and the tribal co-managers are the primary harvest managers of the inter-tidal clams and oysters. WDFW goals in managing the non-tribal portion of the harvest are to protect the resource while maximizing recreational harvesting opportunities for the general public.

In 2000, the recreational fishery harvested approximately 818,600 Pacific oysters and 187,000 pounds of “steamer clams,” including both native littleneck clams and Manila clams. In 2001, the harvest of oysters declined by nearly 19% and the harvest of steamer clams dropped by 12%. This decrease in harvest occurred despite high numbers of oysters and additional steamer clam beds being certified for harvest. The primary factors that affected the harvest rates were:

- **Paralytic shellfish poisoning (PSP):** The widespread presence of PSP in many parts of Puget Sound significantly reduced harvest opportunities in 2001. The dramatic increase of this naturally occurring toxin, which is potentially harmful to shellfish consumers, reduced the number of harvest days by 30% during the second year of the biennium.
- **Clam bed recertification:** The recertification of several clam beds, combined with strong oyster populations, helped to offset recreational harvest reductions caused by PSP. The Duckabush River estuary on Hood Canal, previously off-limits to harvesting because of fecal contamination, was recertified in August 2001 after testing

Point Whitney Shellfish Hatchery

The Point Whitney Shellfish Hatchery, established on Hood Canal in 1974, is WDFW’s only hatchery facility dedicated to shellfish production. The University of Washington also operates a shellfish hatchery in Manchester.

Since 1997, the Point Whitney facility has focused on the development of culture methodologies for native species of intertidal clams to provide the public with clams that are not produced commercially. In the 1999-01 Biennium, the hatchery produced Manila clams for the purpose of increasing harvest opportunities on key recreational beaches. In addition, the hatchery produced and planted more than four million Olympia oysters to restore this native species in Puget Sound and on the coast.

As part of WDFW’s shellfish culture program, the Department maintains 70 artificial shellfish beds occupying 99 acres of tidelands throughout Puget Sound. During the 1999-01 Biennium, 21 beaches were stocked with 5,481 bags of Pacific oyster seed, 235,000 harvest-ready Pacific oysters, 5.6 million Manila clam seed, and 9,610 geoduck seed. This stocking was expected to produce the equivalent of 321,335 recreational sport limits.

showed the shellfish were again safe to eat. This cleared the way for harvests on an estimated 480,000 pounds of harvestable clams and 18 million harvestable oysters. The “new” clam quota from the Duckabush tidelands alone is nearly three-quarters of the combined quotas on all public beaches in Hood Canal.

Intertidal shellfish management occurs on a beach-by-beach basis, an approach that allows WDFW to maximize recreational harvest opportunities wherever funding is available to conduct direct resource and harvest assessments. When staff time is not available to perform direct assessments of the most heavily harvested beaches, WDFW and the tribes have a long-standing agreement to reduce the allowable harvest on those sites by 25% from the most recent survey data. While this management approach

reduces potential harvests, it offers resource protection on a precautionary basis when direct assessment information is not available.

Beach-by-beach management also allows WDFW to meet harvest allocation objectives by trading harvest quotas between beaches with tribal co-managers. For example, in 2001 the state traded a portion of its clam harvest quota to the tribes on a health-restricted portion of the Dosewallips River estuary, which is not accessible to non-tribal diggers. The tribes harvest the clams on the estuary and relay them to an area with clean water for a prescribed length of time so that they can purge contaminants before going to market. The tribes in turn gave the state a portion of its share of harvestable clams at Potlatch State Park, clearing the way for a larger recreational clam harvest on the popular beach.

As discussed later in this section, WDFW participated throughout the 1999-01 Biennium in a major research effort to determine the causes of marine toxin production in coastal waters and to develop an early warning system to alert resource managers when an outbreak is imminent.

Geoduck Clams

While some geoduck clams can be harvested by recreational diggers on beaches during extreme low tides, the vast majority of geoduck grow in subtidal Puget Sound habitats and are harvested commercially by divers. Access to this resource is nearly unique in Washington marine waters in that it is harvested

through an auction system, rather than an open-access fishery.

One of the most valuable shellfisheries on the West Coast, geoduck had an ex-vessel value of over \$30 million during the biennium. The non-tribal portion of the geoduck clam resource is co-managed by WDFW and the Washington Department of Natural Resources (DNR). State and tribal harvesters, who have equal shares of the annual harvest, took 4.2 million pounds in 1999 and 3.4 million pounds in 2000, with an ex-vessel value of \$16.4 million in 1999 and \$15.2 million in 2000. The majority of the clams are shipped by air freight to Asia, primarily China.

Subtidal harvesting occurs in water depths between 18-70 feet and is coordinated with treaty Indian tribes through annual harvest management plans in six Puget Sound management regions. Fishery managers have adopted an annual harvest rate of 2.7% of commercial stocks to maintain adequate populations of this valuable resource, and to provide a sustained yield for the future. Non-tribal commercial harvest opportunities are secured through a competitive bid process conducted by DNR, with revenues generated by the fishery, in part, funding the Aquatic Lands Enhancement Account and a resource management account.

A final supplemental environmental impact statement (SEIS) for the geoduck fishery was completed in May 2001, revising and updating a 1985 environmental impact statement. Results of the SEIS demonstrated a need for continued study of post-harvest bed recovery, natural mortality, and age frequency distributions. Additional study is needed because of inaccuracies in catch reporting and geographical differences in growth, recruitment and natural mortality.

Water pollution continues to affect geoduck resources. In 1999, 47.7 million pounds of geoduck – more than one-fifth of the total biomass in the state – were off-limits to commercial harvesting because of contamination.

Water pollution continues to affect geoduck resources. In 1999, 47.7 million pounds of geoduck – more than one-fifth of the total biomass in the state – were off-limits to commercial harvesting because of contamination.

Recreational Clam and Oyster Harvest

	Year	Region 4*	Region 6**	Totals
Steamer clams	2000	42,200 lbs	144,500 lbs	186,700 lbs
	2001	60,200 lbs	103,000 lbs	163,200 lbs
Oysters	2000	50,000 oysters	795,000 oysters	818,590 oysters
	2001	23,600 oysters	665,000 oysters	688,600 oysters
Butter clams	2000	92,200 lbs	70,600 lbs	162,800 lbs
	2001	141,700 lbs	89,900 lbs	231,600 lbs
Cockles	2000	8,900 lbs	28,000 lbs	36,900 lbs
	2001	12,700 lbs	24,200 lbs	36,900 lbs
Razor clams	2000	--	2,588,300 clams	2,588,300 clams
	2001	--	2,476,300 clams	2,476,300 clams

* Region 4 includes northern Puget Sound, from southern King County to the U.S.-Canada border.

** Region 6 includes southern Puget Sound, the Strait of Juan de Fuca and the Pacific coast.

Compliance with fisheries regulations are sometimes difficult to ensure in geoduck fisheries. A 1999 investigation of the geoduck industry by the WDFW Special Investigations Unit documented more than 100 violations, including poaching, non-reporting and under-reporting of catch, harvesting in shallow water, off-tract harvesting, selling to unlicensed buyers and transporting clams in uncertified vehicles. The practice of discarding lower quality geoduck was found to be widespread. WDFW calculated the discard rate at one geoduck tract surveyed on Hood Canal at 28%.

A total of 50 felonies and gross misdemeanors were filed against one Canadian fish-buying company, and a number of other violations were turned over to tribal authorities. WDFW expects to file additional charges on at least four other companies in 2002 as a result of the two-year investigation.

Another result of the WDFW investigation was a strong commitment by harvest co-managers to improve monitoring efforts and make catch accounting an integral part of their state/tribal harvest management plans. As part of that commitment, the co-managers agreed to conduct post-harvest surveys on geoduck tracts to assess the condition of clam populations following a commercial harvest. The first post-harvest survey under this new initiative was conducted in 2001.

Sea Urchins and Sea Cucumbers

Commercial divers harvest sea urchins and sea cucumbers by hand throughout Puget Sound, primarily for sale to Asian markets. Initiated in 1971, the fishery is co-managed by WDFW and the treaty tribes, with non-tribal participation limited to those with a limited entry license.

During the 1999-01 Biennium, state and treaty tribal fishers landed 1.6 million pounds of sea urchins, with an ex-vessel value of \$1.4 million. During the same period, state and tribal fishers landed 1.1 million pounds of sea cucumbers, with an annual ex-vessel value of \$1.5 million.

A six-person advisory board, consisting of harvesters and buyers, makes recommendations to WDFW



WDFW biologists encounter a sea pen while conducting a geoduck clam survey in Puget Sound.

– Don Rothaus/WDFW

on harvest seasons and management issues. WDFW managers work closely with advisors throughout the harvest season to ensure accurate catch accounting and provide harvest opportunities to capitalize on dynamic market conditions.

Due to budget constraints, WDFW has not conducted stock assessment surveys for red sea urchins since 1995. As a conservation measure, Department and tribal shellfish managers agreed in 1998 on a 15% reduction in the annual total allowable catch (TAC) for red sea urchins, which remain in effect.

With the endorsement of the industry, the state Legislature approved a license reduction program (SB 5658) in 1999 to reduce the number of non-tribal participants in both fisheries. At that time, there were 47 sea urchin licenses and 50 sea cucumber licenses in fishers' possession, and the goal of the legislation was to reduce the number of licenses to 25 in each fishery. The program was funded by a surcharge on license fees and a tax on landing of sea urchins and sea cucumbers.

The Washington State Fish and Wildlife Commission approved rules for the buyback program in December 2001, allowing WDFW to schedule the first round of buy-backs in January of 2002.



State and tribal fishers landed 1.6 million pounds of sea urchins during the 1999-01 Biennium, with an ex-vessel value of \$1.4 million. – Don Rothaus/WDFW

Unclassified Shellfish

Washington's coastline is home to a wide variety of shellfish such as marine snails, shore crabs, limpets and sea stars that live in marine waters. They are often seen in shallow water and intertidal areas in Puget Sound, coastal bays and the Pacific Ocean. Until the 1999-01 Biennium, WDFW did not regulate the harvest of these species, because they have historically attracted little interest from recreational or commercial fishers. However, interest in harvesting of these species has grown immensely in recent years. As a result, significant declines have been observed in the number and diversity of these species on public beaches in Puget Sound, particularly in urban areas.

Acting on recommendations from WDFW staff and an agency-convened citizens' group, the Commission established a bag limit for all invertebrate species not classified as "shellfish" for management purposes. Effective May 1, 2000, an aggregate daily limit of ten organisms was imposed for all unclassified species. In addition, harvesters can collect two nudibranchs (aggregate all species) and five moon snails daily.

Shellfish Research

Shellfish support some of most important fisheries in Washington, contributing millions of dollars to the state's economy every year. Harvest pressure on crab,

shrimp and many other shellfish species is heavy, requiring WDFW and tribal fishery co-managers to make increasingly difficult decisions about when and how to best protect these valuable resources.

Unfortunately, scientific and biological information on many species is extremely limited. The very nature of the intertidal and subtidal environments that shellfish inhabit makes resource assessment, monitoring and management difficult. Funding limitations also require resource managers to make difficult choices about where to focus their research efforts.

Shellfish research in the 1999-01 Biennium was directed primarily at increasing baseline knowledge and understanding of the resource, improving management tools, developing and transferring technology, and protecting public health. Key research activities are summarized below.

- **Marine bio-toxins:** In August 2000, WDFW initiated involvement in a major research effort designed to identify the mechanisms of toxin production and distribution throughout Washington's coastal marine resources. Olympic Regional Harmful Algal Bloom (ORHAB) is a federally funded, multi-agency partnership to investigate the origins of open-coast blooms of biotoxin-producing algae. One goal of the program was to establish an early warning system for biotoxin outbreaks to protect public health, especially during coastal razor clam fisheries. This system was tested in 2001, when a relatively small outbreak forced the closure of one of the state's five razor clam beaches. Early warning helped to reduce disruption to clam diggers and coastal businesses. Major partners in ORHAB include Northwest Fisheries Science Center, University of Washington School of Oceanography, University of Washington Olympic Natural Resource Center, Battelle Marine Laboratory, Pacific Shellfish Institute, Saigene Corporation, Quinault Indian Nation, and the Washington departments of Fish and Wildlife, Ecology and Health.
- **Dungeness crab shell condition:** WDFW and tribal fishery co-managers continued field surveys in mid-1999 to better define the peak soft shell molting periods for Dungeness crab in Puget Sound. This action was in response to a conservation concern that crab fisheries were occurring during time periods when crab were soft shelled and mating, a very vulnerable phase

of their life cycle. The early focus of these studies was the San Juan Islands, Hood Canal and the Everett area where intensive recreational and commercial crab fisheries occur. In 2001, surveys of crab shell condition were initiated in the Strait of Juan de Fuca and Admiralty Inlet. Data from these field surveys showed that the crab molting period varies significantly from one area of Puget Sound to another and from year to year, complicating the crab season setting process. This research led to substantial changes in harvest periods, beginning in 2000.

- **Olympia oyster restoration:** Pilot studies were conducted in 2000-01 to investigate the potential for restoring stocks of the native Olympia oyster *Ostrea conchaphila* to certain areas in Puget Sound and Willapa Bay. Select beaches in Puget Sound and the Willapa Bay Oyster Reserve were planted with enhanced seed from local brood stock to establish study sites and create natural sanctuaries. Monitoring and other associated restoration activities will continue into the 2001-03 Biennium. Partners in the project include Puget Sound Restoration Fund, several treaty tribes, Washington Department of Natural Resources, federal agencies (NOAA and the U.S. Navy), private landowners and business interests, treaty tribes, commercial growers and young people.
- **Oyster aquaculture practices:** A joint study with researchers at the University of Washington and South Slough National Estuarine Research Reserve was designed to examine the influence of oyster aquaculture practices on estuarine habitat and biota including juvenile salmonids. Preliminary data in the four-year project, scheduled through 2004, suggest that some aquaculture practices such as oyster harvest operations negatively affect eelgrass. However, it was not clear how juvenile salmon utilize eelgrass or the oyster habitat that replaces it. Studies of juvenile salmon behavior and prey resources available in these habitats are under way.
- **Burrowing shrimp:** WDFW signed a memorandum of agreement with oyster growers and several other agencies in January 2001 to promote an integrated pest management (IPM) plan to deal with burrowing shrimp. As part of that

agreement, a research project was initiated to develop and test a monitoring program for burrowing shrimp that infest aquaculture beds and cause oysters to be smothered with mud and die.

- **Geoduck genetics:** Beginning in 1997, the WDFW Genetics Lab participated with researchers at the University of Washington in a three-year study of geoduck population genetics funded by Sea Grant. The goal of this project is to determine whether or not different genetic stocks of geoduck exist in Puget Sound and, if so, to define their geographic distribution. This information will be used to protect and manage the genetic diversity of this valuable resource. WDFW investigated protein (allozyme) markers and the University of Washington investigated DNA markers. ■



A WDFW technician sorts crabs, flatfish and other bottom-dwelling organisms during a Puget Sound trawl survey.
— Don Rothaus/WDFW



Guides to the great outdoors

Information about annual fishing and hunting regulations in Washington state is available in print, by phone and via the Internet. Rules pamphlets, shown above, are distributed by WDFW, license dealers and a variety of other outlets. Individuals and distributors can order copies by calling (360) 902-2454. All three pamphlets are posted on the Department's website (<http://www.wa.gov/wdfw/>), as are in-season fishing rule changes (<http://www.wa.gov/wdfw/fish/regs/fishregs.htm>). In addition, WDFW hotlines provide daily updates to in-season fishing rule changes for finfish (360-902-2500) and shellfish (1-866-880-5431). Information about hunting regulations is available at (360) 902-2515.

WILDLIFE

THE WASHINGTON DEPARTMENT OF Fish and Wildlife (WDFW) has stewardship responsibilities for nearly 600 wildlife species, more than 50 of which can be hunted during seasons established by the Washington Fish and Wildlife Commission. From deer and elk to spotted owls and bald eagles, each of these species presented its own management challenges during the 1999-01 Biennium.

Citizens' initiatives, legislative measures and legal actions set the stage for three of the most high-profile wildlife issues during the biennium: tribal hunting rights, cougar management and fur trapping. All three issues required WDFW and the Commission to develop new policies consistent with resource needs and changing legal requirements.

- **Tribal Hunting:** In the case of *State of Washington v. Buchanan*, the state Supreme Court reaffirmed treaty hunting rights on open and unclaimed lands within each tribe's aboriginal hunting grounds. Under the court's June 1999 ruling, aboriginal hunting grounds include areas ceded to the United States government by the tribes and other lands that a tribe can demonstrate it occupied and used for hunting over an extended period of time. In most areas where disagreements over the status of lands occurred during the 1999-01 Biennium, interim agreements were reached by the tribes, WDFW and county prosecutors. One example was the south Puget Sound region, where a limited availability of elk and varying interpretations of the treaty language had led the state and the tribes of the Medicine Creek Treaty to struggle with the location of the treaty southern boundary. WDFW joined with the affected county prosecutors and the Medicine Creek treaty tribes and developed a process that utilized an independent third party to establish the southern boundary for enforcing hunting activities. The findings of the third party determination have since been used by the tribes, WDFW and the affected county prosecutors to set rules for tribal hunting.



Migrating trumpeter swans attract thousands of bird watchers to the Skagit Wildlife Area every year.

- **Cougar Management:** Based on increasing conflicts and human safety issues between people and cougar, the 2000 Legislature amended a 1996 initiative (Initiative 655) that prohibited the use of hounds for hunting black bear, bobcat and cougar. The amendments directed the Fish and Wildlife Commission to authorize the use of hounds in specified areas of the state where cougar pose a public safety threat. The Wildlife Program assisted the Commission in this process by developing a model that identifies areas of the state where cougar problems were occurring and when the number of encounters should result in the use of hounds for public safety. The first public safety cougar removals were conducted from December, 2000 to March, 2001 with a total of 23 cougar being destroyed in 17 public safety cougar units.
- **Initiative 713:** In November 2000, voters approved Initiative 713, which changed the way in which animals could be trapped. The initiative made it unlawful to use body-gripping traps to capture any animal without a permit issued by WDFW. Permits were restricted to protecting listed species and public health and safety, alleviating animal problems or conducting wildlife research. As a result, trapping activity by licensed trappers declined by 65% during the 2000-2001



California bighorn sheep populations have rebounded from the severe winter of 1997, aided by transplants from Oregon and British Columbia.

season, followed by a rapid increase in damage complaints from landowners.

These issues commanded a great deal of attention by both WDFW staff and the public, eclipsing a number of other key developments in wildlife management during the 1999-01 Biennium. During that time, the WDFW Wildlife Program drafted long-term management plans for all seven of the state's major elk herds, joined in a broad-based eco-regional conservation planning effort and helped to recover species and habitat affected by the 2000 eastern Washington wildfire season – one of the worst on record. Four species were added to the roster of State Listed Species during the biennium, while WDFW biologists monitored deer and elk herds for signs of chronic wasting disease and investigated the source of lead poisoning which had killed more than 200 swans in Whatcom and Skagit counties.

For hunters, perhaps the most obvious change during the biennium was WDFW's new automated system for purchasing licenses, applying for special permits and reporting hunting activity. For the first time, hunters were able to complete all these transactions over the phone – or apply for permits and file hunting reports over the Internet. Despite some start-up problems, the new system is designed to provide faster customer service and more accurate hunter information in future years.

Public involvement in the process for establishing hunting seasons was never higher than in the 1999-01 Biennium. More than 3,000 members of the public attended meetings, logged on to the Internet, or wrote to WDFW and the Commission to express their views during the establishment of hunting seasons from 2000 through 2002. Generally, Washington's deer and elk hunters, who comprise more than 75% of all hunters in the state, saw season changes that liberalized seasons and created additional special-permit hunting opportunity.

Through the Internet, WDFW also reached an entirely new portion of the public with candid images of wildlife species in their native habitat. Using donated equipment, two WDFW employees created the highly popular EagleCam website, featuring eagle nesting behavior in real time. The website received more than 500,000 visits after it went on line in May 2001, creating a ready-made audience for BatCam, SalmonCam and other sites to follow.

The WDFW Wildlife Program, with lead responsibilities for all of these activities, is made up of four divisions: Game, Wildlife Diversity, Land Management and Wildlife Science. In the 1999-01 Biennium, the program as a whole had a total operating budget of \$35.6 million, supporting 213.7 FTE employees. Major program activities are discussed, by division, in this section of the report.

GAME MANAGEMENT

Within WDFW's Wildlife Program, the Game Division is responsible for managing more than 50 species that are sufficiently abundant and widespread to support recreational hunting and viewing opportunities. Under state law, WDFW is directed to maxi-

Wildlife Program Funding and Personnel, 1999-01 Biennium						
(dollars in thousands)	GF-S		OTHER FUNDS		TOTAL	
	Funding	FTEs	Funding	FTEs	Funding	FTEs
Administration	\$565	--	\$1,825	16	\$2,390	16
Game Division	\$783	5	\$5,222	27	\$6,005	32
Wildlife Diversity	\$713	6	\$3,539	25	\$4,252	31
Science Division	\$675	6	\$4,045	24	\$4,720	30
Lands Division	\$5,866	29	\$12,380	76	\$18,246	105
Belated Claims	--	--	\$18	--	\$18	--
TOTAL	\$8,602	46	\$27,029	168	\$35,631	214

mize hunting opportunities for Washingtonians while also ensuring the health and long-term viability of wildlife populations. The Game Division worked throughout the biennium to gain up-to-date knowledge about the biological status of individual wildlife populations to provide a scientific basis for management decisions by WDFW and the Washington Fish and Wildlife Commission.

Most big game populations showed substantial recovery from the hard winter of 1996-97 as waterfowl populations stabilized at high levels after the prolonged drought from the mid-1980s through the early 1990s. Small game population levels were more variable, but were typically well below long-term averages. After an earlier drop that mirrored a year of high deer mortality in 1997, hunter numbers increased steadily along with deer populations from 1998 to 2000.

Throughout the biennium, WDFW worked closely with tribal governments to coordinate wildlife management efforts throughout the state. Issues raised



Mule deer populations have benefitted from high buck/deer ratios, due in part to recent mild winters.

by the court's decision in *State v. Buchanan* about tribal hunting areas were addressed through cooperative processes involving the tribes, WDFW and affected county prosecutors, although some inter-tribal issues remain unresolved. Most of the atten-

Annual Harvest of Big Game Species (1991-2000)

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	10 year Average
Deer	57,112	55,297	35,681	47,002	37,765	39,442	31,525	30,253	35,760	40,976	41,081
Elk	8,646	8,875	6,367	9,967	6,429	6,953	4,919	5,858	7,109	8,278	7,340
Black Bear	1,410	1,442	1,507	1,073	1,218	1,310	844	1,802	1,120	1,182	1,291
Cougar	135	156	121	177	283	178	132	184	273	208	185
Bighorn sheep	13	17	15	16	14	10	9	12	17	16	14
Moose	8	11	10	19	20	30	28	38	44	66	28
Mt. Goat	66	92	76	58	48	47	26	37	32	30	51

Small Game Harvest Trends (1991-2000)

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	Average
Quail	110,565	122,398	61,487	84,500	67,069	84,602	127,656	107,689	102,369	131,789	100,012
Chukar/Gray Partridge	69,657	48,367	22,020	35,086	28,050	54,928	47,017	50,425	41,145	45,032	44,172
Turkey	197	224	272	384	586	626	823	1,000	1,615	1,791	752
Pheasant	132,288	164,595	109,405	131,787	93,792	134,505	176,245	155,499	127,738	131,701	135,756
Forest grouse	166,307	194,218	143,262	160,797	169,629	134,605	137,062	140,997	73,429	148,193	146,850
Rabbits	22,412	28,874	18,376	19,304	19,027	18,610	9,037	10,955	7,931	10,120	16,465
Dove	70,967	82,206	52,306	101,515	61,454	80,057	111,602	68,070	65,450	99,731	79,336
Ducks	307,097	341,815	242,501	410,764	389,305	427,711	614,890	557,684	482,575	528,091	430,243
Geese	53,080	60,397	48,848	57,959	46,091	65,608	73,784	58,329	71,062	87,942	62,310

Number of Hunters/Hunter Days for Select Species (1991-2000)

(Estimates based on 12% sample)

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	10 year Average
Deer hunters	184,097	204,147	194,499	183,736	180,757	173,311	134,199	149,301	152,840	149,971	170,686
Deer hunter days	1,175,466	1,257,654	1,218,490	1,274,793	1,225,777	1,067,716	908,722	924,423	1,450,784	949,631	1,145,346
Elk hunters	82,472	84,503	87,088	80,297	81,710	77,039	59,015	70,316	83,487	86,205	79,213
Elk hunter days	474,630	472,639	496,666	492,821	467,122	421,718	333,915	406,562	645,962	471,080	468,312
Bear hunters	10,839	11,648	12,179	11,530	11,859	12,868	11,060	20,891	37,033	37,484	17,739
Bear hunter days	84,771	98,434	102,558	110,872	102,859	104,431	97,426	216,456	481,492	297,286	169,659
Cougar hunters	175	208	232	352	402	175	--	--	--	--	--
Cougar hunter days	1,052	1,358	2,317	2,967	2,816	893	--	--	--	--	--

tion focused on the management and harvest of elk. With additional funding provided by the Legislature, WDFW was able to improve monitoring of elk populations, partly through joint state/tribal projects using tribal resources. In addition, WDFW worked in consultation with the tribes to develop ten elk herd plans, designed to meet common state and tribal management objectives.

As previously discussed, citizen initiatives directed at wildlife management required WDFW and the Commission to adopt a number of policy changes – specifically with regard to cougar management and trapping. While addressing these and other emerging issues, the Game Division continued to perform such core activities such as population surveys, game harvest and hunter surveys, and development of recommendations for hunting seasons. The *Game Status and Trend Report*, *Game Harvest Report*, hunting seasons and rules pamphlets and *Washington Hunting News-Game Trails* were published annually and distributed to the public. The Fish and Wildlife Commission adopted the 2000-02 hunting season package in April 2000 after extensive public review and comment.

WDFW’s Game Management Advisory Council, composed of approximately 20 citizen volunteers, remained very active throughout the biennium. The council provided recommendations to the department on a wide range of management issues, including hunting seasons and regulations.

Harvest surveys were the principal means of monitoring population trends for many game species. A mail questionnaire was sent to a minimum of 12 percent of hunting license purchasers. Their answers to

the questionnaire formed the basis for estimates of harvest and hunter participation.

A mandatory harvest report card, introduced in 1998, continued in effect for black bear and cougar hunting seasons. The report card was attached to each bear or cougar transport tag and was to be completed and returned whether or not the hunter was successful in bagging an animal. In addition, bear hunters were given the option of reporting using the WDFW Internet website or a toll-free telephone number (877-945-3492). All trappers of fur-bearing animals were required to complete and return a trapper report of catch. Of the 323 trappers licensed in 2000, a total of 261 (81 percent) reported.

Deer

The 1998-99 and 1999-00 winters were mild and overall deer survival was good. The statewide buck escapement goal of 15 bucks per 100 antlerless animals was met in most areas of eastern Washington through a three-point minimum antler restriction and short modern firearm hunting seasons. Whitetail deer populations recovered much faster from previous harsh winters than did mule deer, allowing antlerless whitetail harvest to be reinstated.

In central Washington, buck escapement improved and was above management objectives in most units. Permit-only harvest restrictions imposed in 1997 in some game management units were continued to help achieve buck escapement goals. Those units (242 Alta, 290 Desert, 329 Quilomene, 330 West Bar, 342 Umtanum and 371 Alkali) included open, arid lands with minimal cover that did not reach buck escapement goals under general hunt-

ing seasons strategies. Other units were near buck escapement goals.

Throughout western Washington, blacktail deer harvest remained relatively stable. However, success rates decreased in southwest Washington, the most productive blacktail region. Urban development contributed to reduced hunter success in lowland areas. In addition, hair loss syndrome appeared to impact blacktail harvest levels in some areas of western Washington.

Deer population surveys were very limited in Washington. Biologists expanded the use of population models to manage blacktail and whitetail deer, but the models were limited by the amount of population and mortality data available. A study was initiated to evaluate the annual buck mortality rate in western Washington, estimated at 75 percent. Annual mule deer population surveys (pre-season, post-season and spring) continued in north-central Washington. Mule deer surveys were also initiated in one central Washington unit.

The hair loss syndrome in blacktail deer continued to appear in some areas of western Washington. The syndrome was characterized by heavy lice burdens and musclemo worm larvae that migrate to the lungs and impair respiration, inhibit immunities and allow other parasites to take over and weaken the animal. Most observations of diseased animals were made during winter months. Deer with the syndrome were identified by hairless patches of skin on their sides and flanks. Some animals with extensive hair loss, especially fawns, died from hypothermia. Other deer with less hair loss recovered and appeared normal by summer months. Field studies were conducted on Indian Island, the submarine base near Bangor, McNeil Island and in southwest Washington.

Epizootic Hemorrhagic Disease (EHD) periodically affected whitetail deer in eastern Washington. An outbreak occurred in 1999 in GMUs 127 through 142. The area, just south of Spokane, was subject to more frequent EHD mortality. In 1999 the EHD outbreak spread to a larger-than-usual area of farmland in Spokane and Stevens counties. In some localized areas mortality rates were as high as 60 or 70 percent, but incidences of this mortality level were isolated.

Elk

Five of Washington's 10 elk herds were well below population goals during the 1999-01 Biennium. Three appeared to be fairly healthy and the other two were stable. Status, by herd, is summarized below:

- **Yakima:** Numbers increased to an estimated 10,500. This herd was controversial because of agricultural crop damage and use of private grazing lands. Hunting seasons were expanded in an effort to reduce herd size. The Rattlesnake Hills population had grown to about 900 elk in 1999. Nearly all the elk were on private land with limited hunting available and on the Arid Lands Ecology Reserve where they are protected. The population was reduced through increased harvest and removal by trapping.
- **Selkirk:** Population estimated at 1,900 elk. Numbers appeared to be increasing, but survey data was inadequate to confirm the trend.
- **Blue Mountains:** Stable at an estimated 4,400 animals; 1,100 below management objectives. Elk populations on the west side of the Blue Mountains were stable, while elk numbers on the east side declined.
- **Olympic Peninsula:** Herd population declined approximately 40 percent over the preceding 10 years, then stabilized far below population goals. The population was estimated at 10,400, with 4,000 animals in the Olympic National Park and 6,400 outside the park.
- **Colockum:** Population stable at 4,500.
- **St. Helens:** Herd size was within population goals at 13,350, although population modeling indicated a slight decline in numbers.
- **Willapa Hills:** Population modeling in the southern part of the herd area indicated a slight decline in numbers, which were estimated at 4,200.
- **North Rainier:** Herd size was below goal at 1,250; damage issues arose along the Puget Sound corridor.
- **South Rainier:** Population declined and was below goals at 2,100, damage issues arose near Packwood/Randle and Tenino/Centralia areas.
- **Nooksack:** Currently numbering only 250 to 300 animals, herd size was down from over 1,000 elk historically. Approximately 80-100 animals remained along the Skagit River where they con-

tinued to cause pasture damage. The Department implemented liberal hunting seasons to alleviate the damage problem.

Elk populations were under intense hunting pressure statewide during the biennium. With approximately 80,000 elk hunters and an estimated elk population of 45,000 animals, Washington had the highest number of hunters per elk of the 11 western states. Bull elk in Washington were hunted in seasons that started in September and extended until the middle of December in some areas. In an effort to respond to high hunter demand while balancing resource conservation, increased antler restrictions and reduced season lengths were adopted to achieve bull escapement objectives.

During the 1999-01 period, tribal hunters increasingly exercised their treaty hunting rights, especially for elk. In June of 1999, the state Supreme Court ruled in the case of *State v. Buchanan* that members of federally recognized treaty tribes could hunt only within their ancestral hunting areas. Amid efforts to determine which areas were open to each treaty tribe, WDFW continued working with tribal managers to protect herds from over-harvest and habitat loss through cooperative agreements and elk herd plans. By mid-2001, the first such plan – the Blue Mountains Elk Herd Plan – was approved, and draft plans had been written for the South Rainier, North Rainier, North Cascade, Yakima, Selkirk and Mount St. Helens elk herds.

In February and March of 2000 the Rattlesnake Hills elk population, which resides primarily in the Arid Lands Ecology Reserve, was reduced in response to damage complaints from private landowners. The



Hunting opportunities for mountain goats have been restricted as populations continue to decline.

operation resulted in the successful capture and release of 157 elk to the Blue Mountains and the Selkirk area. In addition, liberal hunting seasons aided by an extensive fire on the Reserve resulted in a harvest of over 200 elk during the fall of 2000. The reduction of the elk herd on the Arid Lands Ecology Reserve was expected to help relieve crop damage problems that escalated with increases in elk numbers.

Increased legislative funding of \$350,000 during the biennium was used to pay for the initial design and programming of an improved harvest reporting system and for the development of elk population estimates for three sub-herds in cooperation with several tribes on the Olympic Peninsula. The funds also contributed to population studies conducted on the Green River elk herd in cooperation with the Muckleshoot Tribe. In addition, elk herd composition surveys were expanded for the Olympic, Willapa Hills, South Rainier, St Helens, Colockum and Yakima elk herds. The Nooksack elk movement and distribution study was also initiated with the new funding, in preparation for possible augmentation of the herd.

Mountain Goat

Mountain goat populations continued their long decline from an estimated historic peak of 10,000 animals to fewer than 4,000. Hunting opportunity was decreased accordingly, with only 41 permits issued in each year of the biennium. Despite continued harvest reductions many goat populations continued to decline. Contributing factors may include predation and disease, but Department biologists believe habitat changes are the primary cause of this downward trend. A mountain goat research project using federal funding was proposed to investigate the decline and status of goats.

Bighorn Sheep

Rocky Mountain bighorns in the Blue Mountains continued to struggle as they recovered from a 1995 disease outbreak, which decimated their populations. The disease organism, *pasteurella*, was carried by domestic sheep and goats and had dramatic consequences for wild bighorn sheep. The estimated Blue Mountains sheep population has now stabilized at low levels.

California bighorn sheep populations increased in most herds, as the animals rebounded from a severe

winter in 1997, and reintroductions were conducted by the Department. The population of California big-horns rose to more than 700. New herds were established in the Lake Chelan and Tieton River drainages. Using transplanted sheep from British Columbia, Oregon and various herds in Washington, the Lake Chelan and Tieton River areas received more than 45 sheep each.

Moose

Moose hunting continued to draw tremendous interest in Washington. Moose appeared to expand their range and it appeared feasible to consider increased future hunting opportunity for the species. However, more information was needed on herd composition, productivity and natural mortality factors affecting the populations and the level of harvest they could

Rocky Mountain Bighorn Sheep Population Trends

Sheep Herd	Population							Comments
	1994	1995	1996	1997	1998	1999	2000	
Hall Mountain	35	35	35	30	30	29	--	Lamb survival is varied. Population slowly recovering to 1993 level.
Asotin Creek	15	12	13	13	30	35	38	Minimal lamb survival in 1999.
Black Butte (Joseph Creek)	215	50	45	54	64	70	80	Population slowly recovering. Yellow-star thistle continues to spread.
Wenaha	110	90	50	69	65	70	65	Lamb mortality declined. Yellow-star thistle is serious range threat.
Cottonwood Creek (Mt. View)	60	45	18	23	23	32	27	Survival of lambs in 2000 decreased from 1999 level.
Total	435	232	161	189	212	236	210	

California Bighorn Sheep Population Trends

Sheep Herd	Population							Comments
	1994	1995	1996	1997	1998	1999	2000	
Tucannon	50	45	50	50	42	30	27	Continued poor lamb survival.
Vulcan	115	100	70	70	35	24	--	Continued population decline. High evidence of disease in herd.
Mt. Hull	--	55	60	65	--	70	65	Recent fire on Mt. Hull. Mature rams missing after fire.
Sinlahekin	--	--	45	40	40	40	30	Population continues to struggle. Range forage condition is poor due to noxious weeds and livestock grazing competition.
Swakane	30	38	25	30	36	35	--	Population is static and is exposed to domestic sheep and disease risk.
Quilomene	50	70	90	135	143	164	165	Exposure to domestic sheep a threat.
Umtanum	200	150	150	150	154	174	173	Population stable given transplants and movements.
Cleman	55	60	65	100	117	135	156	Population continues to grow.
Lincoln Cliffs	35	45	65	90	102	88	95	Excellent production continues as herd continues to grow.
Lake Chelan	--	--	--	--	--	--	47	
Tieton	--	--	--	--	--	--	37	Eighteen lambs produced in last three years.
Approx. Total	635	608	620	730	734	760	795	

sustain. Winter helicopter surveys proved effective in determining moose distribution and sex/age composition. Not all units were flown each year due to funding limitations, but one or two traditional areas were flown and a new area was added each year. Monitoring the calf/cow ratio and winter snow conditions was especially crucial in determining recruitment.

The need increased for stricter management of moose populations (primarily through harvest opportunity) in the GMUs surrounding Spokane, in order to address increasing nuisance concerns in the metropolitan area. Moose continued to expand their range with sightings reported from many areas, including western Washington.

Black Bear

The long-term outlook for black bear was generally good. Based on a model using population reconstruction methods and harvest age data, the statewide black bear population was estimated at more than 30,000 animals by mid-2001 and appeared to be increasing. Statewide harvest and median age data in-



Washington has one of the largest black bear populations in the nation.



Moose have been expanding their range on both sides of the Cascade Mountains.

dicated that the bear population, as a whole, was not impacted by harvest.

Washington faced a unique and challenging situation in black bear management. Washington has one of the largest black bear populations in all of the lower 48 states, much of it in close proximity to human habitation. Meanwhile, the state's human population—the second-highest in the 11 western states—continued to grow at record levels. However, approximately 75% of Washington's black bear habitat was in federal or private industrial ownership, so a large portion of the core black bear habitat was relatively secure.

As local bear populations responded to urbanization and subsequent reduced harvest pressure, a greater emphasis on monitoring populations within individual bear management units appeared necessary. Harvest age guidelines, indicators of the overall health of the bear population, were used to monitor the influence of harvest.

Guidelines for Black Bear Harvest Management

Criteria	Over Harvest	Acceptable Harvest	Desirable Harvest	Results
%Females in harvest	≥ 40%	≤ 36%-39%	≤ 35%	33% (1997-2000 average)
Median harvest age	≤ 3 Years	≥ 4 Years	≥ 5 Years	4.8 years (1997-1999 average)*
Median age of males in harvest	≤ 2 Years	> 2 Years	≥ 4 Years	4.8 years (1997-1999 average)*
Median age of females in harvest	≤ 4 Years	≥ 5 Years	≥ 6 Years	4.8 years (1997-1999 average)*

* Estimate

Cougar

The state's cougar population in the 1999-01 Biennium was estimated to be between 2,500 to 4,000 animals, and rising at a rate of about 3% per year. This estimate by WDFW is about double the size of the state's estimated cougar population in 1980.

Hunting pressure on cougars dropped significantly in 1996 after voters approved Initiative 655, banning the use of hounds for hunting cougar, bobcat and black bear. By 1997, the number of cougars killed by hunters (132) declined 53% from 283 killed in 1995, despite the fact that WDFW expanded cougar-hunting season from six weeks to 7½ months to address the anticipated decrease in cougar harvest.



In 2001, the Legislature authorized the use of hounds to hunt cougars that present a risk to public safety.

By the 1999-01 Biennium, however, harvest levels increased to 273 animals in 1999 and 208 in 2000, probably due to a growing cougar population, more liberal hunting seasons and a larger number of hunters carrying cougar tags. In 2001, the Legislature authorized the use of hounds to hunt cougars that present a risk to public safety. WDFW worked with hound hunters, the Humane Society of the United States and other interested groups to develop rules for the use of hounds to remove cougars that posed safety threats in specific areas.

Waterfowl

Pacific Flyway waterfowl populations continued to increase in the 1999-01 period, mainly due to increased rainfall and improved nesting conditions. These population increases allowed for longer seasons and larger bag limits. Under the federal framework the maximum number of hunting days allowed under the Migratory Bird Treaty was 107 days. The

general season length was 106 days; with one day reserved for the September Youth Hunt. The bag limit was seven ducks, with two hen mallards.

Regulations were the most liberal ever offered in Washington. Only in 1964-65 and 1970-71 were seasons as long as 107 days on the east side of the state.

WDFW instituted a new license format for the 1999-00 hunting season. A small game license and big game license replaced a general hunting license. For those who hunted a variety of small game species, there was little change in total cost. For people who exclusively hunted waterfowl, the new format resulted in increased cost. Fees for state and federal migratory bird stamps did not increase for the 1999-00 season.

Goose hunting regulations were dynamic. Changes resulted from efforts to protect declining populations of particular Canada goose sub-species (e.g. dusky geese); increase recreational opportunities on expanding populations of Canada geese; simplify regulations, and to address damage/nuisance complaints. The number of goose management areas remained at five for 1999-00.

A 1999-00 midwinter waterfowl inventory was completed by WDFW and U.S. Fish and Wildlife Service (USFWS) personnel. Washington's data for 2000 showed decreases of 39% from the previous year and 5% from the long-term average. The decreases resulted from unusually high numbers in 1999 and unexpectedly lower numbers in 2000. The January 2000 survey number apparently resulted from ducks redistributing to other parts of the flyway.



Canvasbacks were one of several species that showed a decline between 1999 and 2000.

Waterfowl Inventory, January 2000

<i>Species</i>	1990	1992	1994	1996	1998	2000
Mallard	594,709	764,514	421,864	310,724	547,134	442,811
Wigeon	116,486	101,733	95,801	73,771	117,536	112,926
Green-winged Teal	14,857	11,466	11,834	10,993	6,729	11,089
Pintail	74,837	62,813	35,896	48,227	43,763	70,040
Redhead	5,036	4,014	3,744	1,517	2,495	1,505
Canvasback	3,517	2,423	1,401	4,673	6,261	2,898
Scaup	20,743	25,685	26,590	32,261	28,684	26,933
Goldeneye	9,365	15,730	16,910	19,663	12,894	13,157
Bufflehead	13,611	24,750	21,317	19,441	14,780	18,017
Scoter	40,060	42,356	23,952	26,059	21,389	20,326
Other ducks	21,478	26,083	39,712	33,806	31,173	34,106
Snow Goose*	15,062	21,855	34,867	32,340	42,666	48,843
Canada Goose	79,527	113,333	90,780	76,884	95,444	91,229
Brant	13,756	13,505	13,595	7,082	10,881	13,859
Tundra Swan**	939	3,209	2,616	4,118	3,424	4,342
Trumpeter Swan**	183	308	171	3,017	2,352	3,896
Unknown Swan**	626	113	129	85	371	402
Coot	19,478	43,690	33,378	59,652	58,199	62,387
TOTAL	1,044,277	1,277,581	841,181	764,338	1,046,173	978,769
B.C. Snow Geese*	18,290	17,244	12,371	7,206	1,418	879
Skagit/B.C. Total	33,352	39,099	47,238	39,546	44,084	49,722

**Comprehensive western Washington swan surveys in 1989, 1991, 1996 only

Some 100 trumpeter swans were found dead in late January 2000 northeast of Bellingham and a similar number succumbed in 2001 in the same general area. The birds appeared to have fallen victim to lead poisoning, although the source of the lead was not confirmed. Lead shot was banned for waterfowl hunting in western Washington in 1986 and nationally in 1991. All the dead swans were examined and showed signs of lead poisoning. Several were X-rayed, revealing lead-shot in their gizzards. The Department continues to investigate the source of lead poisoning.

Dove and Band-tailed Pigeon

Based on call-count surveys, the band-tailed pigeon population appeared to have generally increased. However, the band-tailed pigeon hunting season remained closed in 1999-01, because wildlife managers recommended waiting to make sure the trend would continue before subjecting the population to hunting pressures.

The 1999 harvest of approximately 100,000 mourning doves was an improvement over the reported harvest of 65,450 doves the previous year. Eastern

Washington provided 98% of the statewide harvest, and 92% of the dove hunters. Grant County had the highest number of dove hunters and Yakima County was the leading county in dove harvest.

Turkey

Harvest opportunity for wild turkeys included a 31-day spring season statewide as well as five-day fall, permit-only seasons in selected counties, beginning in 2000. From 1995 to 2000, hunters were allowed to take one bearded turkey per day from each of three subspecies, for a total of three per year. Starting with the 2001 spring season, hunters were allowed to harvest a total of two bearded turkeys in most eastern Washington counties – regardless of species – and purchase tags throughout the season. Regulations were considered relatively conservative. Statewide harvest increased yearly along with hunter numbers.

Wild turkeys continued to be trapped and translocated in many parts of the state. The birds were used to enhance existing populations, establish new populations in appropriate habitat and trade with other states in cooperative conservation projects. The Department attempted to create new popula-



Washington is one of only a few states with all three subspecies of wild turkeys. WDFW transplanted a number of birds to establish new populations.

tions in the Chelan and Yakima areas. In February 2000, 155 turkeys from Ferry and Stevens counties were released in Chelan and eastern Kittitas counties. Turkeys were released on lands owned by WDFW, the state Department of Natural Resources, and private individuals in 11 locations (every two to six miles) from Tekison Creek in Kittitas County north to the Entiat River in Chelan County. Landowners were contacted prior to releases and were enthusiastic about release efforts.

During the winter of 1999-00, Merriam's turkeys were trapped in Stevens County and released in Yakima and Kittitas counties. Eight birds were equipped with radio transmitters. The project created much enthusiasm among hunters who formed a local chapter of the National Wild Turkey Federation (NWTF). Releases and radio marking continued in 2000-01 with the help of NWTF. In 2000, some 26 turkeys were released in northern Snohomish County in an effort to augment an earlier release of 12 birds in 1998. In the same year, 268 eastern wild

turkeys from Iowa were released at sites in Thurston, Pacific, Grays Harbor and Mason counties.

The Upland Wildlife Restoration Program continued to enhance upland habitats within wild turkey range. The Department, private timber companies and the Department of Natural Resources continued to cooperate to enhance habitats and establish huntable populations of eastern wild turkeys, in accordance with habitat and hunter-access agreements signed in 1997.

Grouse

Based on long-term harvest trends, it appeared that forest grouse (blue, ruffed and spruce) harvest and population numbers remained relatively stable, as they had for 30 years. Because of mis-identification problems, it was difficult to evaluate trends for individual species. Annual production was greatly influenced by weather conditions during the peak of hatching (late May to early June). Wet and windy weather reduced chick survival both through exposure and reductions in insect populations at the time when young grouse needed a high-protein diet. Harvest trends continued a nine-year decline in western Washington but were more stable in eastern Washington.

Pheasant

Hunting season structure and bag limits were conservative. Hunter success changed dramatically over the long term due to the type of agricultural crops grown, timing of harvest, and changes in growing practices, which decreased the amount of effective pheasant hunting cover in irrigated farmland.

Pheasant populations statewide plummeted from levels of the early 1980s, when hen populations at the beginning of nesting season were approximately 100 per section in the Columbia Basin. By 1996, hen density was approximately 10 per section. Breeding season rooster density declined concurrently with hen density, but at a slower rate, from approximately 20 per section in the early 1980s to 13 per section in 1999 and approximately four per section in 2000. To offset these declines, 20,000 farm-raised roosters were released each year of the biennium to provide additional birds for harvest.

Pheasant habitat continued a decades-long decline. Changes in farming practices, particularly in irrigated land, were the main cause of habitat degradation.

Grain, pasture and alfalfa fields were converted to high-value crops such as orchard, vineyard and hops. Cleaner farming practices removed cover bordering fields, riparian areas and irrigation canals. Forbs, weed seeds and insects benefit pheasant survival, when herbicides and pesticides aren't heavily used to keep crops free of weeds and insects. Pesticide depression of the insect base had an especially deleterious effect on pheasant chick survival. Agricultural crops did not provide enough year-round food or cover, since vineyards and hop fields typically were kept free of ground cover and grass cover within orchards generally mowed.

Urban development also negatively affected the pheasant population in the Columbia and Yakima basins, as homes were built in areas that historically provided pheasant nesting and habitat.

The federal Conservation Reserve Program (CRP) did not benefit pheasant habitat in irrigated areas as it did in other areas of the state. In Washington, CRP paid farmers to convert over one million acres of highly erodible dryland wheat fields to permanent grass, forb and shrub cover. Because most agriculture in the Columbia and Yakima basins was irrigated, few acres were enrolled in CRP and few benefits to pheasant habitat were realized.

Chukar and Gray Partridge

Hunting seasons for chukar and gray partridge were standardized throughout the state, running from October 1 to the third Monday in January with a daily bag limit of six and 18 in possession.

Chukar partridge populations declined dramatically since 1982 for unknown reasons. Chukars were plagued by habitat deterioration in southeastern Washington due to the spread of noxious weeds, poor nesting conditions due to drought and wet, cold weather during nesting season in 1999-2001.

The expansion of yellow star-thistle (*Centaurea solstitialis*) and other noxious weeds was extremely detrimental to chukar populations. Although most counties attempted to control yellow star-thistle, the amount of acreage impacted by the weed increased annually. Chukars thrive on lands that tend to be over-grazed and infested with cheatgrass (*Bromus tectorum*). Cheatgrass is a staple in chukar diets in spring and fall, and availability of cheatgrass can



Farm-raised pheasants take flight after their release. WDFW released 20,000 farm-raised each year to provide additional birds for harvest.

have a significant impact on chukar populations. However, conditions that promote cheat grass also provide optimum conditions for invasion by yellow star-thistle. As acreage of yellow-star thistle increased in the Snake River Basin, cheatgrass appeared to become less available.

Quail

The California quail is an important upland game bird that also holds significant interest to wildlife viewers. Overall, quail harvest was relatively stable during the biennium. Hunting seasons extended from early October to mid- January. In addition, a two-day youth-only season for quail and pheasant was held in late September. The bag limit for quail was 10 per day, with 30 in possession. The mountain quail season was closed in eastern Washington because of extremely low population levels.

Like other upland bird species, quail suffered from habitat loss and degradation. The spread of noxious weeds threatened existing habitats. However, habitat for some upland birds improved with the advent of the CRP. Habitat enhancement for quail was conducted on Department properties and private land through cooperative agreements. In addition to vegetation management for food and cover, feeders were placed to provide grain in winter and water sources including guzzlers were developed. Upland Wildlife Restoration Program (UWRP) staff trapped and

translocated quail to take advantage of newly developed habitats. The quail were generally captured in urban and suburban areas and released at acquisition sites and other habitat development areas.

Furbearers

In November 2000, Washington voters approved Initiative 713, which placed limits on the use of body-gripping traps to take animals. The initiative also made it illegal to buy, sell or trade mammals or raw furs of mammals taken in Washington with body-gripping traps. In addition it directed the Department to administer a special-permit process to allow use of some types of body-gripping traps under certain circumstances. The initiative made it unlawful to use or to authorize the use of body-gripping traps to capture any animal (including moles and gophers) except by special permit for protection of endangered or threatened species, protection of public health and safety, to alleviate animal problems or to conduct wildlife research.

Initiative 713 became law on December 7, 2000, disrupting the activities of trappers during the 2000-2001 season. The total number of reporting trappers dropped from 473 to 261 and the harvest of furbearers dropped nearly 75% from 12,665 animals in 2000 to 3,359 in 2001.

WILDLIFE DIVERSITY

In addition to managing game animals, WDFW's Wildlife Program has stewardship responsibility for more than 500 species of mammals, birds, reptiles, amphibians, and terrestrial invertebrates in Washington that are not hunted or fished. Some of these species are common, others are classified as endangered

Trends in Reported Furbearer Harvest

Species	1995-1996	1996-1997	1997-1998	1998-1999	1999-2000	*2000-2001
Badger	6	11	14	2	13	7
Beaver	5163	7456	8116	4558	4819	642
Coyote	1770	1864	1606	922	838	503
Marten	52	74	80	14	140	18
Mink	375	596	607	424	462	101
Muskrat	5335	11028	10924	4117	3572	1159
Nutria	320	923	1116	486	712	267
Otter	1368	2070	772	656	727	83
Raccoon	810	62	1307	832	571	250
Skunk	79	7	127	164	175	16
Weasel	49	14	49	47	87	44
Bobcat	1572	1941	521	324	549	269
Total catch	16899	26046	25239	12546	12665	3359
# of trappers reporting	451	562	601	488	473	261

* The trapping Initiative 713 became effective on December 7, 2000.

or threatened. Lead management responsibility for these species is vested in the Wildlife Diversity Division, which was guided by three primary objectives in the 1999-01 Biennium:

- Maintaining healthy populations of nongame species,
- Restoring populations of species that have declined to the point of being listed as endangered, threatened, or sensitive, and
- Providing opportunities for the public to observe wildlife in Washington.



WDFW initiated a captive breeding program for pygmy rabbits after their rapid decline in 2000.

To meet these objectives, the division's 40 FTE staff members managed, researched and surveyed hundreds of distinct species during the course of the biennium. With science as their foundation, they also provided management recommendations and biological expertise on these species and their habitats to other state, local and federal agencies, and to the public. Activities during the 1999-01 Biennium ranged from developing bald eagle protection plans with individual landowners to assisting in large-scale habitat-protection efforts involving multiple state, local federal and private partners.

Meanwhile, two employees of the Watchable Wildlife Program broke new ground in the Department's effort to promote the state's wildlife viewing opportunities and engage the public in habitat stewardship and wildlife conservation. With wildlife viewing now the number one outdoor activity in the United States, the program helped to steer travelers to key viewing areas in rural counties while using the Internet to bring the popular "WildWatchCam" series into people's homes.

State Threatened and Endangered Species

As the state's human population continues to grow, more fish and wildlife species have been put at risk by loss and fragmentation of critical habitat, disturbance and introduction of non-native species. The Threatened and Endangered Species section of the WDFW Wildlife Program oversees the listing and recovery of those species in danger of being lost in the state.

By the close of the 1999-01 Biennium, 43 species were listed by the state as endangered (26), threatened (11) or sensitive (6). Two species listed as endangered – the Oregon silverspot butterfly and upland sandpiper – have recently been lost from the state and 103 other species are considered candidates for listing. Of those species listed by the state, 22 also appear on the federal list of endangered species.

For most species, habitat loss is the primary factor leading to their decline. Loss of shrub-steppe habitat in the Columbia Basin has resulted in the listing of more than a dozen species, from the pygmy rabbit to the striped whipsnake. In western Washington, nearly 95% of the region's prairie grasslands have been lost, leading to the listing or candidate status

of such species as the mardon skipper butterfly, streaked horned lark, and Mazama pocket gopher. Degradation of marine environments have contributed to the addition of the orca whale as a state candidate species in 2000 and review for listing by the National Marine Fisheries Service in 2001.

To halt and reverse declines in Washington's fish and wildlife species, the WDFW Threatened and Endangered Species section works to identify those species in jeopardy, outline actions needed for recovery and restore those species to their historic habitat. All of these actions involve coordination with multiple state, federal, local, private, and international partners. During the 1999-01 Biennium, the program was active in surveying, monitoring and working to recover a variety of critical and declining species, including the pygmy rabbit, woodland caribou, western gray squirrel, sage grouse, sharp-tailed grouse, and snowy plover. Key activities by WDFW and its partners are summarized below.

- **New listings in 1999-01:** The mardon skipper and northern leopard frog were added as state endangered species. The Olympic mudminnow and common loon were added as state sensitive species, and Cassin's auklet, short-tailed albatross, western toad, sharptail snake, white-tailed jackrabbit, black-tailed jackrabbit, Keen's myotis bat, orca whale, and bull trout were added as state candidate species.
- **Bald eagle:** WDFW completed a status review for the state threatened bald eagle, which found that bald eagle numbers had increased to more than 600 nesting pairs, up from about 100 in 1980. The elimination of DDT from the environment, protection from killing and habitat protection were identified as primary factors for recovery. Since 1986, WDFW has developed more than 1,500 landowner plans to protect and manage bald eagle habitat on state and private lands. A report reviewing all the plans was written in 2000. Concern remains for protection of shoreline nesting trees for two-thirds of the state's nests that are on private lands and the Department is recommending the eagle be downlisted to sensitive status when it is federally delisted. WDFW collected satellite telemetry data from birds captured and released in a study of origins and movements of Skagit River bald eagles. During the 2000-01 breeding sea-

State Listed Species

The Washington Fish and Wildlife Commission has classified the following 43 species as Endangered, Threatened, or Sensitive. Many also hold a federal designation, such as Federal Endangered (FE), Threatened (FT), Proposed Threatened (FPT), Candidate (FC), or Species of Concern (FSC).



Bald eagle: Recommended for downlisting.

State Endangered

A species native to the state of Washington that is seriously threatened with extinction throughout all or a significant portion of its range within the state. The 26 State Endangered species are designated in Washington Administrative Code 232-12-014.

MAMMALS (13)

Pygmy Rabbit	FSC
Sperm Whale	FE
Fin Whale	FE
Sei Whale	FE
Blue Whale	FE
Humpback Whale	FE
Black Right Whale	FE
Gray Wolf	FE
Grizzly Bear	FT
Fisher	FSC
Sea Otter	--
Columbian White-tailed Deer	FE
Woodland Caribou	FE

BIRDS (7)

American White Pelican	--
Brown Pelican	FE
Peregrine Falcon	FSC
Sandhill Crane	--
Snowy Plover	FT
Upland Sandpiper	--
Spotted Owl	FT

REPTILES (2)

Western Pond Turtle	FSC
Leatherback Sea Turtle	FE

AMPHIBIANS (2)

Oregon Spotted Frog	FC
Northern Leopard Frog	--

INSECTS (2)

Oregon Silverspot Butterfly	FT
Mardon Skipper	FC

State Sensitive

A species native to the state of Washington that is vulnerable or declining and is likely to become endangered or threatened in a significant portion of its range within the state without cooperative management or removal of threats. The 6 State Sensitive species are designated in Washington Administrative Code 232-12-011

MAMMAL (1)

Gray Whale	--
------------	----

BIRD (1)

Common Loon	--
-------------	----

FISH (3)

Pygmy Whitefish	--
Margined Sculpin	FSC
Olympic Mudminnow	--

AMPHIBIAN (1)

Larch Mountain Salamander	FSC
---------------------------	-----

State Threatened

A species native to the state of Washington that is likely to become endangered within the foreseeable future throughout a significant portion of its range within the state without cooperative management or removal of threats. The 11 State Threatened species are designated in Washington Administrative Code 232-12-011.

MAMMALS (3)

Western Gray Squirrel	FSC
Steller Sea Lion	FT
North American Lynx	FT

BIRDS (6)

Aleutian Canada Goose	FT
Bald Eagle	FT
Ferruginous Hawk	FSC
Marbled Murrelet	FT
Sage Grouse	FSC
Sharp-tailed Grouse	FSC

REPTILES (2)

Green Sea Turtle	FT
Loggerhead Sea Turtle	FT

State Candidate Species

The Washington Department of Fish and Wildlife has designated the following 103 species as Candidates for listing in Washington. Some of them already hold a federal designation, such as Federal Endangered (FE), Proposed Endangered (FPE), Threatened (FT), Proposed Threatened (FPT), Candidate (FC), or Species of Concern (FSC).

State Candidates

Species that the Department will review for listing as State Endangered, Threatened, or Sensitive. The Department reviews species for listing following procedures in Washington Administrative Code 232-12-297. Public comment is solicited before the Department takes its listing recommendation to the Washington Fish and Wildlife Commission, which makes listing decisions. Listing is based solely on the biological status of the species.

MAMMALS (12)		AMPHIBIANS (6)		Chum Salmon	
Merriam's Shrew	-	Dunn's Salamander	-	Hood Canal Summer	FT
Townsend's Big-eared Bat	FSC	Van Dyke's Salamander	FSC	(includes Strait of Juan de Fuca, not	
Keen's Myotis Bat	-	Columbia Torrent Salamander	FSC	Puget Sound)	
White-tailed Jackrabbit	-	Cascade Torrent Salamander	-	Columbia River	FT
Black-tailed Jackrabbit	-	Western Toad	FSC	Sockeye Salmon	
Gray-tailed Vole	-	Columbia Spotted Frog	FSC	Snake River	FE
Brush Prairie Pocket Gopher	-			Ozette Lake	FT
Western Pocket Gopher	FSC	FISH (38)		Steelhead	
Washington Ground Squirrel	FC	Mountain Sucker	-	Snake River	FT
Wolverine	FSC	Lake Chub	-	Upper Columbia	FE
Pacific Harbor Porpoise	-	Leopard Dace	-	Middle Columbia	FT
Orca Whale	-	Umatilla Dace	-	Lower Columbia	FT
		River Lamprey	FSC	Bull Trout	FT
BIRDS (23)		Herring	†FC		
Short-tailed Albatross	FPE	Cherry Point	FC	MOLLUSKS (6)	
Brandt's Cormorant	-	Discovery Bay	FC	Giant Columbia River Limpet	-
Northern Goshawk	FSC	Eulachon (Columbia River Smelt)	-	Great Columbia River Spire Snail	FSC
Golden Eagle	-	Pacific Cod	†FC	Newcomb's Littorine Snail	FSC
Merlin	-	South and Central Puget Sound	FC	California Floater	FSC
Common Murre	-	Walleye Pollock	†FC	Northern Abalone	-
Cassin's Auklet	FSC	South Puget Sound	FC	Olympia Oyster	-
Tufted Puffin	FSC	Pacific Hake (Whiting)	†FC		
Yellow-billed Cuckoo	FSC	Central Puget Sound	†FC	BEETLES (4)	
Flammulated Owl	-	(Port Susan)	FC	Beller's Ground Beetle	FSC
Burrowing Owl	FSC	Black Rockfish #	-	Columbia River Tiger Beetle	-
Vaux's Swift	-	Brown Rockfish #	†FC	Hatch's Click Beetle	FSC
Lewis' Woodpecker	-	Copper Rockfish #	†FC	Long-horned Leaf Beetle	-
White-headed Woodpecker	-	Quillback Rockfish #	†FC		
Black-backed Woodpecker	-	Tiger Rockfish #	-	BUTTERFLIES (11)	
Pileated Woodpecker	-	Bocaccio Rockfish #	-	Yuma Skipper	-
Loggerhead Shrike	FSC	Canary Rockfish #	-	Shepard's Parnassian	-
Streaked Horned Lark	FSC	Yelloweye Rockfish #	-	Makah Copper	FSC
Purple Martin	-	Yellowtail Rockfish #	-	Chinquapin Hairstreak	-
Slender-billed		Greenstriped Rockfish #	-	Johnson's Hairstreak	-
White-breasted Nuthatch	FSC	Widow Rockfish #	-	Juniper Hairstreak	-
Sage Thrasher	-	Redstripe Rockfish #	-	Puget Blue	-
Oregon Vesper Sparrow	FSC	China Rockfish #	-	Valley Silverspot	FSC
Sage Sparrow	-	Chinook Salmon		Silver-bordered Fritillary	-
		Snake River Fall	FT	Whulge Checkerspot	FSC
REPTILES (3)		Snake River Spring/Summer	FT	Great Arctic	-
Sharp-tailed Snake	-	Puget Sound	FT		
California Mountain Kingsnake	-	Upper Columbia Spring	FE	# Puget Sound, the San Juan Islands, and the	
Striped Whipsnake	-	Lower Columbia	FT	Strait of Juan de Fuca east of the Sekiu R.	
				† Puget Sound	

Not State Candidates

These fish stocks have been the subjects of federal register notices, but have not yet been added to the state candidate list.

Coho Salmon		Coastal Cutthroat Trout	
Puget Sound/Strait of Georgia	FC	SW Washington/Columbia River	FPT
Lower Columbia/SW Washington	FC		

son, WDFW had a video camera on a bald eagle nest, which was placed on the Department website. The site was extremely successful, receiving hundreds of thousands of visits from people all over the world.

- **Peregrine falcon:** A draft status review for the endangered peregrine falcon was written and released for public review in 2001. State population numbers increased from four known pairs in 1980 to 72 pairs in 2001. Numbers of pairs found in 1999-01 surveys increased from 60 to 72. Elimination of DDT and protection from disturbance contributed to statewide recovery. The release of 145 captive-reared peregrines from 1982 to 1997 helped to increase the rate of recovery in the eastern portion of the state. The U.S. Fish and Wildlife Service delisted the peregrine falcon in 1999. The Department is proposing to downlist the peregrine falcon from state endangered to state sensitive in 2002.
- **Western pond turtle:** A state recovery plan was completed for the endangered western pond turtle in 1999, identifying actions needed to restore the population. They include surveys, acquisition of critical habitat, captive breeding, release of both wild and captive-bred hatchling turtles, bullfrog control, habitat enhancement and public education. Another action involves “head-starting” turtles by removing them from wild nests, keeping them in captivity for a year and releasing them back into the wild when they are large enough to escape predation by bullfrogs and warmwater fish. Head-starts have been released back to the wild since 1991. In 1999-01,



Recovery of western pond turtles looks promising with the success of “head start” programs.

WDFW released 265 head-started juveniles and documented the first nesting in the wild by a head-started female in 2000. An experimental population has been established in Puget Sound with captive-bred turtles and in 2001, the first nesting by a captive-bred female occurred. Eighty head-started juvenile turtles were released on a US Fish and Wildlife Service refuge in 2000-01 to establish a new population in the Columbia River Gorge. Statewide population numbers have increased from an estimated 100 in 1990 to more than 600 in 2001. The program has been successful to date and prospects for eventual recovery of the species in Washington appear promising.

- **Sea otter:** Monitoring efforts found more than 600 otters on the outer coast from Cape Flattery to Destruction Island, with the range expanding both to the south and northeast into the Strait of Juan de Fuca. WDFW initiated a cooperative project with the U.S. Fish and Wildlife Service and the U.S. Geological Survey to monitor sea otter range expansion using radio-telemetry and to determine contaminant/biotoxin levels in Washington sea otters. Sea otters have been listed by the state as endangered since 1981.
- **Lynx:** A state threatened species since 1993, lynx were listed by the U.S. Fish and Wildlife Service as a federal threatened species in 2000. The Department completed a recovery plan for lynx in Washington in 2001, conducted DNA hair snagging and snowtracking surveys to determine presence of lynx and monitored animals by snow tracking. WDFW also initiated research studies of lynx in managed habitats and worked with federal agencies to develop a Lynx Conservation Strategy for federal management of lynx habitat.
- **Pygmy rabbits:** The state’s pygmy rabbit population declined precipitously in 2000-01, prompting the Department to develop an emergency action plan to prevent extirpation of the species from the state. The Department conducted genetic studies of pygmy rabbits from Washington, Oregon, Idaho, and Montana and concluded that the Washington pygmy rabbit is unique, and may be a separate subspecies. Surveys conducted in 1999-01 found that sub-populations had declined from six to one, and in 2001 the one remaining population crashed. A decision was made to cap-

Surveys and Forest Management Section

Virtually all wildlife-management activities rely on field surveys for critical information on the abundance, range, diet and other attributes of key species. While today's wildlife scientists may use sophisticated computers to analyze this data, field surveys still provide the foundation for any scientific assessment of management options.

At WDFW, much of this survey information on non-game wildlife species comes from the Surveys and Forest Wildlife Management Section, which is part of the Wildlife Diversity Division. During the 1999-01 Biennium, five biologists based in Olympia conducted surveys and coordinated others carried out by 30 other staff biologists throughout the state to provide needed information on species ranging from the marbled murrelet to the pileated woodpecker.

While this Department network surveyed a variety of listed and non-listed species, forest wildlife remained a major focus of the section during the biennium. Key activities of the Surveys and Forest Wildlife Management Section during the 1999-01 Biennium include:

- **Spotted owl monitoring:** Population trend monitoring being conducted by federal agencies indicate continued population declines of spotted owls in the state. The Department continued to build and improve upon the two statewide spotted owl databases during 1999-01. The owl observation database contains all known observations of spotted owls reported in the State of Washington. The spotted owl database, which includes more than 24,000 records from 1,200 sites, contains all known spotted owl territories in the state. Staff solicited, analyzed, interpreted, and processed all owl surveys performed in the state.
- **Marbled murrelet surveys:** Extensive surveys were conducted on the marbled murrelet along the Washington coast, supported by a grant from the Tenyo Maru Oil Spill Restoration Trustees Committee. Seventeen new occupied sites were discovered, encompassing 1,700 acres of habitat. More than 3,000 new survey records were added to WDFW's marbled murrelet database with the help of 50 surveyors from other agencies, timber companies and consulting firms trained and certified by the Department.
- **Forest and Fish study:** While the landmark Forest and Fish Agreement (See Habitat Section) was designed primarily to protect habitat for fish and amphibians, it also has implications for other wildlife species. Section biologists and other staff initiated a pilot study to determine how modeled riparian buffers and other aspects of the agreement might affect one indicator species, the northern goshawk. Results of this study are scheduled to be finalized in the spring of 2002.
- **Landowner landscape plans:** In December 2000, WDFW and two other participating agencies submitted a final report to the Legislature and the Forest Practices Board on the state's Landowner Landscape Planning (LLP) pilot project. Using computer modeling to explore alternatives to standard practices, the project was designed to promote large-scale, multi-species approaches to forest management that offer greater management flexibility for a range of wildlife species while also optimizing the economic return to forest landowners. While funding for the project lapsed in 2000 before an LLP was completed, much was learned about the potential of landscape planning in forest management. Six large timber company participated in the project, along with WDFW, the state Department of Ecology and the Department of Natural Resources.
- **Snag recruitment:** One issue that emerged from the LLP project was the importance of snag recruitment – practice of managing forests so that dead trees remain available for species that depend upon them as a source of food and shelter. A model was developed that incorporates snag recruitment with forest succession and harvest rotation policies. A second model will be developed to identify strategies for achieving specific snag targets.
- **Forest pesticides:** The bacteria *Bacillus thuringiensis* (Bt) has long been used to treat Washington's forests for tussock moths, but concerns have arisen in recent years as to whether it is a safe alternative to forest pesticides. During the 1999-01 Biennium, WDFW produced a comprehensive document on Bt use and advised the U.S. Forest Service and landowners on ways to minimize its potential impact on other moths and butterflies – particularly listed butterfly species in the southern Cascade Mountains.

tive-breed rabbits in an emergency effort to try to save them. In spring/summer 2001, a dozen of the last known rabbits were captured for captive breeding at facilities at Washington State University, the Oregon Zoo, and Northwest Trek. The project objective is to produce up to 100 rabbits each year for release back into the wild. Other recovery activities include habitat acquisition, protection, and enhancement; public education, reduction of risk factors such as fire, predation, disease and trampling by cattle. The U.S. Fish and Wildlife Service is preparing an emergency federal listing proposal for the Washington pygmy rabbit.

- **Selkirk caribou:** The endangered Selkirk Mountain Woodland Caribou population declined to fewer than 30 animals during 1999-01, with nine mortalities during that time. The Department worked with state, federal, and Canadian partners in an effort to increase the caribou population and determine and address causes of mortality. Radio-instrumented caribou were monitored to determine habitat use, distribution, movements and survival. A study was conducted on the cougar population in the caribou recovery area to determine the extent of cougar predation on caribou. For education purposes, an internet web site, *Track A Caribou*, was established for classroom use.
- **Columbian white-tailed deer:** WDFW participated as a member of the U.S. Fish and Wildlife Service (USFWS) recovery team for Columbian white-tailed deer. In 1999-2000, the Department cooperated with USFWS to establish an additional subpopulation in the lower Columbia River. Thirty deer were transplanted from Puget Island, Wash., and Westport, Ore., to Crimms Island, Ore. Survival and retention of the deer on the island was good; approximately half of the deer still reside on the island, with the remaining animals established on the Oregon mainland nearby. Limited fawn production was documented on Crimms Island. Fawn production on the mainland refuge has been impacted by predation, with only five of the 13 radio-collared fawns surviving through October of 2000.
- **Grouse:** Populations of sage grouse and sharp-tailed grouse, listed as threatened by the state, continued to decline during the biennium. Department recovery activities included habitat acquisition, protection, and restoration; survey

and monitoring of all known populations; genetics analyses of sharp-tailed grouse; and work by an interagency group to develop a Sage Grouse Conservation Plan. That plan will be implemented by the participating agencies and will form the basis for the Department's recovery plan. Twenty sharp-tailed grouse were relocated from Idaho to the Department's Scotch Creek Wildlife Area in 2000 to increase population numbers. The Department provided technical input for a Habitat Conservation Plan initiated in Douglas County in 2000 to address conservation of multiple species, including sage and sharptail grouse. In 2000, the Department grouse scientist published papers on changes in distribution of sage and sharp-tailed grouse in the state and management recommendations for sage grouse habitat. In 2001, the U.S. Fish and Wildlife Service concluded that the Washington population of sage grouse warranted listing, but official listing was precluded by other priorities.

- **Oregon silverspot butterfly:** The Oregon silverspot butterfly, a state endangered species dependent on blue violets, has been extirpated in Washington. During 1999-01, the Department worked to restore violets to silverspot butterfly habitat in coastal areas of the state. The goal of the project is to develop dense, abundant areas of blue violets within meadows that will eventually support silverspot larvae. In 1998-00, approximately 19,000 violets were hand planted at a WDFW site and approximately 120,000 seeds were scattered in burned plots. Once the violets are established, the Department will undertake a reintroduction program for the butterflies.



Surveys located 19 previously unknown mardon skipper sites, although the species remains "endangered."

- **Mardon skipper butterfly:** Recovery efforts for another state endangered butterfly, the mardon skipper, involved surveys by the WDFW and the state Department of Natural Resources in 2000. Federal biologists, trained by WDFW staff in butterfly survey techniques and identification, conducted additional surveys on U.S. Forest Service lands. A total of 19 new mardon skipper sites were located; but numbers of individuals at sites were low. Only five sites had 50 or more individuals; and nine sites had fewer than ten individuals each.
- **Snowy plover:** The endangered western snowy plover nests in very low numbers at three sites in Washington. Recovery actions for plovers include monitoring, surveys and protection of nesting sites. The Department conducted nesting surveys in 1999-01 on the coast from Moclips to Tokeland. In 2000, fewer than 30 nests were found at Damon Point (2) and Midway Beach (25); 32 eggs hatched from 12 nests. Nest failures at Midway Beach (13) appeared due to high winds causing blowing sand, possible corvid predation, and possible abandonment. The U.S. Fish and Wildlife Service monitors nests at the third Washington site at Leadbetter Point. A state recovery plan for the species was written in 1995 and the Department participated in the development of a draft federal recovery plan for the plover in 1999-01.
- **Oregon spotted frog/Northern leopard frog:** Research activities were conducted for two state endangered frog species, the Oregon spotted frog and the northern leopard frog. A two-year study of an Oregon spotted frog population discovered in Thurston County in 1998 was conducted in 1999-00. Objectives of the study were to determine the size of the population and the characteristics of egg-laying habitat. Experimental habitat enhancement was also conducted. Based on counts of egg masses, this breeding population was estimated to include a minimum of 244 adults. Two other spotted frog populations occur in the Columbia River Gorge. Research on the northern leopard frog was conducted for the first time in the Columbia Basin of Washington during 2000. Frogs were instrumented with radio transmitters and information was collected on breeding chronology, breeding locations, habitat use, movements, distribution, and water quality. The study identified potential

threats to the population and will facilitate additional research into key factors affecting the frog populations and management strategies needed to restore populations.

- **Western gray squirrel:** A study was conducted in 1999-00 to determine home range sizes and identify important characteristics of nesting and foraging areas and travel routes of the state threatened western gray squirrel in Klickitat County. Results of the study will be used in future conservation efforts for the squirrel. The Puget Sound population of western gray squirrels plummeted in the late 1990s, when only a few squirrels could be found in areas that contained 80-100 squirrels in 1993 surveys. Western gray squirrel nest surveys were conducted in Chelan and Okanogan counties during 2000, revealing that only one of 89 historical nests remained although 29 new nests were found. A study was conducted during 1999-00 to evaluate western gray squirrel nesting activity on sites which had been harvested in Klickitat County. A more extensive research project was initiated in 2001 to determine annual survival, productivity, immigration and dispersal at sites where timber has been harvested. A state recovery plan for the squirrel was initiated in 2001.

Habitat and Species Conservation

The Land Conservation section of the Wildlife Diversity Division promotes multi-species conservation through large-scale planning efforts, often involving a wide range of partners. The objective of the program is to not only protect critical habitat for threatened and endangered species, but also to “keep common species common” by identifying and protecting sites that represent a full range of wildlife species and habitats in Washington.

Key initiatives during the 1999-01 Biennium include:

- **Ecoregional Conservation Planning:** In 2001, a four-year cooperative project was initiated with The Nature Conservancy, the state Department of Natural Resources, the state Office of Community Development, Defenders of Wildlife, county governments and the University of Washington to identify the most important places for biodiversity conservation in each of Washington’s nine eco-regions. WDFW also began discussions with county representatives about ways to incorporate regional, multi-county

habitat considerations into their Growth Management planning process.

- **Prairie-Oak Woodland Conservation:** WDFW also participated in a multi-agency Site Conservation Plan designed to protect South Puget Sound's prairie-oak woodland ecosystem. Less than 10% of this unique ecosystem remains intact, providing habitat for many species of concern, including the western gray squirrel, Mazama pocket gopher, mardon skipper, Whulge checkerspot, Oregon vesper sparrow and golden paintbrush. The plan includes management and restoration objectives for public lands and protection strategies for key private lands. Other key participants in the plan include the Thurston County Conservation District, the state Department of Natural Resources and Fort Lewis. In addition, WDFW is participating in the Thurston County Conservation District's federal Habitat Conservation Plan for Scatter Creek which includes a significant amount of riparian oak and prairie habitat.
- **Shrub-steppe Habitat Conservation:** Less than 38% of eastern Washington's original sagebrush-grassland is present today, and much of what remains is in isolated fragments in relatively poor condition. Species of concern affected by this habitat loss include the pygmy rabbit, Washington ground squirrel, ferruginous hawk, burrowing owl, greater sage-grouse, sage thrasher, loggerhead shrike, sage sparrow, sagebrush lizard, and striped whipsnake. During the 1999-01 Biennium, WDFW biologists provided technical consultation to the Natural Resources Conservation Service, the Department of Natural Resources and private landowners to review Habitat Conservation Plans and grazing and agricultural practices in an effort to slow the decline of the shrub-steppe ecosystem. WDFW also acquired approximately 1,000 acres of prime shrub-steppe land during the biennium which, together with previous holdings and croplands enrolled in the federal Conservation Reserve Program, provide protection for shrub-steppe wildlife and corridors necessary for mammals to move between isolated patches of habitat. WDFW is a major partner in the Foster Creek Conservation District Multi-species Habitat Conservation Plan that is being developed for Douglas County.

- **Priority Habitats and Species:** During the 1999-01 Biennium, management recommendations were written and distributed to the public via the WDFW web site for 14 species or groups of species, including white pelican, blue grouse, cavity-nesting ducks, chukar, common loon, ferruginous hawk, great blue heron, harlequin duck, mountain quail, peregrine falcon, prairie falcon, ring-necked pheasant, sandhill crane, and wild turkey. The Priority Species Management Recommendations are used by agencies and private landowners to reduce impacts to fish and wildlife during development and other land management activities.

Watchable Wildlife Program

Wildlife viewing is now the number one outdoor activity in the United States and a major component of the tourism industry. Birdwatching alone has been the nation's fastest-growing recreational activity over the past 10 years, drawing an increasing number of visitors to Washington communities.

WDFW's Watchable Wildlife Program was established in July 1997 to promote the state's wildlife viewing opportunities and engage the public in habitat stewardship and wildlife conservation. In the 1999-01 Biennium, the program's two staff members worked with organizations throughout the state to meet those goals and leverage the popularity of wildlife viewing to benefit local economies, particularly in rural areas.



A school group goes birdwatching, the nation's fastest-growing recreational activity over the past decade.

Those benefits can be significant. According to the U.S. Bureau of the Census, participants in wildlife watching activities spent some \$1.7 billion in Washington in 1996, supporting more than 21,000 jobs and generating \$56.9 million in state tax revenues. These expenditures have become especially important to rural areas where they now exceed the sales value of the state's top individual agricultural commodities.

Funded primarily by the sale of state personalized license plates, WDFW's Watchable Wildlife Program launched the following initiatives in the 1999-01 Biennium:

- **Wildlife Area Review:** All WDFW Wildlife Areas were reviewed for their wildlife viewing potential in 2000 and information was posted on the WDFW Web page at www.wa.gov/wdfw about what wildlife species can be found in each area. Two wildlife viewing sites were identified for additional development, using \$200,000 in capital funding approved by the Legislature. Sites chosen include the Fir Island Farm section of the Skagit Wildlife Area (enlarged parking area and fence) and Northrup Canyon in Grant County (trail and parking area), a joint project with State Parks.
- **Visitor Surveys:** Two surveys were conducted by program staff to help determine statewide in-



Captured live on WDFW's EagleCam, this pair of nesting eagles prompted more than 500,000 visits to the agency's website.

terest in wildlife viewing opportunities offered by WDFW and local communities. A telephone survey commissioned by the program in February 2000 found that 41% of those participating had made a trip to view wildlife within the previous year. A separate survey conducted by program staff at state wildlife fairs found that 69% of respondents were female, predominantly college graduates 45 to 55 years old, who spent an average of \$153 per trip.

- **WildWatchCam:** The program used donated high-technology surveillance cameras to bring live views of animals in their natural habitat to thousands of people via the Internet. The website for the hugely popular EagleCam, which featured eaglets emerging from their eggs in real time, received over 500,000 visits since it went on line in May 2001. It also generated \$1,165 in donations from around the country and thousands of complimentary e-mail messages from viewers. The BatCam focused on a Spokane-area maternal colony of Townsend's big-eared bats in an abandoned, rural cabin. Materials and labor were donated to run power and phone lines to this remote site. SalmonCam was installed at the Issaquah Salmon Hatchery.
- **Partnerships:** Joining with the Department of Tourism and other state agencies, Watchable Wildlife staff helped to develop wildlife viewing opportunities as part of the Lewis and Clark Bicentennial operations. Staff also worked with the local organizations that make up the Coulee Corridor group to develop a scenic byway plan for Highways 17 and 155 from Othello to Coulee Dam to stimulate economic development in the area. A grant from the Department of Transportation funded participation by a Watchable Wildlife staff member, who helped to identify fish and wildlife viewing opportunities.

WDFW LANDS

The WDFW Lands Division manages a statewide network of 802,031 acres of land and water that provide habitat for Washington's fish and wildlife while also providing a range of fishing, hunting and other wildlife-related recreational opportunities compatible with that purpose. Of that total acreage, WDFW owns 491,630 acres and manages 310,401 more for such agencies as the U.S. Bureau of Reclamation,

the U.S. Fish and Wildlife Service and the state Department of Natural Resources.

Most of these lands are part of designated Wildlife Areas, which are scattered throughout the state in almost every county. Management of these areas is designed to achieve two primary goals:

- Provide habitat for endangered and threatened species, big game, waterfowl and other birds, upland game, fish and invertebrates.
- Provide other compatible recreational uses, which include fishing, hunting, cycling, horseback riding, cross country skiing, rafting, rock climbing, hang gliding and numerous other outdoor activities. Public use of Wildlife Areas is extensive and diverse, approaching 3 million visits annually during the 1999-01 Biennium.

The WDFW Lands Division is divided into four sections: Wildlife Areas, Upland Wildlife Restoration, Public Access & Washington Conservation Corps, and Real Estate. Key issues during the 1999-01 Biennium included developing road inventory/assessment plans on agency lands as required by the new Forest and Fish rules, working with landowners on habitat restoration on private agricultural lands through the USDA Conservation Reserve Program, helping the Bonneville Power Administration meet its mitigation obligations by funding enhancement activities on WDFW lands, and attempting to meet basic maintenance needs at WDFW access sites.



A WDFW wildlife manager surveys the Chief Joseph Wildlife Area in southeast Washington, a major elk calving area.

Wildlife Areas

WDFW lands in designated Wildlife Areas range in size from just a few acres to over 100,000 acres and are managed by a staff of 21 managers who provide on site protection, management, maintenance and enhancement of fish and wildlife resources and habitat.

A majority of these lands have been purchased since 1939 with federal Pittman/Robertson funds, although some have been acquired through mitigation agreements with local utility districts and the Bonneville Power Administration. Since 1991, more than 55,000 acres of critical habitat along with a number of public access sites have been acquired with state funds provided by the state Legislature through the Interagency Committee for Outdoor Recreation.

Management activities on Wildlife Areas include day-to-day maintenance responsibilities that consume the majority of any available funding. In recent years, WDFW has been forced to defer many of these activities – ranging from elk fencing to weed control – due to inadequate resources, in some cases tarnishing the agency’s reputation as a good neighbor. In the 1999-01 Biennium, funding available for maintenance activities – either through mitigation agreements or from grants – was re-prioritized for state and federally listed species, primarily salmon, sage and sharptail grouse and pygmy rabbits.

Weed control accounted for approximately 20% of all operating expenditures for Wildlife Areas. Spartina, diffuse knapweed, Canadian thistle, purple loosestrife and other weeds threaten habitat for both fish and wildlife. State law and most counties in the state require that they be controlled.

A bright spot was that WDFW’s efforts to control purple loosestrife showed clear signs of success during the biennium. Starting in the mid-1990s, WDFW became one of the first major landowners in the state to combine herbicides with bio-control (loosestrife eating insects) to control this potentially catastrophic noxious weed. The results of that effort were realized in the 1999-01 Biennium when monitoring revealed large scale die-offs of purple loose strife infestations in the Columbia Basin. This has provided effec-

WILDLIFE AREA ACRES, LOCATION & DESCRIPTION

Wildlife Area	Acres	County/Location	First Acquisition	Description/Primary Use
Chief Joseph Sherman Creek Wooten	29,696 9,982 16,492	Asotin Ferry/Pend Oreille Columbia/Garfield	1962 1948 1941	The wildlife area is an outstanding chukar habitat, an elk winter range and a major elk calving area. The area is important for white-tailed deer and for mule deer fawning. These lands along the Tucannon River are historic wintering areas for game and receive year-round use by a variety of wildlife species.
Chelan	27,400	Chelan	1965	Chelan, Swakane and Entiat Wildlife Areas provide important winter range for mule deer and offer year round habitat for upland birds.
Columbia Basin Methow	181,212 29,568	Grant/Adams Okanogan	1952 1941	This area with its wetlands, coulees, and channeled scablands is managed primarily for waterfowl. The Methow Wildlife Area provides critical winter habitat for mule deer, white tailed deer and golden eagles.
Sinlahekin	14,034	Okanogan	1939	This area was purchased to provide habitat for mule deer, today the area is managed for a diversity of wildlife species.
Colockum	104,918	Chelan/Kittitas	1953	These lands were purchased primarily to provide wintering area for Rocky Mountain Elk, mule deer, and big horn sheep.
LT Murray Oak Creek	96,352 41,586	Kittitas Yakima/Kittitas	1966 1940	This Wildlife Area supports a large herd of Rocky Mountain Elk. This area provides critical winter range for populations of Rocky Mountain Elk, and California bighorn sheep.
Lake Terrell	2,289	Whatcom	1942	Lake Terrell is within a well- traveled portion of the Pacific flyway and attracts a diversity and abundance of waterfowl.
Skagit	13,000	Skagit/Snohomish	1948	The Skagit Delta is one of the major waterfowl wintering areas in the Pacific Flyway. A bird checklist for the area includes over 180 species.
Snoqualmie	2,031	King/Snohomish	1964	Close to the metropolitan area, this Wildlife Area provides the public with opportunities to hunt, fish, train hunting dogs, and watch wildlife.
S Puget Snd/Scatter Cr.	4,649	Pierce/Thurston	1966	The Scatter Creek with its unique short-grass prairie supports a wide variety of rare or uncommon plants, insects, birds and animals.
Klickitat	14,000	Klickitat	1948	Klickitat Wildlife Area is known for black tailed deer, Merriam's turkey, chukar, black bear, bighorn sheep, valley quail, bandtail pigeon and dove.
St. Helens	2,500	Cowlitz	1989	This property located on the Toutle River debris slide is managed for the elk which use the area for calving and rearing of young.
Olympic Swanson Lakes Sunnyside	3,527 19,000 11,050	Grays Harbor Lincoln Benton/Yakima	1952 1990 1947	This Wildlife Area encompasses several units which are managed primarily for elk and waterfowl. This BPA funded mitigation project is managed primarily for sharp-tailed grouse.
Scotch Creek Wells	15,500 8,447	Okanogan Douglas	1991 1968	This BPA mitigation project is managed primarily for wetland and riparian habitat and provides excellent nesting and winter habitat for waterfowl.
Wenas	104,000	Okanogan Douglas	1991 1968	This BPA funded mitigation project is managed primarily for sharp-tailed grouse.
Cowlitz	13,940	Yakima/Kittitas Lewis	1951 1991	Douglas County PUD provides mitigation funding to manage this area primarily for upland birds and waterfowl.
Shillapoo	1,550	Clark	1952	This BPA funded mitigation project is managed primarily for Rocky Mountain elk, mule deer, big horn sheep and sage grouse.
Sagebrush Flat	8,616	Douglas	1991	Tacoma City Light provides mitigation funding for habitat management and recreation on lands adjacent to Mayfield and Riffe Lakes.
TOTAL	775,339			This BPA funded mitigation project is managed primarily for waterfowl and the associated wetland and riparian habitat. This BPA funded mitigation project is managed primarily for the protection of the pygmy rabbit and other shrub-steppe dependant species.

Wildlife Areas are managed for all of Washington's fish, wildlife, reptiles, amphibians, and marine mammals. *September 2001*

tive protection for wetland-dependent wildlife, resulting in improved habitat for fish and wildlife and greater recreational opportunities.

The summer of 2000 was an unusual year for forest fires in eastern Washington, and WDFW lands were no exception. Approximately 7,000 acres of land burned on five Wildlife Areas in eastern Washington destroying habitat, critical big game winter range and fencing. The Legislature provided \$645,000 to cover fire suppression costs and help with emergency deer and elk feeding.

WDFW also responded to the need to address fish passage and sedimentation problems on Department lands, as required under the new "Fish and Forests" Rules. Approved by the 2000 Legislature, the new rules require all forest owners – including WDFW – to develop a statewide Road Management and Abandonment Plan by 2005 as a step toward addressing these issues. During the 1999-01 Biennium, WDFW began developing road inventory/assessment plans for Wildlife Areas and other Department lands, and also took action to correct a number of fish-passage barriers and fish screens where ESA listings required immediate attention. Approximately 10 of WDFW lands had been surveyed and problems corrected through this effort by the end of the 1999-01 Biennium.

Wildlife Area personnel participated with local landowners and other agencies in ten Coordinated Resource Management Planning (CRMP) efforts during the biennium. CRMPs help to address resource issues on multiple ownerships within a planning area through a consensus and information exchange process. WDFW remains committed to the use of CRMP as a way for neighbors to solve resource problems in a mutually acceptable manner.

Upland Wildlife Restoration

WDFW's Upland Wildlife Restoration Project seeks agreements with private landowners throughout the state to improve habitat for wildlife by planting native grasses, trees and shrubs, and distributing information on the biological needs of various species. In some cases, these habitat agreements are combined with WDFW public access agreements, which provide landowners with free informational signs and better trespass compliance in exchange for allowing public access for hunting or fishing. More than 1,300

private and corporate landowners are enrolled in this program, representing 16% of the state's private lands, mostly in eastern Washington.

Financial support for the program, the largest of its type in the nation and a model for other states, comes primarily from the U.S. Fish and Wildlife Service, which contracted with WDFW for \$1.1 million in services during the 1999-01 Biennium. In addition, more than \$100,000 was donated by conservation-minded sports groups, including Pheasants Forever, National Wild Turkey Federation and the Rocky Mountain Elk Foundation.

Upland Restoration staff have used their local knowledge and contacts to increase the participation and understanding of the Conservation Reserve Program (CRP) administered by the Department of Agriculture. This federal program compensates farmers for taking acreage out of agricultural production in order to improve water and air quality, soil stability and wildlife habitat. During the 1999-01 Biennium WDFW staff helped approximately 1,000 landowners qualify for CRP by providing technical assistance and materials necessary to improve wildlife habitat.

The Environmental Development Goes Educational project (EDGE), created in 1991, gives high school students an opportunity to get involved in hands-on environmental restoration work. Sponsored by Future Farmers of America chapters, nearly 800 Washington students have participated in wildlife enhancement projects on private lands in the past ten years,



Wenas Wildlife Area in Yakima and Kittitas counties is managed primarily for elk, mule deer, bighorn sheep and sage grouse.

helping to forge links between landowners, sportsmen and wildlife. More than 70 students participated in the program during the biennium.

Access Sites

The Department maintains 604 public recreational access sites statewide, which are visited by the public an estimated 13-15 million times each year. These sites provide public access to the lands and waters in every county in the state for fishing and hunting, along with a variety of other outdoor activities that include boating, rafting, camping, hiking, cycling, hang gliding and rock climbing.

WDFW access sites typically range from one to five acres with a few in excess of 100 acres. Most are limited to day use, although overnight camping is allowed in some areas. Development is generally limited to fencing, parking, signage, boat launches and toilet facilities. About 100 sites are operated through mitigation agreements with various public utilities, cooperative agreements with a county, city, or port district, or as a functional part of a Wildlife Area.

During the 1999-01 Biennium, the Department acquired one new water access site. This was a ten-acre site on Lake Kapowsin in Pierce County to provide public access to the lake's warmwater fishery.

Washington's continued population growth and increased recreational demand have made it impossible to adequately maintain all of these sites within the budget provided. Particularly in summer months when use is at its highest, the Department worked to



Members of the Washington Conservation Corps build a rock jack fence on a WDFW Wildlife Area in eastern Washington.

meet minimum maintenance requirements, such as cleaning and pumping toilets, picking up litter and meeting legal requirements for weed control. Many maintenance activities such as signing, fencing, gate repair, tree removal and boat ramp repair had to be deferred due to budget constraints.

The budget for WDFW's access sites totaled \$1.1 million in the 1999-01 Biennium, including \$101,936 from the state Wildlife Fund and \$800,096 in federal Dingell-Johnson funds. The remaining \$124,000 was generated through a \$10 use fee for the non-fishing and hunting public, approved by the 1998 Legislature. Together, these funds supported eight-full time staff, two temporary seasonal positions and goods and services necessary to maintain more than 600 sites statewide.

Washington Conservation Corps

The Washington State Legislature created the Washington Conservation Corps (WCC) in 1983 to give young adults valuable work experience while lending muscle to environmental projects throughout the state. Administered by WDFW, the program employed 98 young adults age 18 to 25 during the 1999-01 Biennium, putting them to work repairing trails and wildlife-control fences, building footbridges, posting signs, planting trees, helping out at hatcheries and assisting with a variety of other activities.

Most WCC projects were focused on stewardship responsibilities on WDFW Wildlife Areas and recreational Water Access Area sites, along with habitat restoration and enhancement projects at Upland Wildlife Restoration Sites. Assigned to mobile crews at Department regional offices, corps members receive both on-the-job and classroom training to make them more employable upon completion of the 6-to-12 month program.

Starting in the second year of the biennium, WCC participants became eligible for AmeriCorps scholarships in the amount of \$4,725 after one year of service. This incentive greatly improved retention of corps members, a majority of whom remained in the program for a full year during the second year of the biennium.

Real Estate Management

The Real Estate Services section of the Lands Division is responsible for acquisition, disposal and real

property management for WDFW's 801,630 acres of owned and controlled lands.

WDFW's real estate holdings include administrative offices, hatchery facilities, wildlife areas, shellfish beds and public fishing access areas. By statute, legal and administrative transactions involving WDFW land are conducted by authorization of the Fish and Wildlife Commission.

During the 1999-01 Biennium, Real Estate Services completed 70 acquisitions valued at \$12,865,018 and totaling 9,256 acres. These purchases addressed program needs ranging from access to public shellfish beds in Hood Canal to elk winter range in Columbia County.

Funding for these acquisitions was provided primarily by grants from Interagency Committee for Outdoor Recreation (Washington Wildlife and Recreation Program), accounting for \$10,252,888 of the total. A new area of focus was the purchase of 10 conservation easements, which provide 675 acres of permanent habitat protection on private land.

Real Estate Services also addressed three surplus properties through the sale of the Retsil Ferry Terminal to Kitsap County Transit, the exchange of the surplus Yakima Hatchery for Kittitas County elk habitat and the sale of the Lake Boran Access to the City of Newcastle for inclusion in their city park. By the end of the biennium, WDFW's real estate holdings totaled 491,630 acres of ownership and control of an additional 310,401 acres.

In managing WDFW's holdings, Real Estate Services addressed 18 easement and right-of-way requests from public and private entities and resolved two boundary conflicts through exchanges. Payments made to counties in lieu of property taxes were \$368,952 for Fiscal Year 2000 and \$373,472 for Fiscal Year 2001. Assessments paid to local governments were \$169,213 and \$168,545 respectively. Forty-one grazing leases covered 67,582 acres as of January 2001 providing for 9,297 animal units monthly. At the same time, 56 sharecrop agreements covered 11,224 acres. A timber sale was conducted on the Sherman Creek Wildlife area to address diseased timber and a gravel sale on the Yakima River provided for the restoration of an important riparian zone.

WILDLIFE SCIENCE

Washington state is home to more than 50 hunted species and nearly 80 wildlife "species of concern" – those that are endangered, threatened, sensitive or candidates for protection listings. To protect and restore vulnerable populations and meet the Department's mandate to provide recreational opportunities, resource managers must understand each priority species' population status, habitat requirements and factors limiting their abundance.

The Wildlife Science Division within WDFW's Wildlife Program provides research expertise, technical information, data management and quantitative analysis for both hunted and non-hunted wildlife species throughout the state. The division employs 33 FTE staff who conduct field investigations into the ecological requirements, population status and habitat relationships of priority wildlife species and provide Geographic Information System (GIS) analysis and support for species management. They also maintain and update databases on endangered species and other wildlife, and offer technical expertise in wildlife veterinary medicine, including training on humane and safe handling techniques for potentially dangerous animals such as cougar, black bear and moose.

In addition to its services within the Department, the Wildlife Science Division maintains working relationships with the scientific community outside the agency and shares information with other natural resource agencies and professionals by producing reports and species management recommendations, publishing scientific papers and presenting seminars and workshops.

Total funding to the division during the 1999-01 Biennium was \$4.8 million, of which 43% was obtained through grants and contracts from federal agencies and other sources outside state government. State funding was generated by the sale of personalized license plates (26%), sale of hunting licenses (19%) and monies from the State General Fund (12%).

Key activities during the 1999-01 Biennium include:

- **Elk management study:** In April 2001, WDFW contracted with a group of elk experts to conduct an external review and analyze cur-

rent WDFW elk management practices, objectives and strategies. The panel was asked to 1) investigate the population impacts of selecting various post-hunt bull/cow ratios as management objectives, 2) evaluate the impacts of hunting during the rut, 3) explore the impacts of late season elk hunts, 4) consider the genetic consequences of managing for various post-hunt bull/cow ratios, 5) address appropriate levels of antlerless harvest, and 6) assess current data collection techniques. The panel of experts, led by Dr. Jim Peek of the University of Idaho, is made up of world-renowned scientists from University of Idaho, University of Montana, University of Alberta, and Northwest Fisheries Science Center in Seattle.

- **Game species applied research:** Research focused on black bear population dynamics, sharp-tailed and sage grouse habitat ecology, and mule deer population dynamics in eastern Washington. All these projects were funded 75



Dr. Briggs Hall, WDFW veterinarian, fits a cougar with a radio collar prior to its release.

percent with federal Pittman-Robertson funds and 25 percent with State Fund-Wildlife monies from the sale of hunting and fishing licenses. Fieldwork for the black bear and sage and sharp-tailed grouse studies ended in 2000, followed by data analysis and report writing in 2001. The grouse studies found that habitat loss and fragmentation were significant factors affecting population dynamics of sage and sharp-tailed grouse. The results from the black bear study indicated that bear population dynamics were significantly related to habitat quality and levels of human disturbance.

- **Wildlife disease surveillance:** As public awareness and concern grew about chronic wasting disease in deer and elk, WDFW stepped up its surveillance for this condition. During the 1999-01 biennium WDFW secured funding to increase sampling of several deer and elk herds throughout the state and provide assurance that Washington deer and elk populations are free of the condition. WDFW also continued annual disease and parasite testing of elk herds that utilize winter feeding stations. The purpose of the annual sampling is to detect the presence of disease which could pose a threat to domestic livestock utilizing similar range habitats.
- **Cougar research:** In the winter of 2000-01, WDFW completed preparation for the first field season of Project CAT (Cougars and Teaching), a study of cougar behavior in Kittitas Valley that includes a K-12 science curriculum. Work included initial curriculum development to identify questions and problems students can investigate and data they can collect for a field study beginning in 2002.
- **Mule deer:** A cooperative study was initiated in 2000 to investigate the possible declining status of mule deer in eastern Washington. Major cooperators in the study include the U.S. Forest Service, U.S. Fish and Wildlife Service, Chelan PUD, Washington State University, University of Washington, and the Inland Northwest Wildlife Council. Over the past year, 164 radio-telemetry collars were placed upon adult female mule deer. The physical condition and reproductive status of captured deer was assessed using ultrasound technology.
- **Marine mammals:** Research by the division's Marine Mammal Investigations unit during 2000-

2001 focused on marine mammal interactions with endangered salmonids and environmental contaminant effects on resident species populations. Research included collaborative efforts with the National Marine Fisheries Service, U.S. Fish and Wildlife Service, Oregon Department of Fish and Wildlife, Department of Fisheries and Oceans-Canada, University of Washington and the North Pacific Universities Marine Mammal Research Consortium.

- **Caspian terns:** In collaboration with Oregon State University and Real Time Research (Bend, Ore.), WDFW anchored a small barge in Tacoma's Commencement Bay to assess whether such vessels could attract nesting Caspian terns as a means of collecting food-habit data in other locations. The project was successful in attracting nesting terns, providing extensive food habits data which can be used in future management of the species.
- **Wildlife genetics:** In 2001, WDFW initiated a new wildlife conservation genetics section for black-tailed deer, elk, black bear, pygmy rabbits and sharp-tailed grouse. Activities included laboratory operations, data analysis and report preparation. Funding for these efforts came from a variety of outside contracts. Baseline conservation genetics work on the pygmy rabbit population in Washington was completed in the summer of 2001.
- **Web applications:** The division provided Department constituents with greater access to data on hunting permit selection and raffle results. Web applications were developed to allow permit applicants to discover the status of their permit drawing via the Internet. Hunting raffle results were also posted on the web.
- **Shrub-steppe mapping:** An inventory of shrub-steppe habitat was completed for eastern Washington, using satellite imagery and image-processing techniques. The mapping effort was performed in collaboration with shrub-steppe research projects conducted over the past several years.

- **Species database expansion:** Databases were expanded and edited on spotted owls, marbled murrelets, reptiles and amphibians, raptors and herons. In addition, the Wildlife Heritage database was increased.
- **Cooperative data sharing:** In early 2001, the Wildlife Science division became an active participant in the newly formed Washington State Remote Sensing Consortium (WARSC), a forum of organizations sharing the cost of acquiring remotely-sensed data, such as satellite imagery and digital ortho-imagery. In the summer of 2001, the WARSC was successful in implementing its first data acquisition: year-2000 satellite imagery for the entire state.

Research Publications

The solution to many wildlife management problems begins with applied research. Below are some of the peer-reviewed publications written by members of the Wildlife Science Division on specific research topics during the 1999-01 Biennium. All are accessible on the WDFW website at http://www.wa.gov/wdfw/science/scn_papers/index.html

Jameson, R.J. and S. Jeffries. 1999. Results of the 1999 survey of reintroduced sea otter population in Washington state. IUCN Otter Specialist Group Bulletin, 16(2):79-85.

Koehler, G.M., P.B. Hall, M.H. Norton, and D.J. Pierce. (2001) Implant versus collar transmitter use on black bears. Wildlife Society Bulletin. 29(2):600-605.

Schroeder, M.A., D.W. Hays, M. Murphy, and D.J. Pierce. 2000. Changes in the distribution and abundance of Columbian sharp-tailed grouse in Washington. Northwestern Naturalist 81:95-103.

Schroeder, M.A., D.W. Hays, M.F. Livingston, L.E. Stream, J.E. Jacobson, and D.J. Pierce. 2000. Changes in the distribution and abundance of sage grouse in Washington. Northwestern Naturalist 81:104-112.

Vander Haegen, W.M., F.C. Dobler, and D.J. Pierce. 2000. Shrubsteppe bird response to habitat and landscape variables in eastern Washington, USA. Conservation Biology 14:1145-1160.

Watson, J.W., D.W. Hays, and D.J. Pierce. 1999. Efficacy of northern goshawk broadcast surveys in Washington State. Journal of Wildlife Management. 63:98-106.

Jacobson, J.E. and M.C. Snyder. 2000. Shrubsteppe mapping of eastern Washington using Landsat satellite thematic mapper data. Final Report. Washington Department of Fish and Wildlife. Olympia, WA. 35p. ■

ENFORCEMENT

THE ENFORCEMENT PROGRAM WITHIN the Washington Department of Fish and Wildlife (WDFW) is the tenth largest law enforcement agency in Washington state, with 164 budgeted commissioned staff serving a population of nearly six million citizens. Each field officer has an assigned area designed to provide coverage and presence throughout all of Washington's 66,582 square miles. Additionally, western Washington officers patrol the 3,026 miles of Puget Sound and coastal marine waters to enforce federal and state laws.

The Washington State Legislature has given WDFW Enforcement personnel a diverse set of duties, with a broad array of responsibilities within their respective jurisdictions. Officers enforce recreational and commercial harvest regulations and ensure compliance with fish passage/diversion standards and hydraulic project requirements. They respond to dangerous bear and cougar complaints and prevent unsanitary shellfish from entering the marketplace. They provide for boating safety and enforce the criminal codes of Washington. They assess and respond to commercial agri-

cultural damage, provide education, and work with local communities. They ensure legal harvest of the state's forest products and control litter and waste in the outdoors.

Washington's human population growth has created an increase in the demand for services from Fish and Wildlife officers. In the 1999-01 Biennium, the Enforcement Program responded to increasing pressure for services in a number of areas, including the need to protect species of concern, prevent dangerous wildlife incidents and unsanitary shellfish from compromising public safety, and protect private property from damage by wildlife.

The total operating budget for the WDFW Enforcement Program in the biennium was \$28.8 million. Of that amount, \$13.9 million came from the State General Fund, \$13.6 million came from the State Wildlife Fund and the remainder from other state, federal and local sources. Fish and Wildlife officers are deployed throughout the state in communities where they live and work, and often respond to calls from the public during off-duty hours.



In 2001, WDFW consolidated all Department marine detachments under a new Marine Division to improve enforcement of state salmon regulations.

Fish and Wildlife officers maintain close working relationships with other law enforcement jurisdictions, including local police departments, county sheriffs, U.S. Fish and Wildlife Service, National Marine Fisheries Service, U.S. Coast Guard, and U.S. Customs. Likewise, they work closely on a day-to-day basis with Department biologists in coordinating harvest and protection regimes, assessing habitat alterations, and ensuring compliance with an assortment of permit activities.

Violations and Workload

Work assignments for Fish and Wildlife officers cover four broad areas of responsibility:

- Regulating harvest;
- Protecting fish and wildlife habitat and non-harvested species;
- Providing for public health and safety; and

- Responding to and resolving damage caused by wildlife.

In the 1999-01 Biennium, WDFW officers made more than 550,000 contacts with the public. During those contacts, officers made approximately 28,000 arrests and issued 10,000 written warnings, resulting in an overall ratio of one violation for every 14.5 contacts.

Most of the officers' time – almost 69% – was dedicated to enforcing harvest regulations. Officers also spent nearly 16% of the time regulating habitat compliance and enforcing laws governing species of concern, and almost 7% of the time was spent responding to deer and elk damage and other problem wildlife complaints. Public safety efforts, including responding to reports of dangerous bear and cougar activity, protecting shellfish sanitation and enforcement of other public safety-related laws and rules, consumed 9% of officers' time.

CONTACTS, VIOLATIONS AND COMPLIANCE

1999-2001 BIENNIUM

	FY 2000		FY 2001	
	Contacts	Arrests and Written Warnings	Contacts	Arrests and Written Warnings
REGULATING HARVEST				
Salmon & Steelhead	35,548	2,506	49,603	3,570
Trout & Warmwater Species	40,274	3,395	44,580	3,716
Shellfish	19,837	1,559	25,604	1,974
Groundfish	4,328	221	4,434	244
Sturgeon	4,392	226	4,406	329
Big Game	33,484	1,684	35,370	1,832
Migratory Birds	5,825	288	5,702	399
Game Birds	3,614	173	4,231	177
RESOURCE PROTECTION				
Dept. Lands & Access Sites	14,648	2,479	16,511	3,167
Litter, ORV, Snowmobile, and Forest Products	6,710	790	6,227	1,022
Threatened & Endangered Species	8,295	790	6,218	773
Habitat & Hydraulics	3,800	133	2,926	147
PUBLIC HEALTH & SAFETY				
Dangerous Wildlife	2,506	7	3,172	1
Boating Safety	4,936	419	5,288	639
Alcohol, Narcotics, Criminal Traffic, and other Crimes and Infractions	2,814	988	3,291	1,289
Sanitary Shellfish	834	168	357	37
PROBLEM WILDLIFE				
Damage & Wildlife Control	7,257	9	6,728	31

NOTE: Arrests/Written Warnings does not include verbal warnings.

During the biennium, officers responded to nearly 6,400 problem wildlife-related contacts, and made almost 1,700 checks on priority Hydraulic Permit Approval projects. More than 5,000 contacts were made responding to dangerous bear and cougar incidents.

Dangerous Wildlife

Within WDFW, the Enforcement Program is responsible for responding to calls from the public concerning nuisance and dangerous wildlife. Since 1996, when Initiative 655 prohibited the use of hounds in the hunting of bear and cougar, the program has dealt with an increasing number of bear and cougar complaints throughout the state.

Pursuant to the legislation, the Enforcement Program and Wildlife Program staff tabulated and analyzed complaint data to identify areas with high incidents of verifiable human/cougar interactions. Wildlife Program staff developed specific criteria to determine harvest numbers and areas based on the number and type of complaint. Enforcement staff compiled complaint history data and developed a training video to explain and familiarize successful permittees with the process. Suggested permit levels, permit areas, and justification were then submitted to the Fish and Wildlife Commission for final approval before a permit drawing could be conducted. Twenty-three cougar were taken under this program in Fiscal Year 2001, the first year of the new permit program.

In another effort to address increasing cougar and bear complaints, the Legislature authorized an additional eight positions within the Enforcement Program. The Enforcement Program has redeployed personnel and filled these positions in areas showing high numbers of verified complaints and human conflicts. The program continues to use this criteria as part of its

ongoing hiring and deployment process in prioritizing which stations to fill.

In March 2001, the Enforcement Program also created a new, one-stop, toll-free emergency/incident hotline service for reporting all dangerous wildlife and poaching incidents. The hotline was intended to provide more streamlined customer service, combining two former toll-free lines into one.

Initiative 713

In the November 2000 election, Washington voters passed Initiative 713, which limits the methods and conditions under which fur-bearing animals can be trapped. The initiative did, however, make a provision for addressing documented nuisance and/or problem wildlife under prescribed conditions with otherwise unauthorized traps. Prompted by the change in state law, the Fish and Wildlife Commission adopted rules to help guide the public and enforcement officers in implementing the new law. With adoption of new rules, the Enforcement Program took responsibility for administering a new permit program, under which citizens must apply for permission to trap damage-causing furbearers with certain types of body-gripping traps.

COUGAR AND BEAR COMPLAINTS 1999-2001 BIENNIUM

	COUGAR		BEAR	
	Year 1	Year 2	Year 1	Year 2
Human Encounters				
Sighting/Chance Encounters	334	348	184	126
Incident/Attack (a)	26	74	18	37
Non-Human Encounters				
Livestock or Pet Depredation/Other	334	519	423	316
Total Confirmed Complaints	694	941	625	479
Unconfirmed Complaints	218	214	18	43

(a) One encounter in the "Incident/Attack" category was a cougar attack occurring on 8/24/99 in Ferry County.

Sightings are defined as direct observations, in urban or rural settings, near individuals or residences, while chance encounters are singular situations wherein a person came in close proximity to a cougar or bear and a reasonable person would conclude it was not a deliberate act of the animal involved.

Incidents are defined as aggressive or unusual behavior by an animal which presents an actual or perceived threat to an individual, while an attack includes a physical attack by the animal.

Livestock or pet depredation and other encounters include incidents associated with property disturbance, property damage, and livestock/pet harassment, injury or kill.

PUBLIC SAFETY COUGAR REMOVAL

(as authorized by ESSB 5001 and Commission WAC)

FY 2001

GMU	Applicants	Permits Issued	Animals Taken
109	3	3	1
117	9	9	2
121	7	6	4
124	10	10	7
130	8	8	0
250	2	2	0
407	4	4	1
448	4	4	1
454	8	7	1
460	4	4	2
621	6	6	4
654	1	1	0
666	2	2	0
TOTAL	68	66	23

NOTE: Public Safety cougar removal permits were first issued late in calendar year 2000 and became effective in 2001.

SPECIAL TRAPPING PERMITS

January 1, 2001 through June 30, 2001

(as authorized by Initiative 713)

PERMITS ISSUED: 181

By County

Benton	4	Mason	11
Clallam	1	Okanogan	1
Clark	6	Pacific	7
Cowlitz	13	Pierce	6
Franklin	6	Skagit	3
Grant	3	Snohomish	13
Grays Harbor	18	Thurston	16
Jefferson	2	Wahkiakum	3
King	21	Walla Walla	2
Kitsap	1	Whatcom	4
Kittitas	7	Whitman	1
Klickitat	3	Yakima	8
Lewis	29		

By Species

Beaver	110	Muskrat	10
Black Bear	4	Nutria	7
Cougar	1	River Otter	7
Coyote	35	Porcupine	7
Moles	4	Raccoon	1
Mountain Beaver	2		

New Marine Division

On July 1, 2001, the Enforcement Program consolidated all marine detachments under one division to improve coordination and direct work activities between the marine detachments, the WDFW Fish Program and Intergovernmental Resource Management Group, the Pacific Fishery Management Council, North of Falcon participants, the National Marine Fisheries Service (NMFS), the U.S. Coast Guard (USCG), state Department of Health (DOH), and Enforcement's Statewide Investigations Unit (SIU). A Captain was assigned to develop the operations framework for the three WDFW marine detachments for Puget Sound and coastal waters.

The new Marine Division emphasized enforcement of selective salmon fisheries in the four salmon management areas, employing vessels, dock patrols, special investigations, and joint operations with the Oregon State Police, NMFS, the USCG, and Canada Oceans and Fisheries.

The increased presence of WDFW enforcement officers on the state's coastal waters appears to have paid dividends for wild salmon by increasing angler awareness and compliance with fish protection rules. Significantly, more than 95% of all anglers contacted by officers were found to be in compliance with a new rule that wild, unmarked coho be released unharmed. Meanwhile, compliance among anglers checked regarding salmon rules overall ranged from 85% to 90%.

Selective salmon fishery enforcement efforts during the past biennium revealed compliance rates of those contacted as noted below.

Compliance Issues

	FY 00	FY 01
Overall salmon regulations	85.4%	90.2%
Unmarked coho possession restrictions	98.0%	98.7%

Citations and warnings were issued for fishing without a license, failing to record salmon catch, improper gear, possessing fish over the limit and fishing in closed areas or during closed seasons, as well as boat safety violations and other non-fishing offenses.

Cooperative Fish Screen Compliance

During the biennium, the Enforcement Program, in cooperation with the Habitat Program, initiated an effort in the Walla Walla River Basin in response to federal listings of steelhead and bull trout under the Endangered Species Act. The program is designed to inform and assist landowners and irrigators in an effort to achieve compliance with current state laws regarding fish passage, screening of gravity diversions and pump stations, and obtaining permits required by the state hydraulics code for the operation and maintenance of such facilities.

The Cooperative Compliance Program is designed to inventory water diversions and pump stations in order to determine which sites currently are or are not in compliance with existing state screening laws. Staff assist landowners in identifying fish passage obstacles that may exist on property they own or control.

Landowners who have chosen to participate in this program have received assistance in identifying commercially available screen materials and devices that will bring their facilities into compliance with law and rules. They also have received assistance with the development and implementation of approved plans to correct fish passage issues. Additionally, landowners not operating their facilities with necessary permits have received guidance and assistance in obtaining those permits.

Applicants who meet eligibility requirements by possessing a current legal water right are eligible for cost-share assistance covering the acquisition of new screens and the development of fish passage facilities. Landowners who participate in the program and commit to an approved compliance plan are not at risk under state law.

These efforts have been institutionalized within the Enforcement Program and have resulted in the establishment of a new division. An acting captain was assigned to develop the framework for an Environmental Protection Division, which will coordinate with a myriad of players who will need to be in-

involved in this critical project as it is expanded further in the state.

By the end of the biennium, 314 landowners had chosen to participate in the program, identifying 424 non-compliant diversions. In addition, 81 site assessments had been completed, and \$738,000 from the Salmon Recovery Funding Board and the Bonneville Power Administration had been approved to provide funding for screen materials and devices.

FTEs and Staffing Update

The 1999-01 Biennium began with the rehiring of officers previously affected by the Department's reduction in force action in May 1998. As the biennium ended, a number of senior officers retired, and by the end of June 2001, more than 20 commissioned positions were vacant. Actual FTE expenditures for the biennium were 157.3 FTEs in FY 2000, and 169.4 FTEs in FY 2001.

In concert with the Department of Personnel (DOP), Enforcement retooled the testing process for Fish and Wildlife Officer 1 candidates. Candidate applications underwent an initial screening process by the DOP. Applicants also completed background questionnaires, a new component of the initial testing process.

The Enforcement Program found that applicants are self-screening once they complete this questionnaire. This has resulted in a dramatic drop in the overall number of candidates for the officer register, but has also led to a higher percentage of candidates who are successful in passing the polygraph and psychological portion of the testing process. Review of the background questionnaire prior to the initial written/oral test eliminates marginal candidates, and retains qualified individuals. Because of retirements and existing vacancies, Enforcement plans to offer employment to up to 20 new officers.

Enforcement Program Funding and Personnel, 1999-01 Biennium						
(dollars in thousands)	GF-S		OTHER FUNDS		TOTAL	
	Funding	FTEs	Funding	FTEs	Funding	FTEs
Administration	\$997	6	\$977	6	\$1,974	12
Aviation/Shop	\$378	3	\$370	3	\$748	6
Field Operations	\$12,488	70	\$13,596	76	\$26,084	146
TOTAL	\$13,863	79	\$14,943	85	\$28,806	164

Accreditation

In August 2000, the Enforcement Program signed a contract with the Commission for Accreditation of Law Enforcement Agencies (CALEA) to begin the self-assessment process toward CALEA recognition. CALEA was created in 1979 by four major national law enforcement organizations to improve professional standards and promote excellence.

The CALEA Recognition Program includes 95 core requirements designed to help smaller or specialized law enforcement agencies to meet essential professional standards. Recognition is intended as a significant step toward full accreditation.

About 18% of the full-time police officers in the United States are members of agencies officially in the CALEA process. However, only two other state natural resource agencies are affiliated with CALEA: the Enforcement Section of the Delaware Division of Fish and Wildlife and the Indiana Department of Natural Resources.

The WDFW Enforcement Program is currently half way through the 24-month self-assessment process. During the first year of this process the program updated its policies and procedures to accurately reflect current operations and to comply with essential CALEA standards. The next step is an evaluation of changes necessary to the program's seizure-for-forfeiture and evidence-handling processes. Representatives of CALEA are scheduled to conduct an on-site evaluation of the program in the summer of 2002. If their assessment is favorable, the WDFW Enforcement Program is expected to gain CALEA recognition in the fall. ■

Officer Recognition, 1999-01

- **May 19, 2000:** Terry Hoffer, a State Fish and Wildlife Officer killed in the line of duty in 1984 while conducting a hunting license check, was honored posthumously with the Washington State Medal of Honor. The medal was presented to Hoffer's widow by Governor Gary Locke.
- **January 6, 2001:** Two Fish and Wildlife Officers performed a water rescue of a duck hunter whose boat had capsized in rough water at the mouth of the Nisqually River. The hunter was clinging to the side of the capsized boat and reportedly would not have survived had he not been rescued by the officers.
- **May 25, 2001:** A WDFW sergeant was awarded a U.S. Coast Guard (USCG) Silver Lifesaving medal by the USCG and Governor Gary Locke. The sergeant was honored for the rescue of a teenage girl in the ocean surf at Long Beach on June 3, 2000. A man on the beach, who had also attempted a rescue of the young woman, drowned in his efforts. The rescue at Long Beach was the second surf rescue performed by that sergeant in less than a year.
- **June 5, 2001:** A Fish and Wildlife officer responded to a "Mayday" call from a vessel in distress, located off Gedney Island. Using his onboard GPS plotter, the officer established the coordinates of the vessel. Upon arrival, two of the three individuals on board were unconscious. All three on board were subsequently airlifted to Harborview Medical Center in Seattle for treatment of carbon monoxide poisoning.
- **June 6, 2001:** Two Fish and Wildlife officers on shrimp season boat patrol in Hood Canal observed a plume of smoke coming from a vessel. Maneuvering through high winds and waves, the officers reached the boat and assisted in extinguishing the onboard fire. They also rescued a man, who was hypothermic after jumping into the water.

OUTREACH

Protecting and preserving Washington's fish and wildlife is a big job – too big for the Washington Department of Fish and Wildlife (WDFW) to do alone. Throughout the 1999-01 Biennium, WDFW worked with tribal co-managers, conservation groups, fishers, hunters, landowners, farmers, foresters and government agencies at every level to promote the protection – and enjoyment – of Washington's wildlife resources.

WDFW's public outreach efforts involve virtually every employee in the Department, from those who work at the customer service desk to biologists in the field. For example, in preparing for the 2001 North of Falcon meeting where the year's salmon seasons were set, WDFW added two all-day public workshops and created a new interactive website to increase citizen involvement in the process. When the Wildlife Program began work on a six-year wildlife-management plan in May 2001, staff asked for public comment on top wildlife priorities and received more than 2,000 responses by mail and Internet. Those comments will be a key consideration in the development of the plan.

As the biennium drew to a close, the Department was laying the groundwork for a series of Director's Roundtable meetings with the public conducted in seven locations throughout the state. Those meetings, held in October and November of 2001, were specifically designed to elicit ideas about how the Department can improve communications and services for the public. At the same time, the Department was preparing to launch a new "Go Play Outside" marketing campaign designed to promote outdoor recreation and encourage outdoor ethics. Sponsors of the campaign include the Washington Wildlife Federation, Trout Unlimited, Natural Resources Youth Camp, and the Washington Hunter Education Instructors Association.

To support these and other public outreach efforts, several programs worked throughout the biennium to promote awareness and involvement by the people of Washington in the issues facing the state's fish and wildlife resources. As discussed below, the



A WDFW employee talks to young people about fish and fishing at the Puyallup Fair.

services they provide fall into three basic categories: volunteer activities, educational services and public information.

Volunteer Programs

WDFW administers a number of volunteer programs that give citizens an opportunity to make a real contribution to the future of fish and wildlife in Washington state. In some cases, the Department helps organized groups compete for grants to support their work. In others, it simply ensures that the work done by individual volunteers is consistent with accepted environmental practices. In all cases, volunteers work without pay, providing thousands of hours of work for the satisfaction of knowing they have done their part to sustain Washington's fish and wildlife resources.

During calendar years 1999 and 2000, some 4,800 people provided 188,660 hours of volunteer effort. Some volunteers may have spent a few hours planting native shrubbery on a stream bank re-vegetation

project in their local community, while others have dedicated hundreds of hours over the years feeding elk at Oak Creek. Volunteer opportunities include such varied activities as serving as a hunter education instructor, assisting at a hatchery during the busy salmon spawning season, providing counts of various wildlife and gathering biological data at check stations. WDFW publishes a calendar of volunteer opportunities that mentions the Regional Fisheries Enhancement Groups as a key contact for folks looking to help fish and wildlife.

Regional Fisheries Enhancement Groups (RFEG)

The Regional Fisheries Enhancement Groups (RFEG) program was created by the Legislature in 1990 to tap citizen interest in participating in salmon enhancement efforts. Fourteen RFEGs were at work throughout the state during the 1999-01 Biennium, restoring streams, planting salmon eggs and improving habitat for future generations of salmon.

Each of the 14 RFEGs oversees specific local watersheds in the state, from the Pacific coast to eastern Washington. Within each assigned area, each non-profit organization develops and proposes projects designed to improve watershed habitat, boost salmon production, promote scientific research and educate local citizens about the resource.

During the 1999-01 Biennium, RFEGs worked on more than 300 projects around the state, many involving partnerships with tribes, sport fishing and commercial fishing groups, the private sector, and local, state and federal agencies. State funding for those efforts totaled over \$860,000, which was derived from recreational and commercial license revenues and the sale of surplus salmon eggs and carcasses returning from state hatcheries. In addition, the RFEGs leveraged more than \$7 million from other sources, including federal, state, and local grants, foundations, donated materials and volunteer labor.

In 1999, the RFEGs worked with hundreds of volunteers to improve 148 miles of stream habitat, deposit 27,000 salmon carcasses in streams to provide key nutrients, replace or repair 41 culverts and release three million salmon eggs and fry. A report on the RFEG's accomplishments in the 1999-01 Biennium will be available in the spring of 2002.

Volunteer Cooperative Fish and Wildlife Enhancement

Through the Volunteer Cooperative Program, citizens throughout the state can compete for funding that supports projects beneficial to fish and wildlife that rely on volunteer labor and expertise. WDFW received \$2 million from the Aquatic Lands Enhancement Account to support the program during the 1999-01 Biennium, of which 20 percent was used to meet administrative costs. The remainder funded 102 projects in five major categories: education, fish culture, habitat, research, and facility development.

As usual, the ingenuity and industry of Washington volunteers concerned with better fishing, hunting, bird watching and wildlife habitat resulted in some memorable achievements. Grant awards ranged from \$500 given to the members of the Port Townsend Garden Club to install a butterfly garden in a city park to \$92,000 sought by KBH Archers to continue the Olympic Mountain Elk Study under the guidance of agency wildlife biologists.

In 2000, WDFW created a seven-member citizen review panel to evaluate and rate all applications for Cooperative Program grants. Additional steps were taken to publicize the program, which in turn produced more than 150 grant applications for the most recent funding cycle.

Fish Production

The Volunteer Cooperative Program also supports approximately 250 Volunteer Fish Production Projects. These projects produce salmon and trout as fry, smolts, and adults. One hundred projects produced more than 7 million unfed fry from remote site incubators (RSIs) and egg boxes; 67 projects produced nearly 6.5 million fed fry; and 86 projects produce over 4 million yearling salmon or "catchable" trout. The total production from Volunteer Fish Production is more than 17.5 million fish at various lifestages.

The sophistication of these projects range from simple backyard egg buckets to full-scale endangered species recovery projects. In Hood Canal, three volunteer groups spearhead Hood Canal summer chum recovery projects in seven streams. In addition, the Hood Canal Salmon Enhancement Group conducts projects on the Union River and Big Beef Creek, and works in conjunction with the non-profit group

“Long Live the Kings” on projects in Lilliwaup Creek and the Hamma Hamma River. In the Straits of Juan de Fuca, Wild Olympic Salmon, in cooperation with the North Olympic Salmon Coalition, conducts projects on Salmon Creek, Chimacum Creek, and Jimmycomelately Creek.

All of these projects involve capturing and spawning returning adult salmon, incubating the eggs to hatch, and feeding the fry for a short time before release. These delicate procedures are not always conducted in the relative comfort of a hatchery, but rather often occur in adverse conditions using temporary field facilities. But despite these hurdles, these projects have generated dramatic results. In the longest running of these projects, summer chum runs have increased ten-fold on Salmon Creek and dramatic improvements also being observed in the Chimacum, Lilliwaup, Hamma Hamma, and Big Beef systems.

Education Programs

Responsible stewardship of the state’s fish and wildlife resources begins with education. Many young people get their first hands-on experience in salmon biology through the Department’s Salmon in the Classroom program or catch their first fish through one of the angling-education events sponsored by the Department. People of all ages are required to take basic training classes before they can receive their first hunting permit and naturalists can – with a little training – contribute to statewide research on fish and wildlife. All of these educational programs sow the seeds for responsible resource stewardship in Washington state.

Salmon in the Classroom

The Salmon in the Classroom program was created in 1991 to give students a hands-on learning experience in biology by rearing salmon eggs to fry stage in school classrooms. Through the program, students study the salmon lifecycle, become aware of water quality and habitat issues and discover the interrelationships of species and conditions within a given watershed.

In the past ten years, more than 250,000 students have participated in the program and reared more than 15 million salmon fry. During the 1999-01 Biennium, the number of permitted projects grew to more than 700 per year, up by approximately 100

Salmon in the classroom gets boost from sponsors

Since 1991, the number of schools involved in WDFW’s Salmon in the Classroom program has grown year after year. To help meet the growing demand for this type of instruction, WDFW has enlisted an array of public/private sponsors to help provide training or defray costs. Sponsors during the 1999-01 Biennium included:

- Seattle Public Utilities
- Clark County Public Utilities
- Everett School District
- Renton School District
- Yakima School District
- Tulalip Tribe
- Yakama Nation
- Colville Tribe
- Asotin County Conservation District
- Benton County Conservation District
- Pomeroy County Conservation District
- Ivar’s Seafoods
- Microsoft
- Tacoma Nature Center
- Northwest Trek
- Tri-State Steelheaders
- Trout Unlimited

projects from the previous biennium. Each proposed project is reviewed by Department biologists to ensure the appropriate stock is used and the planned release site does not adversely impact wild salmonids. As a direct result of the program, many teachers and students have created local stream monitoring and habitat restoration projects.

Project WILD

Educators across the state have found that students respond well to core educational subjects when they are taught in the context of fish and wildlife science. Students who have never demonstrated a great deal of interest in science or math, for example, can suddenly find themselves absorbed in observing salmon returns and tabulating the results. The Project WILD Education Program trains educators to meet state standards in science, social science, math, reading and writing through outdoor learning.

During the 1999-01 Biennium, Project WILD staff provided 40 workshops for 870 teachers, who in turn provided instruction for an estimated 26,280 students. Many of these workshops were offered in conjunction with the Water Education for Teachers (WET) program sponsored by the Washington Department of Ecology and Project Learning Tree sponsored by the Washington Forest Protection Association.

WILD program staff provide educators with activity guides and posters to teach ecological concepts. Project partners distributed 30 “education trunks” through the public school system, containing instructional videos, catch and release tools, fishing tackle with tools to debarb hooks, plastic models illustrating how to distinguish between wild salmon (with adipose fin) and marked hatchery salmon (clipped adipose fin) and educational games. Ten new WILD Salmon trunks were created by outside groups with WDFW assistance in the past two years.

NatureMapping

The NatureMapping Program gives students and other members of the public an opportunity to contribute to the scientific understanding and management of the state’s natural resources through the data they collect on the world around us. Administered jointly by Project WILD and the Gap Analysis Project at the University of Washington, the program provides training and written guidelines to those who want to share in a public data base that documents fish and wildlife resources and their habitat. That information is used by natural resource agencies, municipal governments, environmental organizations and schools to help answer fundamental research questions about those resources.

Since 1994, more than 200,000 wildlife reports have been submitted for entry into the data base and 150 groups have contributed water and stream data. During the 1999-01 Biennium, the program sponsored 30 workshops, providing training for 750 teachers and reaching an estimated 60,000 students. An on-line NatureMapping home page was established in December 2000, and program staff are currently exploring the use of NatureMapping to involve the public in helping to monitor salmon recovery efforts.

Marine Education/Diversity Outreach

Responding to public demand for increased opportunities to investigate the intertidal environment, the

Marine Education program provides hands-on instruction in the marine ecosystem and tidelands stewardship. Since 1979, the program has expanded from its initial focus on razor clams to include all kinds of coastal and Puget Sound shellfish and marine fin fish. The program’s single staff member provides classroom instruction, presentations to civic groups, beach walks, razor clam workshops, training for national and state park rangers and cooperative instruction with the Seattle Aquarium in the Tidelands Stewardship Training program.

Building on efforts began in the previous biennium, the Marine Education program entered into a partnership with two Asian Pacific Islander groups – the Korean Women’s Association of Pierce County and the Indochinese Cultural and Services Center – to reach people in these underserved communities. One result of those partnerships was the production of the educational video “Good Food From the Beach,” which addresses such issues as shellfish species identification, health issues, legal harvesting, and conservation. Funded by a grant from the Puget Sound Action Team, the video was translated into five languages and has been widely distributed. In 2000, project partners were invited to conduct a workshop on their model for multi-cultural outreach at the U.S. Environmental Protection Agency’s national conference.

During the biennium, the staff member for the Marine Education Program visited 94 classrooms reaching more than 2,300 students; conducted 22 field trips involving 1,330 students; and offered 25 diversity outreach workshops with 1,251 participants. He also spoke with 116 students at four



Volunteers from the Wenatchee Sportsman’s Association construct a water tank in the Collin Springs area to benefit elk, deer, bighorn sheep and other wildlife.

high school career fairs, participated in 15 cross-Department programs and staffed booths at seven fairs involving thousands of public participants.

Angler Education

The Youth Fishing/Angler Education Program works with sportfishing groups to provide fishing opportunities to young people and adults, provides educational material about fish and fishing to the public and trains volunteers to teach others about fishing and the aquatic environment. It also provides rods, reels, and fishing tackle to beginning anglers, and distributes pamphlets and fact sheets on where and how to fish.

Approximately 13,000 students received angling instruction or participated in a fishing experience sponsored by the program in the 1999-01 Biennium. More than 97 percent of those participants were age 18 or younger and overall participation was up by approximately 10 percent from the previous biennium.

The main reason for this increase was the Department's "Youth Fishing Initiative," launched in the spring of 2001 to increase fishing opportunities and education for young people, many of whom had never been on a lake or a river before. Under that initiative, nine "Kids' Klassic" fishing events were held in 2001 from Vancouver to Spokane, drawing more than 6,000 young people – many of whom had never fished before.

Angler Education has also been actively involved in Washington Outdoor Women workshops specifically designed to help women become involved in outdoor activities such as hunting and fishing tradi-

tionally dominated by males. Twenty-one women enrolled in angling classes through Washington Outdoor Women in the 1999-01 Biennium, and approximately one-third (4,300) of all participants in the Department's fish programs were female.

More than 700 volunteer instructors have been recruited and trained by the Angler Education Program, about 100 of whom conducted fishing training during the 1999-01 Biennium. At least a quarter of the instructors have been active continuously since the program was founded in 1988, and 45 new instructors were added during the biennium.

Hunter Education

Hunter education training is required for all first-time hunting license purchasers in Washington. A total of 21,561 students enrolled in 894 courses during the 1999-01 Biennium. Volunteers certified by the Department of Fish and Wildlife teach almost all courses, and a total of 760 volunteer instructors were actively involved in hunter education during the two-year period.

The basic hunter education training program and student materials remained unchanged during the year biennium, maintaining a focus on safety instruction and training practice with firearms and archery equipment. Instruction is also provided in principles of wildlife management and responsible outdoor behavior. An additional 600 people during the biennium enrolled in advanced hunter education, a voluntary program built upon an independent study model where the individual works alone to complete course objectives. ■

This program receives Federal financial assistance from the U.S. Fish and Wildlife Service. It is the policy of the Washington State Department of Fish and Wildlife (WDFW) to adhere to the following: Title VI of the Civil Rights Act of 1964, Section 504 of the Rehabilitation Act of 1973, Title II of the Americans with Disabilities Act of 1990, the Age Discrimination Act of 1975, and Title IX of the Education Amendments of 1972. The U.S. Department of the Interior and its bureaus prohibit discrimination on the basis of race, color, national origin, age, disability and sex (in educational programs). If you believe that you have been discriminated against in any program, activity or facility, please contact the WDFW ADA Coordinator at 600 Capitol Way North, Olympia, Washington 98501-1091 or write to:

U.S. Fish and Wildlife Service
Office of External Programs
4040 N. Fairfax Drive, Suite 130
Arlington, VA 22203

