The Intake

WDFW Hatcheries Division

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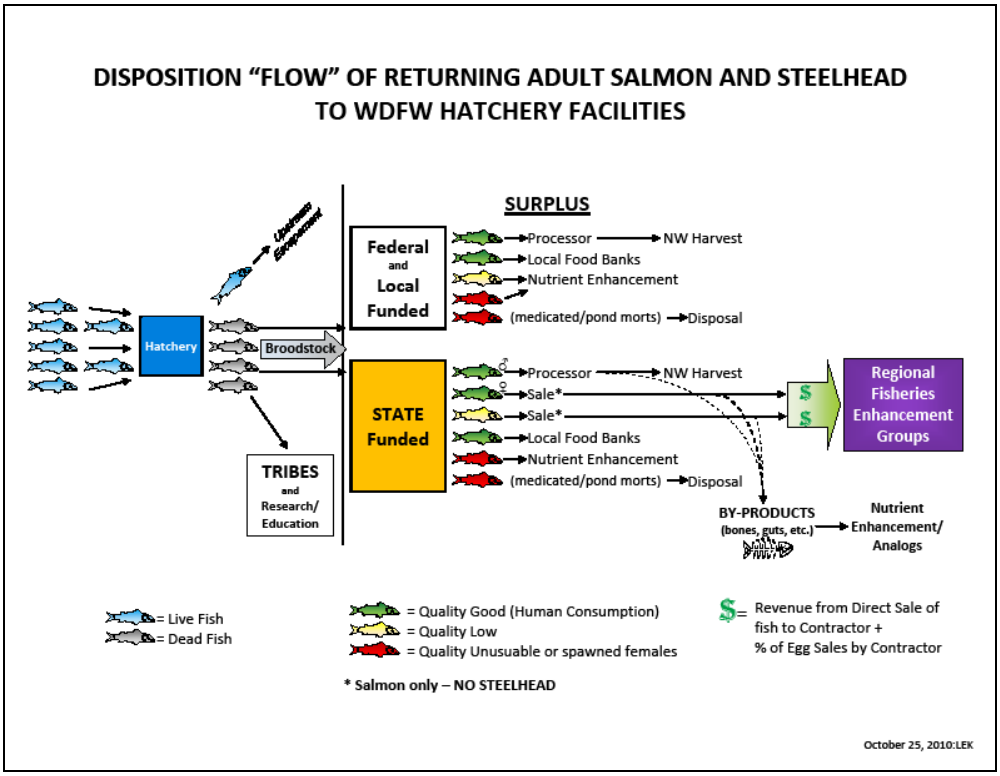
WDFW Hatcheries Provide Meals for Statewide Food Bank Program

By Mark Kimbel, Hatchery Evaluations Manager

Each year, more than 500,000 adult salmon and steelhead return to our hatchery facilities. After eggs are taken and upstream escapement goals are met, what happens to the remaining fish? Most of the food quality fish are donated to Northwest Harvest, the statewide food bank. In fact, WDFW has been donating fish to Northwest Harvest and smaller local food banks for many years. For Northwest Harvest these donations have never been more important as food bank use is at an all time high.

Currently, over 200,000 pounds of processed salmon products are donated to Northwest Harvest annually providing approximately 1,000,000 meals to needy citizens in 37 of the state's 39 counties. In addition, the small, local food banks provide assistance in communities near the hatcheries; many of them in rural areas. This also benefits the hatcheries as it is a means to deal with small numbers of fish.

Part of a recent legislative directive requires WDFW to enhance provisions to food banks. The subsequent Stakeholders Process conducted over the last few months resulted in a report to the legislature outlining recommendations that will be implemented through the upcoming renewal of the Surplus Carcass and Egg Contract. The new contract will focus on prioritizing food quality fish for food bank use, as well as increasing revenue to the fourteen Regional Fisheries Enhancement Groups (RFEGs) through sales of surplus fish at state-funded hatcheries.



WDFW graphic by L. Kishimoto (10/25/10)

See also "*Where do all the dead salmon go*?"article on page 8.

Inside this issue:

Alternate Commercial Fishing Gears and Methods being Tested in the Lower Columbia By Eric Kinne (Reg. 5 Hatchery Reform Coord.) and Pat Frazier (Reg. 5 Fish Prog Manager)

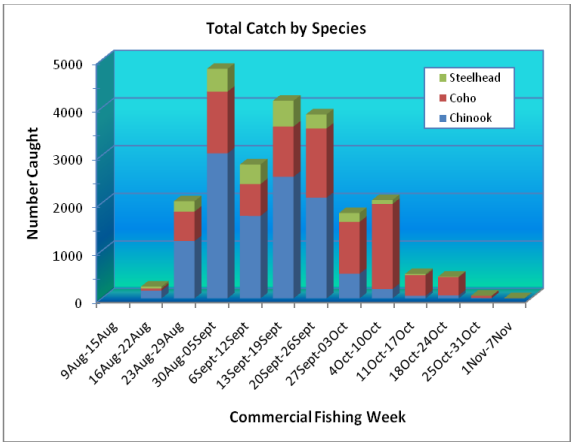
Over the last two years, Region 5 staff have conducted an alternative commercial fishing gear study in the Lower Columbia River. The purpose of this study is to test and implement use of alternative commercial fishing gears that increase catch of hatchery-produced fish while allowing naturally-produced fish to be released with a high survival rate. This study is being implemented partly in response to the recently-adopted Commission Policy on Hatchery and Fishery Reform (C-3619), which calls for WDFW to "Develop, promote and implement alternative fishing gear to maximize catch of hatchery-origin fish with minimal mortality to native salmon and steelhead."

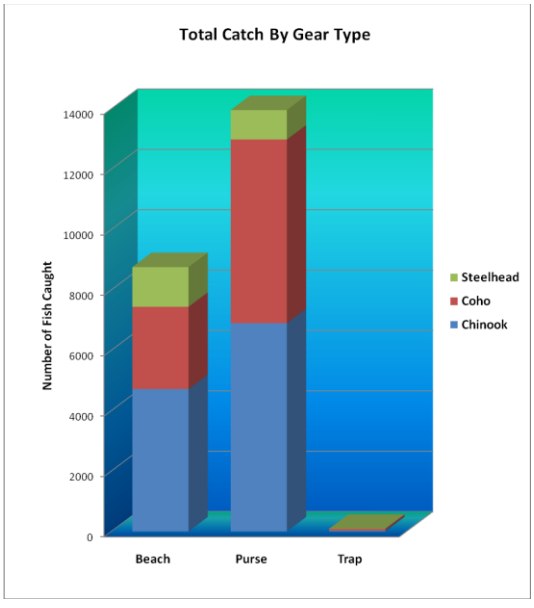
A small scale pilot study was conducted in 2009 with three fishers participating, each fishing a different gear type: purse seine, beach seine and trap net. The results of the 2009 study showed great promise and in 2010, the study was expanded in terms of number of participants and sites fished.


Three different gear types were tested: purse seine, beach seine, and trap net. (Photos by Eric Kinne and Josh Holowatz)

With Mitchell Act funding secured, a Request for Qualifications & Quotation (RFQQ) was sent out to over 500 fishers and posted on the state's WEBS system in February 2010. Thirteen fishers were selected to participate in the 2010 feasibility study: 5 purse seiners, 6 beach seiners and 2 trap nets. Each fisher was contracted to fish a total of 30 days from mid-September through late October. The 2010 study focused on the three following objectives:

- Test deployment and operation of three gear types
- Species-specific catch and catch per effort data
- Species-specific short term (24-48 hrs) mortality rates





The preliminary results for 2010 are generally positive. The total catch of 22,900 mature salmon and steelhead was comprised of 11,800 Chinook, 8,800 coho and 2,300 steelhead. Both purse and beach seines provided good catch rates while the trap net was ineffective: catches totaled 13,900, 8,900, and less than 100 for purse seine, beach seine and trap nets, respectively. Staff was unable to address the short term mortality rate objective due to predation damage to nets inflicted by otters, seals and sea lions.

Additional years of testing will be necessary to determine: 1) if these gears can be economically viable for use in a commercial fishery; 2) long-term survival rates of released fish; and 3) if other gears may have potential for use in the lower Columbia River. Feasibility testing is expected to continue in 2011, using both purse and beach seine gear plus other possible gear types. A key objective for the study in 2011 will also be determining post-release survival rates.

SF Nooksack Spring Chinook Rescue Program

By Josh Lewis (FHS-3) and Crystal Conley (FHS1), Kendall Creek Hatchery

Early in 2007 representatives from WDFW, NOAA and the Northwest Indian Fisheries Commission came together to decide on the best approach for recovery of the South Fork Nooksack spring Chinook population. The program consists of captive-rearing 1,000 fish per brood year with the goal of releasing one-million plus sub-yearlings each year. Half of the broodstock are reared at **Kendall Creek Hatchery** and the other half is raised at NOAA's **Manchester Research Facility** in Port Orchard.

Kendall Cr crew: Josh Lewis, Colleen Howard and Crystal Conley. (Photo by Larry Sisson)

Field technicians from the Lummi and Nooksack tribes beach-seine juveniles throughout the year, as long as water conditions and temperatures are favorable. In order to confirm that the juveniles are native South Fork fish, tissue samples are taken and run through DNA testing at the WDFW Genetics Lab. The fish are held at **Skookum Creek Hatchery** in partitioned vertical trays until DNA analysis is complete.


Tribal staff use beach seines to collect juveniles in the SF Nooksack River. (Photo by Ryan Vasak)

All fish that are verified South Fork Nooksack spring Chinook are transferred to Kendall Creek Hatchery. New arrivals to Kendall are placed in one of our small aquariums to be monitored for diseases. The fish are introduced to hatchery feed as soon as they arrive at Kendall. It is essential that the newly-arrived fish are eating the hatchery diet before they are combined with the rest of their brood year populations. Half of the fish (or about 500) of each age class are later transferred to the NOAA Manchester Research Facility to be reared to maturity in saltwater. Juveniles from each brood year are transferred to Manchester as zero-age fish and as yearlings. A small trial group of fish is sent prior to the main transfers to ensure fish are ready for the transition to saltwater. The rationale for raising the fish at two different facilities is to split the risk of losing the entire population due to disease or other issues.


Fish are kept at Skookum Creek Hatchery in partitioned trays until DNA analysis confirms their origin.
(Photos by Ryan Vasak)

This program has evolved significantly since its inception at Kendall. It was started with limited rearing facilities and little experience with raising fish to maturity. At first just getting the fish to eat an artificial diet proved challenging. These fish were used to eating natural food in their natural habitat so adaptations to feeding technique and diet had to be implemented. Improvements were made to the facility, including aquariums, circular ponds, and alarms.

All Chinook are prone to *Bacterial Kidney Disease* (BKD), and the longer they are held in captivity the higher the chance there is of an outbreak. To prevent this, we administer prophylactic antibiotic treatments three times a year.

An outbreak of *Bacterial Coldwater Disease* in December 2009 prompted us to make a few changes to the indoor rearing environments. Full-spectrum UV lighting was installed with timers to mimic the natural light cycle. Care was taken to reduce stress on the fish and tarps were used as privacy curtains so the fish would not be bothered by

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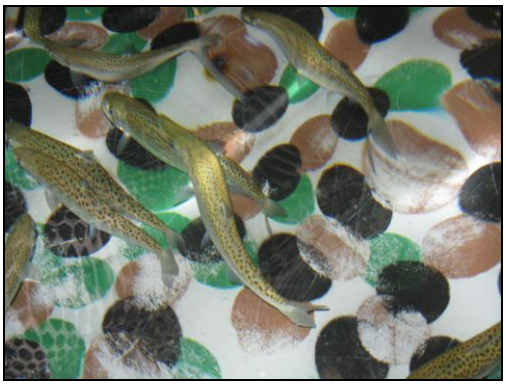
SF Nooksack Chinook (continued from page 2)

unnecessary interactions. All of these modifications have greatly improved our ability to keep the fish healthy and growing.

Kendall staff reached out to other fish culturists with captive brood experience and they were all extremely generous with sharing their knowledge. **Dan Witzack** from **Hurd Creek Hatchery**, WDFW fish pathologist **Dr. Jed Varney**, and **Carlin McAuley** from Manchester Research Facility have all made valuable contributions to the success of the program. While awaiting installation of large circular ponds we installed four 6-ft round ponds outside. This allowed us to reduce the density per pond as well as raise the fish under true natural-light conditions. In September, the crew at Kendall moved all of the 2006, 2007 and 2008 broods from 6-ft circulars into the larger 16 and 20-foot circulars outside. The fish are responding incredibly well to their new environment; whereas they used to be timid and easily spooked, now they eat vigorously and practically leap out of the water to feed.



Outdoor 6-ft circular ponds allow fish to be raised under natural-light conditions. (Photos by Chrystal Conley)

PIT tags, or passive identification transponder tags, are utilized to identify each fish and their corresponding DNA sample. The fish at Kendall are injected with 12 mm PIT tags at around twenty fish per pound. This size seems to be best for injection, handling and reducing mortality. Each PIT tag transmits its unique number via radio frequency.

Staff from Manchester travel to Kendall in order to ultrasound the older fish to check for maturation and to determine sex. At this time the PIT tag codes for the maturing fish are read and used to compile the DNA results and spawning matrix is designed to maximize genetic diversity in the resulting progeny.

NOAA staff use ultrasound on older fish to check maturation and determine sex. PIT tags are read to create a spawning matrix designed to maximize genetic diversity. (Photos by Craig Olsen)

Maturing fish from both Manchester and Kendall are transferred to Skookum Hatchery where they ripen and are eventually spawned. This year marks the program's first spawning of South Fork spring Chinook. While this year's mature brood numbers are small with only two females, the years to come look very promising.

The evolution of Kendall's role in this program has been full of advances. These advances could not have been achieved without the help and cooperation of so many different people. This truly collaborative effort that has helped the staff at Kendall to do the best job possible.

Hatchery Reform By the Hatchery Evaluation and Assessment Team (HEAT) staff

Importance of Genetic Composition in Integrated and Segregated Programs

Hatcheries represent unique environments separate from the natural evolutionary history of Pacific Northwest salmonids. A significant proportion of all returning adults in Puget Sound, the Washington coast, and the Columbia River are the progeny of hatchery-spawned adults. The primary purpose or potential benefits of hatchery programs are to help conserve naturally-spawning populations, and provide fish for harvest. Many hatchery programs are designed to provide both harvest and conservation benefits. Other purposes of hatchery programs include scientific research, education, and obligations to Native American cultural and subsistence rights.

Hatchery production goals depend on the purpose of the program (harvest or conservation) and the type of program (segregated or integrated). According to the Hatchery Scientific Review Group (HSRG), successful hatchery programs must conform to the guidelines specified by a "properly-integrated" or "properly-segregated" program; programs that operate outside these guidelines pose significant genetic risks to naturally-spawning populations.

Over time, hatchery environments can cause genetic changes relative to naturally-spawning populations. Most hatchery programs only have control over their stock from adult collection until juvenile release. The genetic composition of a hatchery population is the product of the original broodstock, adaptation to the stream in which they are released, domestication and gene flow resulting from stock transfers or natural straying. Collection, spawning, incubation and rearing protocols, as well as the hatchery environment in which fish are reared, can affect the survival and behavior of the stock. One way to achieve healthy and viable hatchery populations is to include the biological characteristics of local wild fish populations (**proportionate natural influence = PNI**). Including the characteristics from wild spawners may also reduce negative interactions with naturally-produced fish.

Salmon in the Soos Creek Hatchery holding pond.

Hatchery programs are classified as genetically ***integrated*** if a principal goal is to minimize differences between the hatchery broodstock and a naturally-spawning population. This means that natural-origin fish are systematically included in the broodstock each year (**proportion of natural-origin broodstock = pNOB**). Integrated programs are most appropriate when conservation is one of the goals of the program or when significant numbers of hatchery-origin fish on the spawning grounds (**proportion of hatchery-origin spawners in the river** = pHOS) makes it impossible to achieve a proper segregated program. An integrated program seeks to minimize genetic differences between hatchery broodstock and the naturally-spawning population in areas where fish are released and/or collected for broodstock. In an ideal integrated program, natural-origin and hatchery-origin fish are both represented in a common gene pool. However, the goal is to maintain the genetic characteristics of naturally-spawning fish among hatchery-origin fish (high PNI), not vice-versa; the presence of hatchery-origin fish on the spawning grounds does not make a hatchery broodstock genetically integrated! Natural-origin fish must be included in the broodstock in a way that represents the natural run throughout the spawning schedule. Programs should explore all avenues of securing wild broodstock to meet their pNOB goal. This includes using hatchery weirs, trapping ponds, adult collection facilities, hook and line, and river seining.

Darin Combs (FHS4) and volunteer George Cook at Issaquah Salmon Hatchery.
(Photo by John Kugen)

For integrated programs the HSRG recommends:

- an average pNOB that is greater than pHOS, with a minimum of 10–20% of the hatchery broodstock composed of natural-origin adults each year;
- adults should be collected and spawned randomly with respect to time of return, time of spawning, age, size and other characteristics related to fitness; and

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Catie-Kelly Corner

By Sa Hoang, Catie Mains and Kelly Henderson, Science Division/BDS-Hatchery Data Section

Do you know RMPC and RMIS?

How does hatchery management get the data to estimate adult production or evaluate rearing and release experiments? The Pacific States Marine Fisheries Commission manages the Regional Mark Processing Center (RMPC), which maintains the on-line Regional Mark Information System (RMIS). The RMIS database provides information used to help manage broodstocks, harvest, and natural populations.

RMIS was designed to facilitate exchange of coded-wire tag (CWT) data among release agencies, sampling & recovery agencies, and other data users. RMIS provides information on CWT releases and recoveries, as well as catch and effort data for the Pacific Region. Data are provided by state, federal, tribal and international fisheries organizations. RMIS serves as the U.S. site for exchanging CWT data with Canada for Pacific Salmon Treaty purposes; Canada houses a second complete copy of Pacific coast-wide CWT data sets.

Several times a year, WDFW staff analyzes, summarizes, and submits information regarding its coded-wire tagged hatchery and wild salmonids releases to the RMPC. Release data information reported to the RMPC includes: tag code, submission date, reporting agency, and release information (agency, hatchery location, release location, stock, brood origin date of release, average size, etc.) by brood year, species, run, mark type, etc. Other research information such as double index tags (DIT), study type, tag loss rates, release strategy can also be accessed.

Release data have been updated twice for the current calendar year. Incomplete mid-year releases are reported no later than August 15, and final releases reported no later than January 31.

You can query release data information from RMPC under RMIS Standard Reporting. Requested data can be selected by hatchery name, tag codes, regions, species, brood year, release year and agency reported, etc.

RMPC website can be found at http://www.rmpc.org/.

Fish Health Notes By John Kerwin, Science Division/Conservation *Biology*

What is Bacterial Kidney Disease [BKD]?

USGS photo

Bacterial Kidney Disease, often times shortened to just BKD, is caused by the bacteria *Renibacterium salmonis* (*Rs*). When viewed under the microscope, *Rs* is a small, gram-positive *diplobacillus*. Because the disease progresses at a very slow, often relentless rate it is difficult to control and nearly impossible to cure. To date, the use of anti-microbial agents has yielded only temporary relief, and treatments usually have to be repeated. Experimental vaccines have been tried, but thus far the results have been barely modest to disappointing. *Rs* can be transmitted from the adult female to her progeny (vertical transmission) and from fish-to-fish (horizontal transmission). *Rs* is considered an obligate pathogen as survival outside of the host is limited.

Currently WDFW employs five strategies to control BKD. It is important to note that not all of these strategies are antibiotic related. Those strategies are:

1. **Treat returning adults of susceptible species and stocks with antibiotic injections**. Returning adult female salmon are injected with Erythromycin in an attempt to prevent pre-spawning loss and limit the vertical transmission of *Rs*.
2. Some *Rs* bacteria may reside on the surface of the eggs so the **surface disinfection of green eggs with iodophor** can reduce the number of bacteria. This is done at spawning and can be repeated after eye-up of the eggs.
3. **Culling of eggs from females who have moderate or high ELISA (Enzyme-Linked Immunosorbent Assay) values**. An ELISA test looks for the presence of an antigen. An antigen is an introduced

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Did you know…?

- Smooth (non-porous) surfaces transmit bacteria and viruses better than porous materials. The reason is that porous, especially fibrous, materials absorb and trap the contagion, making it harder to contract through simple touch (*Appl Envir Microbiology*. 1994. **60**(10): 3704–10).

Hatchery Reform (continued from page 5)

- to avoid broodstock "mining," the natural component of the hatchery broodstock should not cause the number of natural spawners to fall below the escapement goal for natural spawners.

Hatchery programs are classified as genetically ***segregated*** if the broodstock is produced as a reproductively-distinct population using only adult returns back to the hatchery. In segregated programs, little or no gene flow should occur from a naturally-spawning population to the hatchery broodstock. The principal goal of a segregated broodstock program is to create a new, hatchery-adapted population to meet the needs for harvest or other purposes. Segregated harvest programs are most appropriate when nearly all returning hatchery-origin adults can be harvested or recaptured, or where the habitat or natural environment cannot support natural salmon populations. Segregated broodstocks are often selectively bred for particular traits (e.g. early run-timing) to easily differentiate from natural-origin stocks and/or to help achieve harvest benefits. Unlike integrated programs, however, any natural spawning by hatchery-origin fish from a segregated program poses potentially unacceptable genetic risks to natural populations. Properly-managed segregated programs must ensure that the pHOS is at very low rates to minimize biological risks to natural populations. The HSRG recommends that:

- fish are released in areas where opportunities to capture non-harvested adults are maximized, thus minimizing genetic risks to natural populations;
- fish are reared in a manner and/or at a location that minimizes potential straying and opportunities for natural spawning;
- adult production from segregated programs does not exceed harvest opportunity and the potential of selective impacts of harvest on the long term viability of segregated programs are considered;
- pHOS is no more than 5% of natural spawners, or 2% actual gene flow.

Hatcheries can no longer be regarded as surrogates for lost habitat. Hatchery programs must consider the receiving habitat in which they operate and also the naturally-spawning and hatchery-propagated fish that use that habitat. There is a significant amount of scientific uncertainty about the effects and proper uses of hatcheries, and a great need for flexibility and adaptation to changing goals, new scientific knowledge, and new information about the condition of stocks and habitat. A structured adaptive management program will be a key component of a strategy for success in these circumstances.

For more information, check out the Hatchery Reform website on the WDFW Hatcheries Division web page.

(Based on *Hatchery Reform: Principles and Recommendations of the HSRG*, April 2004)

What hatchery is this?

Lake Aberdeen Hatchery

BKD (continued from page 6)

substance on a molecular level that results from the presence of *Rs*. The culling of eggs from broodstocks that have high or moderate ELISA values is another non-antibiotic strategy. Recently published literature of a 13-15 year study done at Idaho Fish and Game hatchery facilities has shown progress towards reducing the prevalence of *Rs* and BKD when culling is employed under specific conditions.

4. **Antibiotic treatments of juvenile fish**.
5. **Rear the juvenile fish at lower densities to minimize stress**.

Even with all of these strategies employed we are not always successful in controlling BKD.

One of the critical ways to limit mortality resulting from clinical infections of *Rs* is to closely monitor the health of the fish at our hatchery facilities. If a culturist observes fish behavior or increases in mortality that might be caused by a pathogen, including *Rs*, they should report it to the Fish Health Specialist responsible for that facility.

Where do all the dead salmon go? By Josh Benton, FH2 Puyallup Hatchery

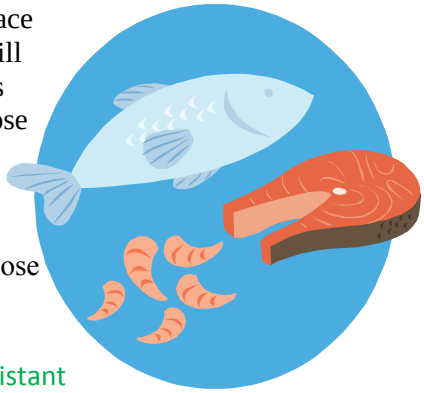
Ah yes, the salmon carcasses…the thought of the thousands upon thousands of the ubiquitous dead salmon brings so many mixed emotions. The smell of the ones that have spent too many hours in the sun, who are becoming a little too supple in the flesh and are destined for "nutrient enhancement," brings many a fond memory. Like that time my swing was off and I sprayed my old manager with black "dead-fish-goo" across the face… Ah yes, good times!

Photo by John Kugen, Issaquah Salmon Hatchery

But what about the others that are packed in ice and hauled away in trucks? Most are processed into fertilizer and pet food (mmm, "Old Spawned-Out-Coho Cat Chow"). The rest – those that still have a little silver on the body and haven't yet developed the secondary sexual characteristics – that are deemed "food grade," or "fit for human consumption" are distributed to Northwest Harvest. The fish are then further distributed to food banks across the state.

In 2009, 189,000 WDFW hatchery salmon (28% of returns) were distributed to food banks. By comparison, 161,000 carcasses (23%) went to nutrient enhancement, 870 (1%) went to rendering plants, 17,693 (2.6%) unusable carcasses went into the landfill and 13,769 (2.0%) were disposed of on-site. Over the last eleven years, an average of 180,000 fish/year has been donated – roughly 24% of all adult returns since 1999. According to the NW Harvest Web site, the Coastal Harvest Distribution Center in Hoquiam alone distributes over 200,000 pounds of skinless/boneless salmon fillets statewide. That is a lot of nutritious protein going free of charge to a lot of families in need!

This summer, NW Harvest purchased the machinery necessary to turn a portion of their fillets into salmon patties. The compact patties are easier to store (in the limited freezer space at the distribution centers) and assures uniformity in distribution. The hope is this will increase the desirability of the product and also increase the ease of preparation. It is clear to see how cooking a patty vs. cooking a whole fillet will be a lot easier for those that may be new to cooking fish.



Over the years, the distribution of the salmon to those in need has been an excellent example of a public/private/non-profit partnership established in part to benefit countless families in the state of Washington. I can't think of a better place for all those still-edible salmon to go.

Staff Happenings By Rachel McDaniel, Hatcheries Division Admin Assistant

Please join me in wishing the following employees success in their new positions:

Randy Aho, acting-Region 6 Hatchery Operations Manager (replacing Rich Eltrich, who retired in September)

Washington Department of Fish and Wildlife Hatcheries Division
600 Capitol Way N., Olympia, WA 98501

The Washington Department of Fish and Wildlife (WDFW) serves Washington's citizens by protecting, restoring and enhancing fish and wildlife and their habitats, while providing sustainable and wildlife-related recreational and commercial opportunities.

Comments are always welcome and much appreciated. This newsletter is for you; to keep us connected, share information, and motivate us to new levels of scientific exchange and hatchery management. Suggestions are being taken for future articles. Tell us what you want to read about!

– Contact: Lori Kishimoto

mailto:fishpgm@dfw.wa.gov
http://wdfw.wa.gov/fish/management/hatcheries.html