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Washington State Status Report for the Common Loon

by Scott Richardson, David Hays
Rocky Spencer and Julie Stofel

Washington Department of
FISH AND WILDLIFE
Wildlife Management Program

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Washington Department of Fish and Wildlife
600 Capitol Way North
Olympia, Washington 98501

February 2000

The Washington Department of Fish and Wildlife maintains a list of endangered, threatened and sensitive species (Washington Administrative Codes 232-12-014 and 232-12-011, Appendix A). In 1990, the Washington Fish and Wildlife Commission adopted listing procedures developed by a group of citizens, interest groups, and state and federal agencies (Washington Administrative Code 232-12-297, Appendix B). The procedures include how species listing will be initiated, criteria for listing and de-listing, public review and recovery and management of listed species.

The first step in the process is to develop a preliminary species status report. The report includes a review of information relevant to the species' status in Washington and addresses factors affecting its status including, but not limited to: historic, current, and future species population trends, natural history including ecological relationships, historic and current habitat trends, population demographics and their relationship to long term sustainability, and historic and current species management activities.

The procedures then provide for a 90-day public review opportunity for interested parties to submit new scientific data relevant to the status report, classification recommendation, and any State Environmental Policy Act findings. During the 90-day review period, the Department held public meetings to answer questions and take comments. The Department has now completed the final status report and listing recommendation for presentation to the Washington Fish and Wildlife Commission.

This is the Final Status Report for the common loon. **Submit written comments on the report by March 22, 2000 to: Endangered Species Program Manager, Washington Department of Fish and Wildlife, 600 Capitol Way N., Olympia WA 98501.** The Department will present the results of this status review to the Fish and Wildlife commission for action at the April 7-8, 2000 meeting.

This report should be cited as:

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EXECUTIVE SUMMARY

Historic and current population levels of the common loon are not well known in Washington, with most of the available information dating from the past 15 years. It is a rare breeder and a common migrant and wintering species within the state. A total of 20 confirmed nest sites are known to have been active for at least one year during the years 1979-1999 in Chelan, Douglas, Ferry, King, Okanogan, and Whatcom counties. The number of confirmed nests during 1990-99 ranged from 8-10 each year, with 9-14 sites surveyed. Nesting at 12 additional sites has been reported but not confirmed.

Common loons once were described as a fairly common breeding species both east and west of the Cascade crest, but likely declined between 1890 and 1925 in much of Washington. Declines across the U.S. during this period are thought to have been the result of shooting. A number of lakes in Washington appear to have offered ideal conditions for loon nesting in the past. Characteristic sites would have been relatively undisturbed forest lakes at least 20 ha (49 ac) in size, with deep inlets and bays. They would have had islands or logs and other floating debris for nest sites. Finally, they would have been characterized by good water quality, an adequate food source, and seclusion from intense human activity. At many lakes, unfortunately, these conditions have been lost.

Shoreline development, including homes, roads, and powerlines, has eliminated nesting habitat and increased the level of human activity in the vicinity of potential loon nests. Human disturbance is likely to reduce loon productivity and may preclude nesting at important sites. Persecution directed toward loons can cause abandonment of nesting sites. Drastic changes in water level (frequent events at reservoirs) either flood nests or render them unapproachable, causing abandonment. Based upon historic records, the species has a reduced opportunity to breed in the Puget Sound region, compared with historic conditions. Loons no longer nest at 4 lakes in western Washington and one lake in eastern Washington where nesting was known early in the 20th century.

Although human influences are problematic, allowances for loons sometimes are made. Floating nest platforms, access restrictions, and educational campaigns have helped loons to persist and successfully reproduce at certain sites. The development of reservoirs on rivers from dam construction has created some nesting and wintering habitat for common loons. Currently, about half the loon nests documented each year are located on water bodies that are relatively inaccessible to people, so they have limited human disturbance.

Increased development and recreational pressure at sensitive nesting lakes must be actively managed to prevent further loss of nesting loons. Protection and education programs must be expanded to appropriate lakes that currently do not support breeding loons to allow the species to recolonize and nest undisturbed, ensuring a stable and well-distributed population. The use of rotenone to kill unwanted fish may affect the food supply of common loons for several years.

The common loon does not merit State Endangered status, because it is not seriously threatened with extinction within the state. It does not appear to merit a State Threatened classification at this time, because we have no evidence of a declining population or a substantial change in distribution. However, because historic records are sketchy and surveys have not been comprehensive, it is not known if the population is stable, increasing or decreasing. Although threats such as human disturbance, predation, and oil spills have been identified, the severity of these threats to the breeding population is not well understood. Numbers of known nests have increased over the past 15 years, but this increase may be a result of increased survey effort. Processes of dispersal and site colonization are also not well understood. New information on these issues may change our understanding of the status of common loons in Washington.

State Sensitive status is warranted because the common loon is a rare breeding species and vulnerable to a number of threats. Loons require special management to breed in proximity to humans, and they are likely to become endangered or threatened without continued cooperative management and removal of threats.

The Department recommends the common loon be classified as a State Sensitive species.

INTRODUCTION

The common loon (*Gavia immer*) has been the subject of intensive study and management elsewhere in its range. A recent thorough review (McIntyre and Barr 1997) provides detailed information on most aspects of common loon life history and human interactions. A recent annotated bibliography (McIntyre and Cutler 1995) offers additional remarks and resources on the common loon. Because these exhaustive references exist, information in this review is, as much as possible, specific to Washington.

TAXONOMY

The common loon is one of five members of the family Gaviidae and the order Gaviiformes (American Ornithologists' Union 1998). It was first described by Brünnich in 1764. The species is known as the great northern diver in the Old World. It and the yellow-billed loon (*Gavia adamsii*) constitute a superspecies (American Ornithologists' Union 1998).

DESCRIPTION

Common loons typically measure 66 to 91 cm (26 to 36 in), with a 130-140 cm (50 to 55 in) wingspan, and weigh 3,800 to 7,200 g (8.4 to 19 lb)(Evers, pers. comm). Males are larger than females and territorial individuals tend to be larger than those not on territories (McIntyre and Barr 1997). Both male and female common loons bear striking black-and-white plumage during the breeding season. In winter, loons acquire a gray-above, white-below basic plumage. Subadult loons may remain in basic plumage all year.

During eastern Washington summers, many lakes support red-necked grebes (*Podiceps grisegena*), which can superficially resemble loons and are sometimes locally called loons (Richards and Musche 1985). In western Washington, common mergansers (*Mergus merganser*) may also be confused with common loons (A. McMillan, pers. comm.), as they superficially resemble loons and adult mergansers sometimes carry young on their backs (M. Ostwald, pers. comm.). These potential misidentifications complicate the interpretation of reports received from the general public.

GEOGRAPHICAL DISTRIBUTION

North America

Common loons breed across Alaska, Canada, and most of the northern-tier states. They winter on the west coast from the Aleutians to Mexico and on the east coast from Newfoundland to the Gulf Coast (American Ornithologists' Union 1998).

Washington

Common loons have nested recently on lakes and reservoirs in Ferry, Okanogan, Douglas, and Chelan counties in eastern Washington and Whatcom and King counties in western Washington Unconfirmed nesting has been reported in Benton, Clallam, Douglas, Grant, Grays Harbor, Jefferson, King, Okanogan, and Whatcom counties. Non-breeding loons, adults or sub-adults (D. Evers, pers. comm.), occur on fresh and salt water during summer. Common loons winter primarily on coastal and inland marine waters, but are also found in low numbers on unfrozen reservoirs, rivers, and lakes in the interior.

NATURAL HISTORY

Migration

Little information is available on migration of loons that nest in Washington. Most migrants seen in the state are traveling to or from Canada and Alaska, where the majority of common loons breed. Adults begin to move toward breeding lakes during late March. Males from established breeding lakes may return first to maintain and defend nest sites. They return as early as mid- to late March in King County (R. Spencer, pers. observ.; McIntyre and Barr 1997). The peak of movement occurs in mid- to late April and stragglers are present into early May (R. Spencer unpubl. data, S. Zender pers. comm.). A few young loons migrate to breeding waters in June (Campbell et al. 1990, McIntyre and Barr 1997). Sub-adult loons often remain in the marine environment throughout the summer.

After nesting, most common loons leave breeding lakes to winter on marine waters, although some loons use bodies of fresh water during winter. Post-breeding migration in Washington is probably similar to movement in British Columbia, initially movement begins in late August and continues through November, with a peak in early October (Campbell et al. 1990).

Reproduction

The following information is summarized from Evers (1993a), Evers et al. (in press), and McIntyre and Barr (1997).

> Common loons first breed when they are at least 5 years old, but 7 may be typical, and some may not breed until they reach 11. Site fidelity is high, with annual rates of 84% on lakes with single pairs and 76% on lakes with multiple pairs. Mate switching within and between seasons averages approximately 20% per year. Upon returning to nesting lakes, common loons quickly commence nesting; territories are established and eggs laid within about 2 weeks after arrival. Individuals usually return to the same territory year after year. Common loons

normally lay 2 eggs and incubate them about 28 days. If a full clutch is lost early loons will re-lay.

Chicks are down-covered at birth and are semi-precocial. They enter the water and swim with parents just hours after hatching. To reduce heat loss through their feet, young chicks climb onto a parent's back for brooding until they reach about age 16 days. Chicks are initially dependent upon adults for food, but catch half their own prey by the age of 8 weeks and most of their prey by the age of 11 weeks. First flights occur when chicks are 11-13 weeks. Young become independent sometime between mid- September and mid- November, depending when they hatched.

Data on nesting chronology in Washington are limited. The date of first egg laying varies, likely depending on weather, pair bond formation, and nest site availability; the latter is sometimes affected by water levels, particularly on reservoirs. Since 1989, more than 40 laying dates have been documented in western Washington (R. Spencer unpubl. data). Laying has occurred between 4 April and 20 May, with most occurring between the last week in April and 11 May in King County (R. Spencer, unpubl. data). Hatching generally occurs the last week of May or early June, but can occur as early as mid-May (R. Spencer, unpubl. data) or as late as July 7 (D. Base, pers. comm.). In King County, egg hatching and chicks have been observed between 14 May and 13 June, with the majority seen between 20 and 30 May (R. Spencer and D. Paige, pers. observ.). Chicks have been observed in Ferry County on 4 June (Richards and Musche 1985), in Whatcom County on 8 June, and in Okanogan County on 13, 19, and 22 June (Rogers 1997). Juvenile loons are likely to remain on natal lakes until at least August or September, and have been observed as late as October on lakes and reservoirs in western Washington (R. Spencer and D. Paige, pers. observ.).

Hatching success (proportion of nests with at least one hatched egg) was 0.69 at nine King County sites between 1989 and 1993 (R. Spencer, unpubl. data). Productivity, (the average number of young fledged per nesting pair per year), was 0.77 during the same period (R. Spencer, unpubl. data). Elsewhere in the loon's range, productivity has ranged from near zero to just over 1 (McIntyre and Barr 1997). Average productivity of 0.535 young per pair per year characterized stable populations in northern Saskatchewan (Yonge 1981, cited in McIntyre and Barr 1997). Hatching success and productivity in western Washington vary due primarily to predation, human disturbance, weather, water level fluctuations, and unknown causes (R. Spencer, unpubl. data). Productivity also depends in part upon lake size and food availability. Smaller lakes, or lakes with insufficient prey, reduce productivity, while larger lakes with abundant prey enhance productivity. Lake acidity may also depress productivity (McIntyre and Barr 1997).

Dispersal

Dispersal distances of young from natal sites is not well known. Limited data from the U.S. Great Lakes region suggest that most juvenile loons that leave their natal lake migrate to ocean

wintering areas and typically remain on the ocean for the next 2 ½ years (Evers et al., in press). These researchers also studied the distance between natal lakes (or water bodies) of juvenile loons and breeding sites established years later as adults. They found breeding territories averaged 13 km (8 mi) and ranged from 0 to 64 km (40 mi) from natal lakes (N = 27).

Mortality

Maximum longevity for the common loon is likely to be more than 25 years, although the maximum age for banded birds is 18 (McIntyre and Barr 1997, D. Evers, pers. comm.). Sources of mortality on breeding lakes have been summarized by McIntyre and Barr (1997). Loon mortality in the marine environment, where loons are especially vulnerable during their mid-winter flightless period, has been reviewed by Spitzer (1995). Estimated survival of adults banded as juveniles was 17-25% after 3 years (Evers et al., in press).

Natural sources of mortality include predation (of young, in particular), death due to injuries sustained in territorial conflicts, botulism, and parasitic infections (Franson and Cliplef 1993, McIntyre and Barr 1997). Avian predators include eagles, corvids, and gulls, while mammalian predators include coyotes, raccoons, skunks, mink and weasels (McIntyre and Barr 1997). In 1999, the campground host at Lost Lake in Washington State reported 2 common loon chicks taken by an eagle (species unknown). Also in 1999, a Forest Service biologist reported a juvenile bald eagle harassing an adult loon on Bonaparte Lake. Eagles are also suspected in the loss of a chick on Bonaparte Lake in 1999 (G. Gum, pers. comm.). In western Washington, young loons have been taken by bald eagles and river otter (R. Spencer, pers. obs.).

Human-related mortality factors include drowning in fish nets and traps, contamination by spilled oil, poisoning by mercury or lead, collisions with motorized watercraft, collision with powerlines, collisions with vehicles (D. Swedberg, pers. comm.) and shooting (Franson and Cliplef 1993, McIntyre and Barr 1997). Human disturbance can promote predation on eggs or chicks (McIntyre and Barr 1997)(See “Factors affecting continued existence”, page 18.).

Food

Common loons eat fish, primarily, but also eat other aquatic animals (McIntyre and Barr 1997). Crustaceans can be important when fish are not plentiful or where water is murky, making fish pursuit difficult (Barr 1973, cited in McIntyre and Barr 1997). Prey items frequently weigh 10 to 70g, though much larger prey are sometimes taken (McIntyre and Barr 1997).

A variety of fish species are eaten by common loons (McIntyre and Barr 1997), but little is known of their food choices in Washington. Fish identified during the preparation of two specimens (Slater Museum numbers PSM 21055, 22482) salvaged from marine waters of Skagit County in 1994 and 1996 were Pacific staghorn sculpin (*Leptocottus armatus)*, big skate (*Raja binoculata)*, tidepool sculpin (*Oligocottus maculosus)*, flounder (Pleuronectidae), and sole (Soleidae). In October of 1997 and 1998, at a lake on the Queen Charlotte Islands, British

Columbia, all common loon prey identified (*n*=84) were three-spined sticklebacks (*Gasteropteus oculeatus*), with lengths estimated to be 50 to 70 mm (2-3 in)(Reimchen and Douglas 1980).

Although loons are found on lakes supporting trout and other game fish, loons may only prey upon them opportunistically. Barr (1973) suggested that native trout are more secretive and wary than hatchery stock, which may be especially vulnerable when recently planted and unacclimatized.

Behavior

Foraging. Common loons begin to forage after dawn and hunt intermittently until late afternoon or near sunset (McIntyre and Barr 1997). In fall and winter, they spend more than half the day foraging, but when incubating or caring for young they hunt less (McIntyre and Barr 1997). Loons search for fish by peering under water while at the surface and dive in search of prey. Average dive duration has varied among studies, ranging from about 30 sec to >1 min (Reimchen and Douglas 1980). Dives exceeding 2 minutes have been observed in western Washington (R. Spencer, pers. observ.). Time spent below the surface reflects time to search, pursue, capture, and manipulate prey. Most prey are swallowed under water.

Interspecific relationships. Interspecific aggression is strong in loons on breeding territories, where adult loons will attack and kill other loons, geese, ducks, and mammals (Kirkham and Johnson 1988). Most loon attacks on waterfowl are directed toward goslings and ducklings. Common loons are known to attack and kill common mergansers (McIntyre and Barr 1997) but in Nova Scotia, loons and common mergansers co-existed and reproduced successfully where lakes were greater than 80 ha (198 ac) in size (Kerekes et al. 1994).

Intraspecific relationships. Common loons often form small feeding flocks in autumn and winter (McIntyre 1983) and groups of loons will roost together at night (McIntyre 1978, McIntyre 1983, McIntyre and Barr 1997). When nesting, however, common loons are usually highly territorial. This behavior is somewhat variable; Strong and Bissonette (1988) noted a lack of aggressive encounters on lakes shared by >1 pair of nesting loons.

Territoriality. Common loons defend nesting, feeding, and chick-rearing territories (McIntyre and Barr 1997). Fights are common when loons defend breeding territories. Territorial behaviors, which include water treading and calling while chasing, are often misconstrued as courtship (Sjölander and Ågren 1972, McIntyre and Barr 1997). In contrast, courtship displays are simple and of low intensity (Sjölander and Ågren 1972, McIntyre and Barr 1997). Territoriality is expressed less strongly in fall and winter (McIntyre 1978) (For territory size, see "Home Range" below).

Vocalizations. Common loons have a repertoire of four basic call types: yodel, hoot, wail, and tremolo (McIntyre and Barr 1997). The yodel, given only by males, is a territorial signal and is sometimes thought of as the loon's "song." The hoot is a brief, low note used as a contact call.

Wails, fairly long and pure notes, signal a "willingness to interact" (McIntyre and Barr 1997). The tremolo, or "laughing" call, indicates distress (McIntyre and Barr 1997); it is used during nest/chick defense or when fleeing, and can be prompted by human disturbance.

Locomotion. Loons spend most of their time on the water or near its edge. Their legs are positioned well behind their center of gravity and they travel poorly over land. While swimming, loons use their feet for propulsion, and may use their tail as a rudder. To become airborne, loons patter along the water surface for 30-200 m (100-650 ft) (McIntyre and Barr 1997). Once airborne, loons are powerful fliers, readily reaching 120 kph (75 mph) (Kerlinger 1982, cited in McIntyre and Barr 1997).

HABITAT REQUIREMENTS

Common loons typically breed on forest lakes with deep inlets or bays and numerous islands (McIntyre and Barr 1997). During migration, they aggregate on rivers, reservoirs, and lakes. They tend to winter in shallow, sheltered marine waters. In all situations, loons require water bodies with ample prey populations.

Size of lakes ranges between 19 and 7800 acres (4-3150 ha), and maximum water depth ranges from 11 to 320 ft (3-98 m)(Table 1). In western Washington, loons nest on lakes and reservoirs between 200 ft (61 m) and 2800 ft (853 m) in elevation. In eastern Washington, nesting elevations reach 3800 ft (1158 m).

Home Range

Home ranges of breeding territories vary widely in size depending upon habitat quality. The average size of 420 Ontario territories was 70.4 ha (174 ac), with a range between 7 and 200 ha (17-494 ac) (Barr 1973, cited in McIntyre and Barr 1997). In Nova Scotia, territories were at least 20 ha (49 ac) in size, but successful territories covered at least 40 ha (100 ac) (Kerekes et al. 1994, cited in McIntyre and Barr 1997). Seventy loon-nesting lakes monitored in northern Wisconsin ranged in size from 20 to 120 ha (50 to 300 ac) (Meyer and Woodford 1996). Pairs nesting on a 22-ha (54 ac) lake in New Brunswick have had excellent fledging success (Clay and Clay 1997). Loons nesting on smaller lakes may defend additional lakes (Miller and Dring 1988) or forage in parts of water bodies which they do not defend (Parker 1985, cited in Strong and Bissonette 1988).

Table 1. Habitat features at water bodies with confirmed common loon nesting in Washington in at least one year, 1979-1999. Lake data from Wolcott (1965).

County: Water Body	Area (ac)	Water Depth (ft)	Elevation (ft)
Chelan: Lake Wenatchee	2,445	300	1,875
Douglas: Rufus Woods Lake	7,800	190	946
Ferry: Ferry Lake	19	61	3,329
Ferry: North Twin Lake	744	50	2,572
Ferry: South Twin Lake	973	57	2,572
King: Eagle Lake	53	n/a	2,230
King: Calligan Lake	361	82	2,222
King: Chester Morse Reservoir	1,682	116	1,555
King: Howard Hanson Reservoir	770	100	1,206
King: South Fork Tolt Reservoir	850	220	1,765
Okanogan: Blue Lake	186	69	1,686
Okanogan: Bonaparte Lake	159	109	3,554
Okanogan: Lost Lake	47	36	3,817
Okanogan: Sidley Lake	109	22	3,675
Whatcom: Diablo Reservoir	910	320	1,205
Whatcom: Hozomeen Lake	111	n/a	2,800
Whatcom: Lake Terrell	438	11	212
Whatcom: Lake Whatcom	5,003	311	307

n/a = no data available (Wolcott 1965)

Nesting

Common loons nest at ground level within 1.5 m (5 ft) of water. Preferred sites provide some shelter from winds, allow a broad view of the loon's territory, and may include screening vegetation (McIntyre and Barr 1997). Loons often nest on small islands or floating bog mats in medium- to large-size lakes, but will also use mainland shorelines. Where marshes receive less human disturbance than islands, loons may use them preferentially (Alvo 1981). Common loons readily use artificial nesting platforms where other conditions for nesting are met.

Nursery

Common loon chicks, as soon as they are dry, are guided from their nest to a "nursery" area within the territory (McIntyre 1983). Nurseries contain calm, shallow water, sheltering vegetation, and a population of small fish adequate for two chicks for at least 2 weeks (McIntyre 1983).

Foraging

Common loons forage primarily in shallow, clear water with little obstructing vegetation (McIntyre and Barr 1997). They usually use the top 5 m (15 ft) of the water column, but can dive

to at least 60 m (180 ft) to seek food in clear water (McIntyre and Barr 1997). Common loons are only known to feed during daylight (McIntyre and Barr 1997). Loon pairs with chicks older than 4 weeks often moved with the chicks up to 4 km (2.5 mi) from the nesting lake to forage (Piper et al. 1997).

POPULATION STATUS AND TREND

North America

The world population of common loon, which resides primarily in Canada, has been estimated at 500,000 to 700,000 individuals (Rose and Scott 1996, cited in McIntyre and Barr 1997). Numbers and range in the southern portion of the breeding range in Canada and the United States were reduced, likely due to persecution, early in the 20th century. Loons were extirpated from California early in the 20th century. However, Breeding Bird Survey (1969-1989) data for North America show an increase over the 20 year period (McIntyre and Barr 1997). Basic information on population demography, factors that regulate and restrict expansion of loon populations, are not well known and need further study (McIntyre and Barr 1997).

Washington Breeding

Past. A number of authors have commented on the historical distribution and abundance of the common loon in Washington (Suckley 1860, Edson 1908, Dawson and Bowles 1909, Brooks 1917, Kitchen 1922, 1934, 1949, Hoffman 1926, Miller et al. 1935, Booth 1948, Jewett et al. 1953, Alcorn 1978, Cannings et al. 1987, Smith et al. 1997). The data and descriptions provided by the authors, however, do not provide a clear understanding of the species' status and how it has changed over time. Records from these and other sources are summarized in Table 2 and Figure 1.

The earliest remarks on the breeding status of loons in Washington were made by Suckley (1860), who observed that loons are "abundant during winter in the bays along the coast, and in summer disperse in pairs to the small lakes of the interior, especially near Puget Sound, to breed". Suckley describes how loons were hunted by the Indians: "In winter they are quite fat and are much sought after by the Indians, who are very fond of eating them". Confirmation of loon nesting, however, did not come until 1886, when W.S. Scott collected eggs at Lake Wilderness, in lowland King County (Table 2). Through 1950, only 10 sites were known to have supported common loons (Table 2).

Edson (1908), describing birds of the Bellingham Bay area in Whatcom County, states that the common loon "breeds about the lakes". Miller et al. (1935) describe the common loon in the San Juan Islands as "Undoubtedly resident in small numbers about fresh water lakes on larger islands. Breeds." Miller et al. (1935) cite D. Brown and J. Edson, both respected ornithologists, with

Table 2. Breeding records of common loons in Washington prior to 1950. Documentation on file at Washington Department of Fish and Wildlife, Olympia.

Year	County	Location	Reference
1886	King	Lake Wilderness	UWBM 30068[a]
1898,1902	Pierce	Lake Kapowsin	Jewett et al. 1953
1906	Pierce	Eatonville	Jewett et al. 1953
1908	Whatcom	Bellingham vicinity	Edson 1908
1921	Clallam	Lake Ozette	Cantwell journals, per S. Speich
1922	Mason	Shelton	Kitchin 1922
1925	Spokane	Chapman Lake	Ransom 1929
1930's	Pierce	Tanawax Lake	Alcorn (1990 pers. comm. to Spencer)
1948	San Juan	Sportsman Lake	McMannama, Audubon Field Notes 3:249
1948	Okanogan	Big Hidden Lake	Patterson WDG (pers.comm. to D. Wechsler)

[a] University of Washington Burke Museum

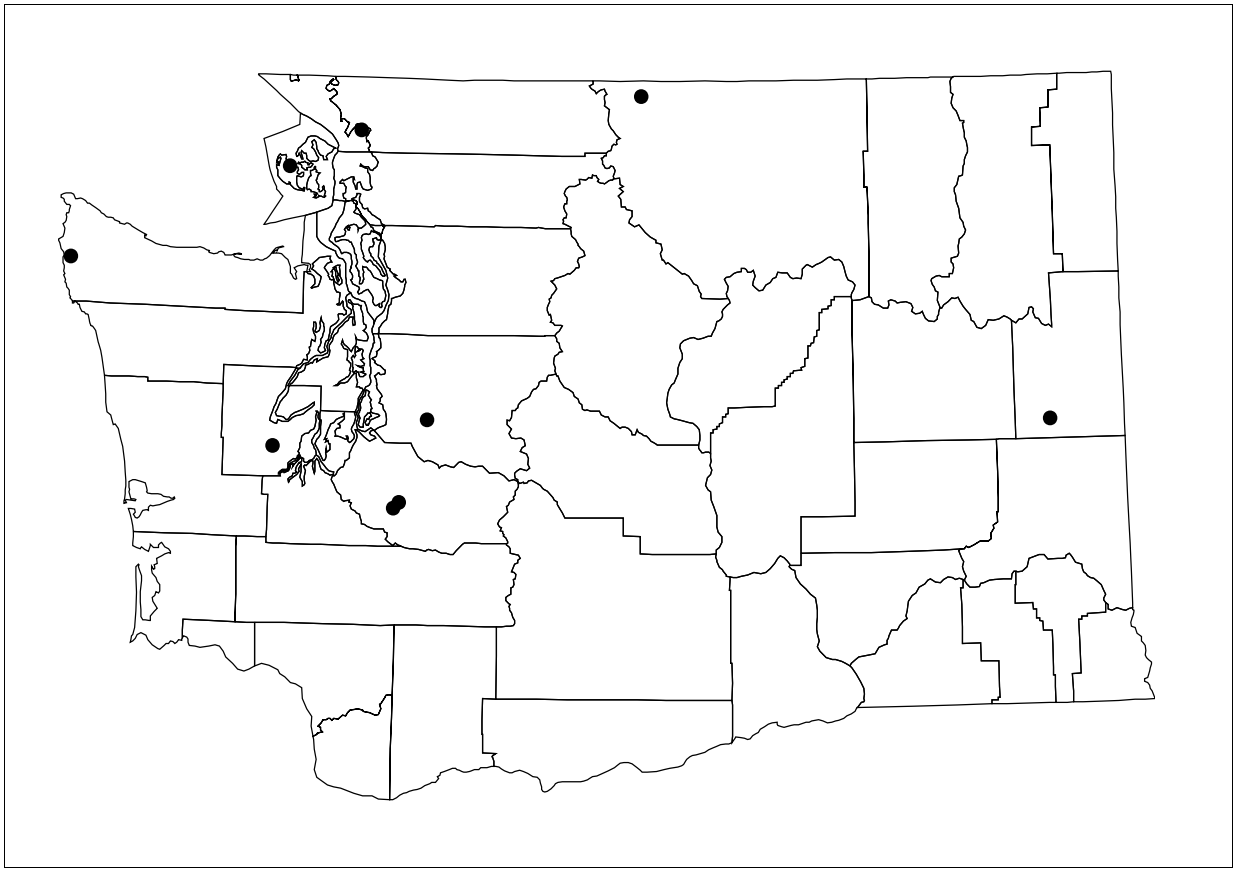

Figure 1. Loon nesting observations, 1868-1948.

personal communications. Kitchin (1922) states that common loons bred "on a small lake near Shelton". Journals of George Cantwell note his finding a loon nest on Lake Ozette on the Olympic Coast in 1921 (Steve Speich, pers. comm. to K. McAllister). Spencer (1990) discusses the possibility that several other low elevation lakes in western Washington may have had historic nesting by loons, including Haddon Lake, Deep Lake, Hyde Lake, and an unnamed lake near Olympia.

In western Washington, breeding common loons apparently declined between 1900 and 1930. Dawson and Bowles (1909) describe them as "sparingly resident on secluded lakes in the mountains and foothills - much less common than formerly". Edson (1926, cited in Wahl 1995) reiterates their decline; "Diminished from 1890 to 1926". Kitchin (1949) discusses the distribution and abundance of common loons on the Olympic Peninsula: "at one time they must have bred on our inland lakes, but the opening up of the country and the logging of the forests has driven them out. A few pair may still breed locally, but I have no recent records." Brooks (1917) describes the common loon as a fairly common breeder in the Chiliwick River Valley of southern British Columbia and northern Washington during an 13-year period from 1887-1900.

In eastern Washington, much less is known of their historic distribution. Loon Lake, in Stevens County, was named by early settlers because loons were heard calling there in spring and summer (Youngblood, pers. comm.). Ransom (1929) discovered a loon nest on Lake Chapman, Spokane County, in 1925. Another loon nest was found in the Pasayten Wilderness, Okanogan County, in 1948 (Table 2). Jewett et al. (1953) describes the common loon as " a fairly common breeding species in Washington, both east and west of the Cascades, though few details of its nesting within the state have been published". Outside of Chapman Lake, only Omak Lake is mentioned as a breeding site in eastern Washington by Jewett et al. (1953), and this only given a "probable" description. Booth (1948) states that the loon "breeds in mountain lakes from British Columbia southward to northern California and east to the great plains, but most commonly in northern Washington". Except for the single Spokane County record (Table 2), there are no historic nesting records from the southern and eastern portion of eastern Washington (Hudson and Yocum 1954, Weber and Larrison 1977).

In an attempt to discover additional loon nesting records from the past, the Department contacted 20 museums, requesting information on Washington specimens and egg sets in their collections (Appendix C). Of 15 museums that responded, 6 held records from Washington. Most museum specimens (rounds, mounts, skeleton, or wings) were taken during migration and winter, but five were collected on fresh water sites between May and August (Table 3).

Present. Table 4 and Figure 2 present information on Washington water bodies where common loons have been documented to nest in recent years. This information is based upon agency surveys (Washington Department of Fish and Wildlife, North Cascades National Park, Seattle Water District), and other sources (e.g., Loon Lake Loon Association, Washington Ornithological Society). Loons no longer nest at 4 lakes with historical nesting in western Washington and one in eastern Washington. Breeding by common loons is often difficult to

determine without careful boat-based surveys of lakes. Surveys in Washington have not been comprehensive.

Table 3. Common loon museum specimens collected between May and August in Washington.

Date	County	Location	Reference	Museum Number
1 May 1935	Unknown	Crystal Lake	Col./Salv. by A. Williams	UWBM 10316
8 May 1956	King	Pine Lake	Donated by Burton Lauckhart	CRCM 57-7
July 1973	Kittitas	6 mi W of Ellensburg	Salvaged by G.G. Benson	CWU 1368
1 July 1975	King	Lake Washington	Salvaged by J. Watson	UWBM 30068
9 July 1983	Okanogan	Duck Lake	Salvaged by J. Danielson	PSM 10418

[a] UWBM = University of Washington Burke Museum, Seattle; CRCM = Charles C. Conner Museum, Washington State University, Pullman; CWU = Central Washington University, Ellensburg; PSM = James R. Slater Museum of Natural History, University of Puget Sound, Tacoma.

Surveys, monitoring, and observations found a total of 20 confirmed and 12 unconfirmed nest sites reported in Washington between 1979-99. The number of confirmed nests during 1990-99 ranged from 8-10 each year, with 9-14 sites surveyed. Sightings were considered confirmed if they were reported by a) professional biologist, b) independent observer of demonstrated knowledge, or c) an independent observer whose knowledge is vouched for by someone under (a) or (b). Unconfirmed sightings include those such as second-hand reports with no corroborating field notes, a report by an inexperienced observer, an observer whose experience is unknown, or an experienced observer who is unsure of observation.

The reason for the lack of information prior to 1985 may have been due to limited concern for loons, few or no survey efforts, or a decline in loon abundance, nest sites, or productivity (Spencer 1990). In the mid- to late 1980's, however, greater attention was given to loon surveys. In 1985, Richards and Musche (1985) searched for nesting loons at dozens of lakes in Ferry, Stevens, and Pend Oreille counties, but discovered only 2 nesting pairs. In 1989, Corkran (1990) and others made a statewide search and reported that “loons nested or apparently attempted to nest” at 8 lakes, producing 9 young. Subsequent searches for historical data conducted for this report showed confirmed nesting at 7 lakes (8 young produced) and unconfirmed nesting at 4 lakes (4 young reported) in 1989. Annual surveys were begun at Chester Morse Reservoir in 1989 and continue to the present (D. Paige, pers. comm.). The Department of Wildlife surveyed Whatcom, Snohomish, and King counties for loon activity in 1989 and 1990, and surveyed Okanogan County in 1996 (Bartels 1996). Department biologists have revisited confirmed nesting sites, and searched for additional breeding lakes regularly during the 1990's, but no comprehensive survey of potential nesting lakes has been attempted, except in King and Okanogan counties.

Additional non-breeding loons are known from over 140 different locations on lakes, reservoirs, and rivers during Washington summers (Figure 3, Appendix D). Unsuccessful territorial or

Table 4. Status of confirmed and unconfirmed common loon nest sites in Washington, 1979-1999. Blanks indicate years when site was not surveyed or data was not reported.

County: Site	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99
Confirmed Nest Sites[a]																					
Chelan:Wenatchee L											2	O[b]									
Douglas:Rufus Woods L						A															
Ferry:Ferry L																					1M
Ferry:N Twin L			S	S	2	S	1	S	F	F	F	F	F	1	1	F	1	1	2	2	2
Ferry:S Twin L		S	S	A	S	1	U	F	F	F		1	2	1	1	1	U	1	SA	SA	
King: Eagle L													1	2	F	U	U	U	AU	U	U
King:Calligan L										A	1	1	F	F	U	SA	SA	U	U	U	U
King:Ch. Morse/Cedar											1	1	1	F	F	1	2	1	F	O	O
King:Ch. Morse/Pool	1			1						2	1	2	2	U	1	O	O	1M	2	2	1
King:Ch. Morse/Rex											1	F	1	1	F	1	F	2	1	F	1M
King:Howard Hanson																F	F	F	F	1	1
King:Tolt Reservoir												F	O	O	1	1	O	1	1	O	O
Okanogan:Blue L																1[b]	AU	1	O	O	O
Okanogan:Bonaparte L																F	2	2	2	2	1[c]
Okanogan:Lost L								FL	O	2	1	2	2	1	2	1	2	2	2	2	2[c]
Okanogan:Sidley L		AU				3[b]											AU	F	OU	FL	SA
Whatcom:Diablo L													1								
Whatcom:Hozomeen L	O					O	O	O	O	1	1	A	AU	O	O		O		AU		
Whatcom:Lk. Terrell					1[d]	1[d]						FL	FL								
Whatcom:Whatcom L												SA	FL	2		2					
Confirmed Nest Sites:	1		2	3	3	4	2	1	2	5	9	8	9	8	7	9	7	10	9	6	7
Confirmed Young:	1			1	3	1	2		0	5	8	6	9	9	5	7	8	10	11	9	7
Unconfirmed Nest Sites[b]																					
Benton:Col. Riv/White B.										1[b]											
Clallam:L Ozette						1[b]				O						O		SA	O	O	
Douglas:L Entiat/Daroga								A[b]			2[b]		AU								
Douglas:L Entiat/Orondo											1[b]										
Grant:Osborn Bay											1[b]										
Grays Harbor:L Quinault						1[b]					FL	O	AU	FL	O		O	FL	SA	FL	
Jefferson:Penny Creek														1[b]							
King:Mud L						A[b]											AU				
Okanogan:Beth													SA			A[b]	SA	OU			
Okanogan:B. Hidden L	A[b,d]																				U
Okanogan:Spectacle L	OU										A[b]							O	FL	O	
Whatcom:Ross L										A[b]											

Status: # = known number of young produced (not necessarily survival to migration); **M** = known mortality of chick; **A** = active (indications that eggs were laid); **AU** = activity unknown (breeding suspected, but not confirmed), **SA** = single adult; **S** = Successful (but # of young unknown); **O** = occupied (adult pair present); **OU** = occupancy unknown; **F** = failed nesting; **U** = unoccupied; **FL** = summer flock (3+).

[a] Confirmed: reported by a) professional biologist, b) independent observer of demonstrated knowledge, or c) an independent observer whose knowledge is vouched for by someone under a) or b).

[B] Unconfirmed: a second-hand report with no corroborating field notes, a report by an inexperienced observer, an observer whose experience is unknown, or an experienced observer who is unsure of observation

c The fate of these young were unknown; some were reportedly eaten by eagles.
d Date assigned is not exact. Lake Terrell was active "in 1983-1984 or 1984-1985"; Big Hidden Lake was active "in the 1970's". See Appendix D

non-territorial adults may comprise up to 49% of summer loon populations on breeding lakes (Crosky 1990). Summer (July) marine bird surveys by the WDFW's Puget Sound Ambient Monitoring Program revealed 14 to 36 common loons counted annually between 1992 and 1998. Considering they only surveyed a small fraction of Puget Sound, many more are likely present.

Washington Wintering

Common loons use Washington waters during migration and winter. Most occur in the marine environment, but a few use unfrozen lakes, reservoirs, or rivers. The WDFW Puget Sound Ambient Monitoring Program has, since 1993, estimated wintering population indexes for the Sound and adjacent waters (Table 5). While the index is not a population estimate, it does indicate that the magnitude of the wintering population is likely to be in the low thousands. The reason for an apparent population increase is unknown (J. Evenson, pers. comm.).

Christmas Bird Counts provide a rough comparison for winter abundance. About two-thirds of the state's bird count circles report common loons each year, with the highest numbers coming from those encompassing protected marine waters, such as Sequim-Dungeness (an average of 96 loons over 22 counts), Port Townsend (80/20), San Juan Islands (76/16), Grays Harbor (64/24), and Padilla Bay (56/20). Total common loons counted from all Washington Christmas Bird Counts have averaged 656 over the past 19 years (1980 to 1998), with no evident trend.

Wahl (1995) reported some high counts for specific Washington water bodies, based on winter surveys completed under the Marine Ecosystems Analysis Program (MESA; Wahl et al. 1981) in the late 1970's. They include Drayton Harbor 142, Dungeness Bay 103, Birch Bay 68, Samish Bay 62, Sequim Bay 43, Padilla Bay 37, Admiralty Inlet 33, Hale Pass 32, Bellingham Bay 24, Lummi Bay 22, Fidalgo Bay 21. Fidalgo Bay was also surveyed seven times between 19 January and 28 April 1993 (R. Canniff, WDFW, unpubl. data). These surveys revealed 10 to 18 common loons (mean=15), with no seasonal pattern.

Adjacent Breeding Areas

Common loons nest in small numbers in the North Cascades of British Columbia (e.g., Manning Lake in Manning Provincial Park) and are common in the Okanogan Highlands above 950 m (3000 ft) (Campbell et al. 1990). Prior to 1942, common loons nested throughout the Okanogan Valley on the larger lakes (Cannings et al. 1987). Since 1942, only 3 breeding records are known below 950 meters (3,000 ft) in the Okanogan Valley, all from Swan Lake, near Vernon (Cannings et al. 1987). The common loon is "critically imperiled" in Idaho; at least 12 Idaho lakes once supported breeding (Fetch and Troat 1985). Within the past 2 years, loons have been found nesting once more on Priest Lake in Idaho after an absence of several decades (D. Evers, pers. comm.). Loons also once nested in Oregon and California, but no breeding has been documented for decades (Corkran 1988).

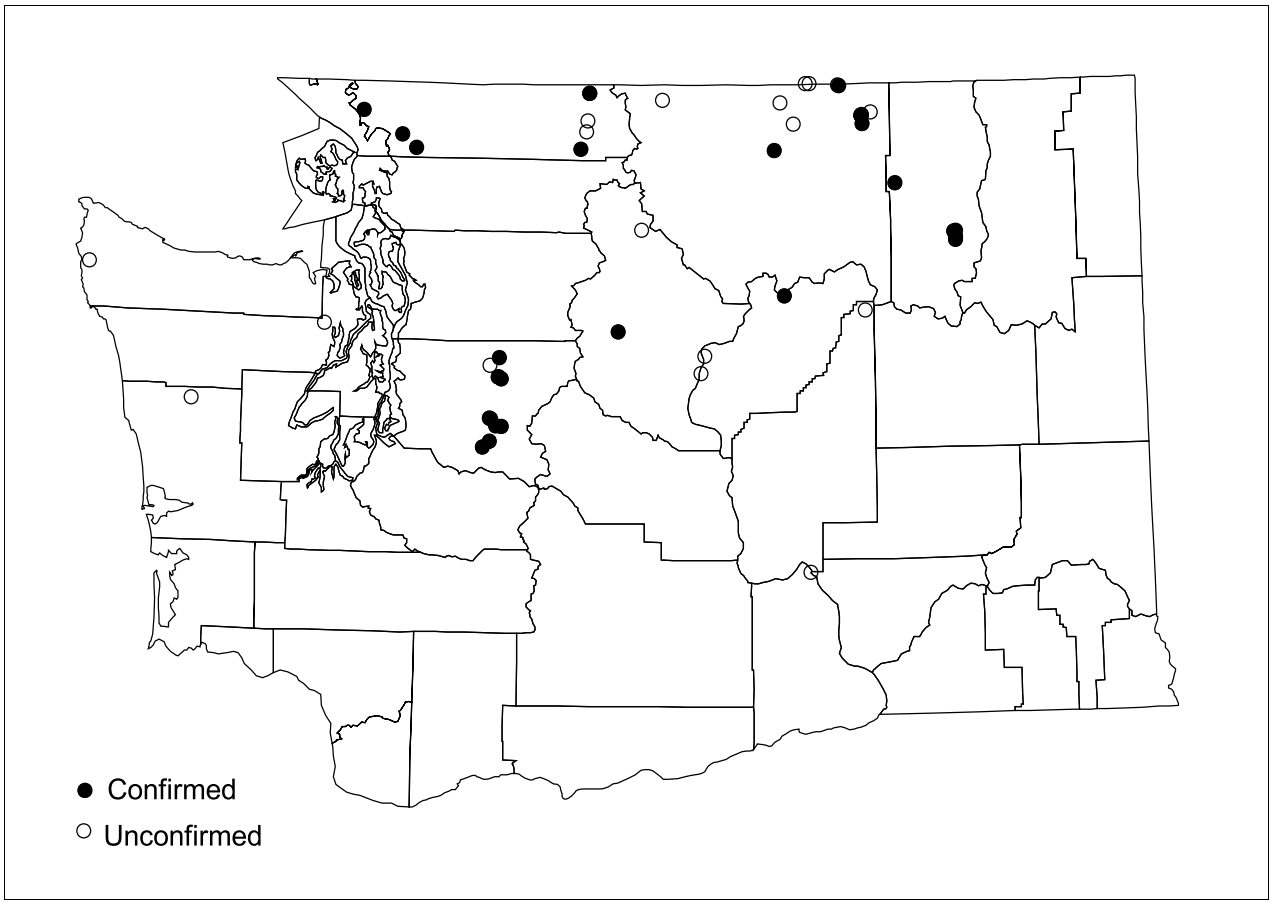

Figure 2. Confirmed and unconfirmed loon nest sites in Washington, 1979 - 1999. Confirmed sightings are those reported by a) professional biologist, b) independent observer of demonstrated knowledge, or c) an independent observer whose knowledge is vouched for by someone under a) or b). Unconfirmed sightings include a second-hand report with no corroborating field notes, a report by an inexperienced observer, an observer whose experience is unknown, or an experienced observer who is unsure of the observation.

Table 5. Estimated population estimates for the common loon during winter surveys of Puget Sound and the Strait of Juan de Fuca (Puget Sound Ambient Monitoring Program, unpubl. data).

Year	Actual Count	Population Estimate	95% C.I.[a]	Low Index	High Index
1993	121	1916	912	1004	2828
1994	143	1542	644	898	2186
1995	174	1572	381	1191	1953
1996	242	2257	536	1721	2793
1997	525	4830	884	3946	5714
1998	375	3877	800	3077	4677
1999	412	4237	972	3265	5209

[a]C.I. = Confidence Interval

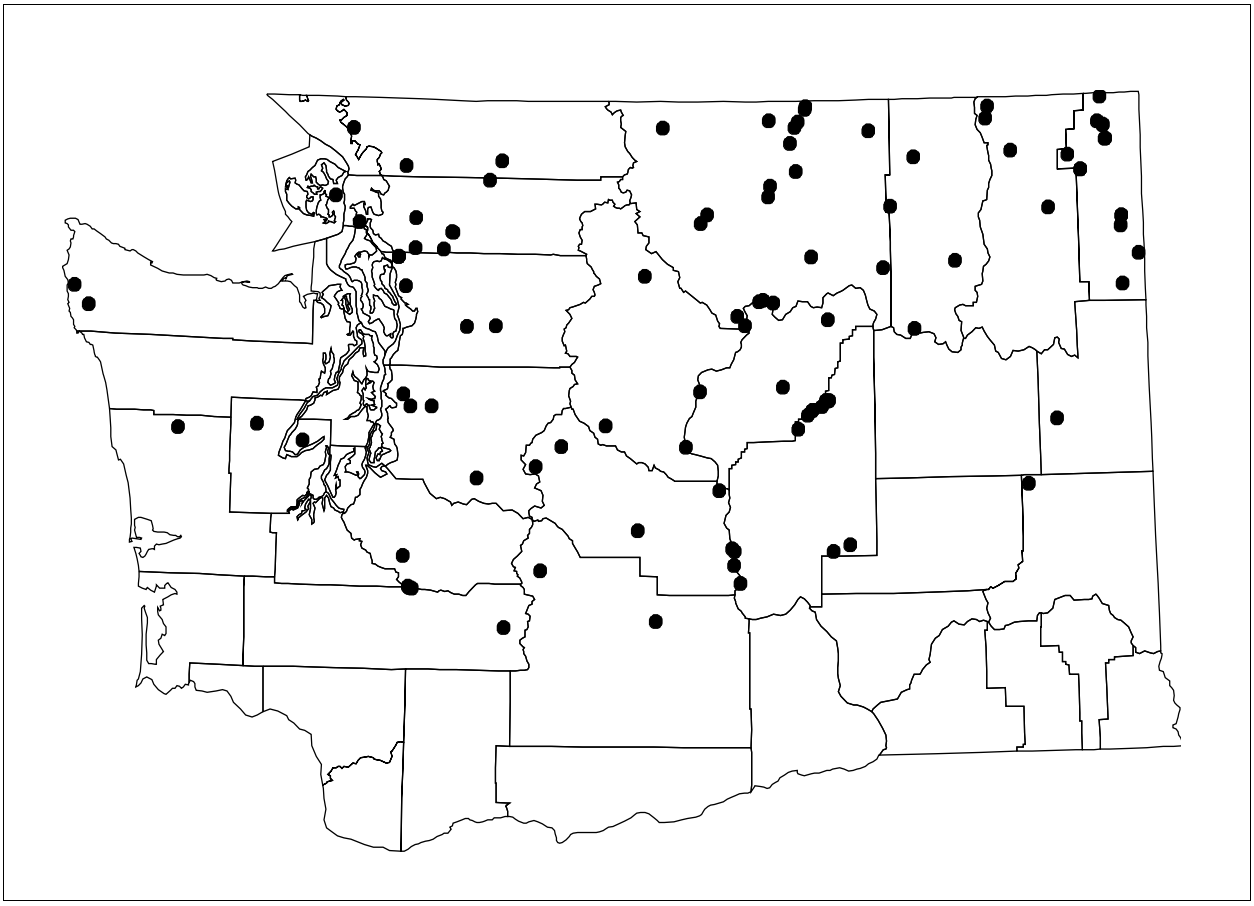

Figure 3. May - August confirmed observations of non-breeding loons in Washington, 1926 -1999.

HABITAT STATUS

Habitat for common loons has changed over the past century. Human settlement of lakes has likely resulted in a loss of habitat, while development of reservoirs, particularly water supply reservoirs with restricted human access, has resulted in additional breeding habitat (Spencer 1990). In lower elevational areas of Puget Sound, many lakes have been ringed with homes, eliminating potential for re-colonization. Roads and powerlines along shorelines have also degraded loon nesting habitat.

An adequate prey base is necessary for common loons to be successful raising young. Fish communities in many Washington lakes have been drastically altered over the past century through stocking of non-native species and lake "rehabilitation", using rotenone. The effects of these changes on loon presence and breeding success are difficult to assess. Given the success of artificial nesting islands, the availability of safe nesting sites may limit loon populations in some regions (McIntyre and Barr 1997).

CONSERVATION STATUS

Legal Status

Federal. Common loons are protected under the Migratory Bird Treaty Act. This species is not listed or proposed for listing under the federal Endangered Species Act and is not considered a species of concern in Washington by the U.S. Fish and Wildlife Service.

State. The common loon has been a Species of Concern in Washington since 1980. It was a "proposed threatened" species in 1983, but no listing action was taken (Washington Department of Game 1983). In 1990, when a formal listing process was adopted by the Fish and Wildlife Commission, the common loon was placed on the list of State Candidate Species.

Management Activities

Breeding-season surveys. Richards and Musche (1985) visited 65 lakes in northeast Washington during June and July 1985. They deemed 2 of 12 lakes in Ferry County, 4 of 28 lakes in Stevens County, and 5 of 25 lakes in Pend Oreille County to be "feasible" for loon nesting. Corkran (1990), with assistance, visited 41 lakes across the state between June and August 1989, although some lakes were surveyed briefly or incompletely. She also compiled reports from 39 additional lakes. Department biologists surveyed 23 western Washington lakes in May and June 1990; 4 were in Whatcom County (Lettenberger 1990), 4 in Snohomish (Leschner 1991), 5 in Skagit (Davison 1990), and 10 in King (Spencer 1990). Department biologists surveyed 49 lakes in Okanogan County in 1996 (Bartels 1996). Several water bodies have been regularly visited by WDFW and other biologists during the 1990's, particularly in King County, Okanogan County, and northeast Washington counties, as well as on the Olympic peninsula (see Appendix D). Non-breeding loons are surveyed on summer transects by the Puget Sound Ambient Monitoring Program.

Winter surveys. In the late 1970's, the Marine Ecosystems Analysis Program provided data on waterbird abundance throughout inland marine waters of Washington (Wahl et al. 1981). Since 1993, biologists within the Puget Sound Ambient Monitoring Program have flown aerial transects throughout the Sound to survey waterbirds, including loons.

Banding. Color bands are visible when swimming loons "foot waggle," or lift and stretch a leg and foot into the air. This permits observers to note color-band information and recognize individuals at or away from nesting or natal lakes. Band recoveries and returns also provide data on loon longevity. In 1995 and 1996, 6 adult and 5 young loons were captured in Washington using the spotlighting technique (Evers 1993b; D. Evers, pers. comm.). In 1995, four adults were captured and color-banded at Lost and Bonaparte lakes in Okanogan County, and two young were color-banded on Chester Morse Reservoir in King County. In 1996, an adult female was color-banded on South Twin Lake in Ferry County, one young was color-banded at Bonaparte Lake, and two young were color-banded at Lost Lake. In 1997 another loon was banded at South Twin Lakes (D.

Evers, pers. comm.) All but one of these loons returned to their nesting lakes in subsequent years (D. Evers, pers. comm.). One young loon from Lost Lake was recovered in January 1997 on the Columbia River near Wenatchee (D. Evers, pers. comm.). One young loon banded at North Twin Lake in 1997 returned to North Twin Lake as a non-breeder in 1999.

Nest platforms. Loons use artificial nesting platforms on numerous lakes across North America. Platforms can provide nesting substrate where it is lacking, offer some protection from mammalian predators, and rise and fall with water levels (preventing inundation or inaccessibility). Nesting success is often enhanced after platforms are installed (e.g., Mathisen 1969, McIntyre and Mathisen 1977); and gradually increasing loon populations in the Midwest and New England regions can be attributed, in part, to platform use. Platforms have been anchored in several Washington lakes and have received regular use in some locations. However, platforms should not be expected to "attract" loons to a lake or reservoir. They will likely be most successful when loons are already prospecting for breeding sites on lakes where other nesting requirements are met but where natural nest sites are absent or subject to excessive disturbance.

Nest protection. Signs or floating markers have been used to encourage lake users to avoid common loon nesting sites. The Loon Lake Loon Association has installed floating markers on Loon and Deer lakes. The Colville Confederated Tribes Fish and Wildlife Division has installed floating markers on Twin Lakes. The Colville National Forest is working with volunteers to monitor nesting loons at Ferry Lake. They are planning to install artificial nesting platforms and construct log booms to prevent boaters from disturbing nesting loons. The Tonasket Ranger District of the Okanogan National forest has made efforts to educate people about loons at Lost Lake and Bonaparte Lake. Nest protection measures have played a significant role in the nearly 100% increase in nesting loons in New Hampshire with the management and education programs of the New Hampshire Loon Preservation Committee (McIntyre and Barr 1997).

Public education. The North American Loon Fund and Loon Preservation Committee, nonprofit conservation organizations, sponsor loon research, management, and education programs throughout North America. The Loon Lake Loon Association has promoted awareness of loons and their habitats in northeast Washington.

FACTORS AFFECTING CONTINUED EXISTENCE

Principal threats to common loons include habitat loss and degradation from development, human influences on lake water levels, disturbance from boaters and fishers, entanglement in fishing line, and mortality from ingestion of fishing equipment. Other potential threats include toxics, disease, mortality from oil spills in non-breeding localities, predation, rotenone application, and persecution. Shoreline development, fluctuating water levels, and human disturbance are the factors most likely to preclude successful loon nesting on Washington lakes. One study (Jung 1991) found loons less likely to nest on lakes with Canada geese.

Adequacy of Existing Regulatory Mechanisms

Common loons are protected under both state and federal law from malicious harm. Neither state nor federal law protects loon nesting habitat. Loons are also inadequately protected from direct and indirect human disturbances.

Federal Migratory Bird Treaty Act. Common loons are protected under the Migratory Bird Treaty Act. Under the act, it is unlawful to pursue, hunt, take, capture, or kill common loons; or to attempt to take, capture or kill them; or to possess, exchange, or ship them, their parts, nests, or eggs without a federal permit.

State Protected Wildlife Code. Washington Administrative Code 232-12-011 identifies the common loon as protected wildlife. Under the Revised Code of Washington 77.15.130, it is unlawful to hunt, possess, or maliciously kill protected wildlife or maliciously destroy the eggs or nests of protected wildlife.

Table 6. Selected potential threats on water bodies with confirmed loon nesting in Washington since 1979.

		Potential Threats/Factors[a]			
County: Water Body	Ownership[b]	Habitat Loss	Disturbance	Dams	Rotenone
Chelan: Lake Wenatchee	USFS/Private	X	4		
Doug: Rufus Woods Lake	Federal		4	X	
Ferry: Ferry Lake	USFS		3		
Ferry: North Twin Lake	Tribal	X	3		X
Ferry: South Twin Lake	Tribal	X	3		X
King: Eagle Lake	Private		1		
King: Calligan Lake	Private		2		X
King: Chester Morse Reservoir	Municipal		1	X	
King: Howard Hanson Reservoir	Municipal		1	X	
King: S. Fk. Tolt Reservoir	Municipal		1	X	
Okanogan: Blue Lk.-Sinlahekin	WDFW		3		X
Okanogan: Bonaparte Lake	USFS	X	3		X
Okanogan: Lost Lake	USFS	X	3		X
Okanogan: Sidley Lake	USFS	X	2		X
Whatcom: Diablo Lake	NPS		2	X	
Whatcom: Hozomeen Lake	NPS		2		
Whatcom: Lake Terrell	WDFW		3		X
Whatcom: Whatcom Lake	Private	X	3		X

[a] **Habitat loss =** Habitat loss, change with development; **Disturbance** = human disturbance; numerically rated 1 = irregular, infrequent human use; 2 = at least weekly visits in breeding season, small numbers of boaters, usually no power boats, parts of the lake inaccessible; 3 = daily use in breeding season, moderate numbers of people, usually speed restricted, parts of lake inaccessible; 4 = heavy daily use in breeding season, unrestricted use of lake (From Corkran 1990); **Dams =** bodies of water behind dams, water fluctuations; **Rotenone =** past rotenone application or potential for rotenone application.

[b] **USFS** = U.S. Forest Service, **Tribal**= Indian Nations, **NPS** = National Park Service, **WDFW** = Washington Dept of Fish and Wildlife

Present and Threatened Habitat Loss

Nest sites for common loons are permanently lost when development along shorelines (cottages or

resorts, for example) obliterates habitat. Loons may cease to use developed lakes altogether, or may select marginal nest sites where their productivity is compromised (Robertson and Flood 1980). In a central Ontario study, hatching success declined as cottage density increased and nest success increased with distance from the nearest cottage (Heimberger et al. 1983). In the same study, loons avoided nest sites with five or more cottages within 150 m (450 ft.). In east-central Alberta, Vermeer (1973a) found a negative correlation between the number of breeding loon pairs and disturbance ratios based on campsites, resorts, and cottages. At selected lakes in King County, comparing historic (circa 1940's) and current aerial photographs revealed increases in shoreline development (R. Spencer, unpubl. data). All lakes studied showed a decline in potential for supporting nesting loons. Powerline development may also cause loon mortality. Powerlines at a lake in Grant County apparently killed two loons in 1996 (Bartels, 1996).

Water Levels

Loon nests along shorelines, particularly in reservoirs, are vulnerable when water levels rise or fall. Rising water can flood nests, prompting abandonment or failure, and falling water can render nests inaccessible to loons (Fair 1979). Sometimes nesting loons can respond to gradually rising water levels by building up their nests. McIntyre (1988) found loons could contend with a 15 cm (6 in) rise over 2 or 3 days, but nests would fail with a 20 cm (8 in) rise.

When changes in water level are unavoidable, loons have been provided with floating platforms to allow nests to remain accessible and unflooded. Seven of the 20 known nesting sites since 1979 are on bodies of water behind dams, where water flow is regulated (Table 6). These water level changes are of concern to loon nesting.

Human Disturbance

Human activities can directly or indirectly affect common loon site fidelity and reproductive success. In a Minnesota study, loon pairs experiencing fewer human contacts produced more surviving young (Titus and VanDruff 1981). Shoreline walkers, canoeists, motorboaters, and “jet-skiers” each can disrupt normal loon behavior patterns. Pedestrians can frighten loons from their nests, canoeists can separate young loons from their parents, and motorized watercraft can create wakes that wash out nests (Vermeer 1973a). Though disturbance is usually unintended, some boaters intentionally approach—or even chase—loons, which can lead to loon exhaustion or injury. Speed boats essentially running over loons have been documented on two lakes in eastern Washington (Bartels 1996). Fortunately, some loons habituate to human activities and can reproduce successfully at lakes with moderate levels of disturbance (McIntyre and Barr 1997).

Fishing is often a prominent activity on lakes that appear suitable for loon nesting. Trolling along shorelines and still fishing were more disturbing to nesting loons than other activities monitored in a Minnesota study, due to their duration and potential proximity to active nests (Titus and VanDruff 1981). On spring fishing season opening days in Washington, a tremendous influx and

concentration of boating activity occurs on many lakes occupied by migrant loons. Some of these lakes appear to be potential nesting sites, but pair bonding, territory establishment, and nesting are likely precluded by the high level of human activity associated with opening day of fishing (R. Spencer, pers. observ.). At Loon and Deer lakes in northeast Washington, however, loon departure around the opening of fishing season appears to be coincidental; loon numbers taper off in late April whether before or after the opening day of fishing season (Zender 1995).

Entanglement and Entrapment

Given the naturally low reproductive potential of common loons, mortality due to entanglement and entrapment may be a significant threat. Fishing traps in the Great Lakes have killed hundreds of common loons per year, though experiments with net design have shown that loons can escape modified traps (Carey 1993). Vermeer (1973b) found 12 adult common loons entangled in fish nets in British Columbia; 6 others were known to have been released after being caught in nets. Loons have also been caught in fishing nets in Washington; some have been released alive while others have died. Loon entanglement has been documented in gill nets, but not purse seines, and has occurred in non-treaty fisheries in Puget Sound, Hood Canal, Willapa Bay, Grays Harbor, and the Columbia River (Erstad et al. 1994, Pierce et al. 1994, Purse Seine Vessel Owners Association and Natural Resource Consultants 1994, Erstad et al. 1996, Jeffries et al. 1996). Among individuals affected have been at least 11 common, 1 yellow-billed, and 3 unidentified loons. Based on timing and locations, all are believed to have been non-breeding birds, though some young of the year could be included. Only a portion of each fishery was sampled, however, so documented take represents just a fraction of the actual incidental take.

Several additional common loons have fallen victim to fishing gear in Washington. In September, 1971, a dead adult was found at Hozomeen Lake with monofilament line wrapped around its neck (R. Kuntz, pers. comm.). In July 1973, a loon was found dead, entangled in fishing line, at a freeway pond near Ellensburg, Kittitas County (Central Washington University Museum number CWU 1368). In April 1975, a common loon drowned in a gill net downstream of Grand Coulee Dam, Okanogan County (Burke Museum number 32949). In August 1990, a common loon became entangled in a fishing line on Loon Lake, Stevens County (S. Zender, pers. comm.). It was successfully untangled and left the lake 3 days later. In November 1990, an emaciated common loon was found dead with fishing line around its beak on Benson Lake, Mason County (Slater Museum number PSM 12348). In June 1997, a loon was rescued (but died in captivity) near Westport, Grays Harbor County, with a fish hook in its throat (Slater Museum number PSM 22167).

Toxicants

Lead. Lead toxicosis affects loons in New England (Pokras et al. 1993), Minnesota (Franson and Cliplef 1993), and elsewhere. Lead jigs or sinkers are often found in loon proventricula or gizzards. They may be consumed with live bait or taken from lake bottoms (as “gravel”) (Pokras et al. 1993). Lead poisoning causes loss of balance, gasping, tremors, and impaired ability to fly.

Consuming a single lead sinker is enough to kill a loon (Smrchek 1994).

The U.S. Environmental Protection Agency (EPA 1994) proposed, under the Toxic Substances Control Act, to prohibit manufacturing, processing, and distribution in commerce of lead- or zinc-containing fishing sinkers for use in the United States. The EPA continues to deliberate on the proposed rule and response (T. Spector, personal communication, May 1999). Loons may soon receive some protection from poisoning through a ban on lead sinkers and jigs in some national wildlife refuges (U.S. Fish and Wildlife Service 1999).

Mercury. Naturally-occurring mercury is likely not a threat to loons. Mercury is also a by-product of coal-fired power generation, however, so environmental levels have increased substantially in some areas (e.g., midwestern and northeastern United States), placing loons at risk of poisoning. At 70 Wisconsin lakes, where over 360 adults and chicks were banded and bled between 1992 and 1996, common loons were less productive and chick survival was lower where loons were exposed to high levels of mercury (Meyer et al. 1998). Elevated mercury exposure has also been linked to low productivity in Ontario (Fimreite 1974, Barr 1986). Emaciation is a clinical symptom of elevated levels of mercury (Fimreite 1974). In addition to a lowered body weight, mercury intoxication can impair motor coordination, which may compromise foraging ability (Spitzer 1995). Mercury was suggested as a possible contributing factor to a major die-off of common loons on the northern Gulf coast of Florida in winter 1982-1983 (Alexander 1991). High levels of mercury can also suppress immune systems, making loons susceptible to diseases such as aspergillosis. In 1994, fragments from 10 loon eggs collected in western Washington were analyzed for environmental contaminants, but mercury was below detection level (10 ppb) (R. Spencer and D. Paige, unpubl. data). In 1995 and 1996, blood and feathers were taken from Washington loons as part of a North American biomonitoring program (Evers et al. 1998). Mercury concentrations were below the level considered to impose a risk of toxic effects.

Organochlorines. DDTs, PCBs, and other organochlorines have apparently not affected loon populations (McIntyre and Barr 1997). In British Columbia, Vermeer (1973b) found no correlation between DDE levels and shell thickness in 15 eggs from different clutches. The ten eggs from western Washington tested in 1994 did not contain biologically significant levels of organochlorines or PCB's (R. Spencer and D. Paige, unpubl. data). Although loon eggshells in some areas are thinner than they were prior to 1947, thinning is not considered biologically significant (McIntyre and Barr 1997).

Rotenone

Rotenone is a fish toxicant commonly used to eradicate non-desirable fish species prior to planting of desirable fish species. Rotenone kills a wide variety of species that derive oxygen from water (Bradbury 1986). The effects of rotenone, and the degree of threat of rotenone to loons, has not been studied, but it is highly likely to adversely affect loon food, both fish and invertebrates. Although fish (usually trout) are immediately re-planted in lakes treated with rotenone, it can take years for invertebrate populations to recover, which account for a significant portion of the diet of

common loons (Bradbury 1986). Studies of the effects of rotenone on invertebrates show a range of mortality among invertebrate species, from 5 to 100 percent killed (Bradbury 1986). Rotenone has been used on eight of sixteen lakes that are known to be used by common loons in Okanogan County (Bartels 1996). On five of the eight lakes, rotenone was applied during the 1980's. Rotenone was applied to Blue Lake (Sinlahekin) in 1988. Nesting loons were reported in 1993 and confirmed in 1995 (Table 4). Rotenone was applied to Blue Lake again in 1996. Breeding has not been observed at Blue Lake since 1995, although the lake has been occupied by loons since then. Table 6 lists 9 lakes where rotenone has been used or may potentially be used in recreational fish management.

Oil Spills

Oil spills have the potential to kill loons that breed in Washington's lakes and winter in coastal areas of Puget Sound, and non-breeding adults that reside in coastal areas year-round. Numerous effects of oil on birds have been well documented (Burger and Fry 1993). The most obvious and dramatic effect is plumage fouling, which can rapidly lead to hypothermia and death. A variety of other ailments, some of them lethal, can be brought on by exposure to oil. Reproductive success also can be compromised by direct oiling of eggs or indirect effects on embryos. Loons are especially vulnerable to oiling during their flightless period, which lasts a few weeks between mid-winter and early spring (or between spring and summer in younger birds) (McIntyre and Barr 1997).

Oil-affected loons have been recovered following recent oil spills in Washington. One oiled common loon was found dead on Copalis Beach after a 1964 barge spill (Slater Museum number PSM 08954); five oiled common loons were processed at a cleaning station after the 1985 *ARCO Anchorage* spill in Port Angeles harbor (Kittle et al. 1987); four common loons were among dead, oiled birds recovered after the 1988 *Nestucca* spill off Grays Harbor (Rodway et al. 1989; B. Troutman, pers. comm.); and one common loon was found after the 1991 *Tenyo Maru* spill off Cape Flattery (B. Troutman, pers. comm.). Recoveries of beached birds represent only an unknown fraction of those impacted.

Persecution

Common loons have been shot to prevent them from competing with humans for fish. Shooting likely played an important role in the historic decline of the loon in North America; such persecution was "probably devastating" to loon populations (McIntyre and Barr 1997). Killing loons to protect fish was sanctioned in Washington as recently as June 1956, when the U.S. Fish and Wildlife Service granted the Washington Department of Game a 10-day permit to kill loons on Lake Haddon, Snohomish County. Although no loons were killed under the permit, the birds were driven from the lake. Loons are still occasionally shot intentionally, but this is not likely a significant threat at this time (McIntyre and Barr 1997).

Predation

Common loon predators include eagles, corvids, gulls, coyotes, raccoons, skunks, mink, and weasels (McIntyre and Barr 1997; R. Spencer, pers. observ.), and they may also become prey to certain fish, like tiger muskie, which have been introduced to several Washington lakes. Bald eagles harassed adult and juvenile loons in 1999 on Lost and Bonaparte lakes, reportedly killing chicks and eggs (G. Gum, pers. comm.), but the mortalities were unconfirmed. Eagles are thought to be the greatest potential threat to loons at Chester Morse Lake in western Washington, where bald eagle populations are likely to increase with management efforts to increase salmon production (D. Paige, pers. comm.).

Natural levels of predation may not pose a long-term threat to common loons. Predation on eggs and young can increase, however, when people are active near loon nesting areas. Nests can be plundered when adult loons leave them exposed in response to human disturbance. Young can be taken when they are separated from adults by people in boats. Young are not proficient divers until about 2 weeks post-hatching (Sjölander and Ågren 1972) and they are most vulnerable to predators during this period. Where houses, cottages, and encampments elevate populations of commensal animals such as raccoons, nesting loons may be exposed to above-normal predator densities.

Disease

Avian botulism is a paralytic condition occurring when birds consume a naturally-occurring toxin produced by the bacterium *Clostridium botulinum*. Type E botulism has, during some years, reached epidemic levels in the Great Lakes region (Brand et al. 1988), but it has not been diagnosed elsewhere in the United States. Type C botulism is more widespread. Both types have been diagnosed in common loons. Aspergillosis, a fungal infection of the respiratory tract, has been commonly diagnosed in loons.

CONCLUSION AND RECOMMENDATION

The common loon is currently a rare breeder and a common migrant and wintering species within the state. Historic and current population levels are not well known in Washington, with most of the available information dating from the past 15 years. A total of 20 confirmed nests are known to have been active at some time since 1979 in Chelan, Douglas, Ferry, King, Okanogan, and Whatcom counties. Twelve unconfirmed nests have been reported in Benton, Clallam, Douglas, Grant, Grays Harbor, Jefferson, King, Okanogan, and Whatcom counties. Thorough surveys have not been conducted in all portions of the range.

Past shoreline development, including homes, roads, and powerlines, has degraded or eliminated nesting habitat at some lakes, and increased the current level of human activity in the vicinity of loon nests. Consequently, increased human disturbance could reduce loon productivity and may

preclude nesting at important sites. Persecution directed toward loons can cause abandonment of nesting lakes. Drastic changes in water level (frequent events at reservoirs) either flood nests or render them unapproachable, causing abandonment. Based upon historic records, the species has a reduced opportunity to breed in the Puget Sound region, compared with historic conditions. Loons no longer nest at 4 lakes in western Washington and one lake in eastern Washington where nesting was known early in the 20th century.

Floating nest platforms, access restrictions, and educational campaigns each have helped loons to persist and successfully reproduce at certain sites. The development of reservoirs has created some nesting and wintering habitat for common loons in Washington. Numbers of wintering and breeding loons are increasing in the eastern United States, and recolonization of some areas where loons were historically extirpated may be occurring. Winter populations in Washington appear to have increased since the early 1990's. Currently, about half the loon nests documented each year in Washington are located on water bodies that are relatively inaccessible to people, so they have limited human disturbance. Five of the confirmed nest sites are in secure habitat, and an additional 5 are cooperatively managed with tribal and federal agencies to reduce threats.

Increased development and recreational pressure at sensitive nesting lakes must be actively managed to prevent decline in numbers of nesting loons. Protection and education programs must be expanded to appropriate lakes that currently do not support breeding loons. This will allow the species to recolonize and nest undisturbed, ensuring a stable and well-distributed population. The use of rotenone to kill undesirable fish may preclude nesting by common loons for a number of years.

The common loon does not merit State Endangered status, because it is not seriously threatened with extinction within the state. It does not appear to merit a State Threatened classification at this time, because we have no evidence of a declining population or a substantial change in distribution. However, because historic records are sketchy and surveys have not been comprehensive, it is not known if the population is stable, increasing or decreasing. Although threats such as human disturbance, predation, and oil spills have been identified, the severity of these threats to the breeding population is not well understood. Numbers of known nests have increased over the past 15 years, but this increase may be a result of increased survey effort.

State Sensitive status is warranted because the common loon is a rare and vulnerable species, with a number of potential threats, often requires special management to persist in proximity to humans, and is likely to become endangered or threatened without continued cooperative management and removal of threats. However, due to the lack of historic and current information and the small number of known breeding sites in Washington, the status should be reviewed when new information becomes available.

The Department recommends the common loon be classified as a State Sensitive species.

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Appendix A. Washington Administrative Codes 232-12-011 and 232-12-014.

WAC 232-12-011 Wildlife classified as protected shall not be hunted or fished.

Protected wildlife are designated into three subcategories: Threatened, sensitive, and other.
(1) Threatened species are any wildlife species native to the state of Washington that are likely to become endangered within the foreseeable future throughout a significant portion of their range within the state without cooperative management or removal of threats. Protected wildlife designated as threatened include:

Common Name	Scientific Name
western gray squirrel	*Sciurus griseus*
Steller (northern) sea lion	*Eumetopias jubatus*
North American lynx	*Lynx canadensis*
Aleutian Canada goose	*Branta canadensis leucopareia*
bald eagle	*Haliaeetus leucocephalus*
ferruginous hawk	*Buteo regalis*
marbled murrelet	*Brachyramphus marmoratus*
green sea turtle	*Chelonia mydas*
loggerhead sea turtle	*Caretta caretta*
sage grouse	*Centrocercus urophasianus*
sharp-tailed grouse	*Phasianus columbianus*

(2) Sensitive species are any wildlife species native to the state of Washington that are vulnerable or declining and are likely to become endangered or threatened in a significant portion of their range within the state without cooperative management or removal of threats. Protected wildlife designated as sensitive include:

Common Name	Scientific Name
Gray whale	*Eschrichtius robustus*
Larch Mountain salamander	*Plethodon larselli*
Pygmy whitefish	*Prosopium coulteri*
Margined sculpin	*Cottus marginatus*

(3) Other protected wildlife include:

Common Name	Scientific Name
cony or pika	*Ochotona princeps*
least chipmunk	*Tamius minimus*
yellow-pine chipmunk	*Tamius amoenus*
Townsend's chipmunk	*Tamius townsendii*
red-tailed chipmunk	*Tamius ruficaudus*

hoary marmot	*Marmota caligata*
Olympic marmot	*Marmota olympus*
Cascade golden-mantled ground squirrel	*Spermophilus saturatus*
golden-mantled ground squirrel	*Spermophilus lateralis*
Washington ground squirrel	*Spermophilus washingtoni*
red squirrel	*Tamiasciurus hudsonicus*
Douglas squirrel	*Tamiasciurus douglasii*
northern flying squirrel	*Glaucomys sabrinus*
wolverine	*Gulo gulo*
painted turtle	*Chrysemys picta*
California mountain kingsnake	*Lampropeltis zonata;*

All birds not classified as game birds, predatory birds or endangered species, or designated as threatened species or sensitive species; all bats, except when found in or immediately adjacent to a dwelling or other occupied building; all wildlife within Titlow Beach Marine Preserve Area and the conservation areas defined in chapter 220-16 WAC; mammals of the order *Cetacea*, including whales, porpoises, and mammals of the order *Pinnipedia* not otherwise classified as endangered species, or designated as threatened species or sensitive species. This section shall not apply to hair seals and sea lions which are threatening to damage or are damaging commercial fishing gear being utilized in a lawful manner or when said mammals are damaging or threatening to damage commercial fish being lawfully taken with commercial gear.

[Statutory Authority: RCW 77.12.020. 98-23-013 (Order 98-232), § 232-12-011, filed 11/6/98, effective 12/7/98. Statutory Authority: RCW 77.12.040. 98-10-021 (Order 98-71), § 232-12-011, filed 4/22/98, effective 5/23/98. Statutory Authority: RCW 77.12.040 and 75.08.080. 98-06-031, § 232-12-011, filed 2/26/98, effective 5/1/98. Statutory Authority: RCW 77.12.020. 97-18-019 (Order 97-167), § 232-12-011, filed 8/25/97, effective 9/25/97. Statutory Authority: RCW 77.12.040, 77.12.020, 77.12.030 and 77.32.220. 97-12-048, § 232-12-011, filed 6/2/97, effective 7/3/97. Statutory Authority: RCW 77.12.020. 93-21-027 (Order 615), § 232-12-011, filed 10/14/93, effective 11/14/93; 90-11-065 (Order 441), § 232-12-011, filed 5/15/90, effective 6/15/90. Statutory Authority: RCW 77.12.040. 89-11-061 (Order 392), § 232-12-011, filed 5/18/89; 82-19-026 (Order 192), § 232-12-011, filed 9/9/82; 81-22-002 (Order 174), § 232-12-011, filed 10/22/81; 81-12-029 (Order 165), § 232-12-011, filed 6/1/81.]

WAC 232-12-014 Wildlife classified as endangered species. Endangered species include:

Common Name	Scientific Name
pygmy rabbit	*Brachylagus idahoensis*
fisher	*Martes pennanti*
gray wolf	*Canis lupus*
grizzly bear	*Ursus arctos*
sea otter	*Enhydra lutris*
sei whale	*Balaenoptera borealis*
fin whale	*Balaenoptera physalus*
blue whale	*Balaenoptera musculus*
humpback whale	*Megaptera novaeangliae*
black right whale	*Balaena glacialis*
sperm whale	*Physeter macrocephalus*
Columbian white-tailed deer	*Odocoileus virginianus leucurus*
woodland caribou	*Rangifer tarandus caribou*
American white pelican	*Pelecanus erythrorhynchos*
brown pelican	*Pelecanus occidentalis*
peregrine falcon	*Falco peregrinus*
sandhill crane	*Grus canadensis*
snowy plover	*Charadrius alexandrinus*
upland sandpiper	*Bartramia longicauda*
spotted owl	*Strix occidentalis*
western pond turtle	*Clemmys marmorata*
leatherback sea turtle	*Dermochelys coriacea*
Oregon silverspot butterfly	*Speyeria zerene hippolyta*
Oregon spotted frog	*Rana pretiosa*

[Statutory Authority: RCW 77.12.020. 98-23-013 (Order 98-232), § 232-12-014, filed 11/6/98, effective 12/7/98; 97-18-019 (Order 97-167), § 232-12-014, filed 8/25/97, effective 9/25/97; 93-21-026 (Order 616), § 232-12-014, filed 10/14/93, effective 11/14/93. Statutory Authority: RCW 77.12.020(6). 88-05-032 (Order 305), § 232-12-014, filed 2/12/88. Statutory Authority: RCW 77.12.040. 82-19-026 (Order 192), § 232-12-014, filed 9/9/82; 81-22-002 (Order 174), § 232-12-014, filed 10/22/81; 81-12-029 (Order 165), § 232-12-014, filed 6/1/81.]

Appendix B. Washington Administrative Code 232-12-297

WAC 232-12-297 Endangered, threatened, and sensitive wildlife species classification.

Purpose

1.1 The purpose of this rule is to identify and classify native wildlife species that have need of protection and/or management to ensure their survival as free-ranging populations in Washington and to define the process by which listing, management, recovery, and delisting of a species can be achieved. These rules are established to ensure that consistent procedures and criteria are followed when classifying wildlife as endangered, or the protected wildlife subcategories threatened or sensitive.

Definitions

For purposes of this rule, the following definitions apply:

2.1 "Classify" and all derivatives means to list or delist wildlife species to or from endangered, or to or from the protected wildlife subcategories threatened or sensitive.

2.2 "List" and all derivatives means to change the classification status of a wildlife species to endangered, threatened, or sensitive.

2.3 "Delist" and its derivatives means to change the classification of endangered, threatened, or sensitive species to a classification other than endangered, threatened, or sensitive.

2.4 "Endangered" means any wildlife 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.

2.5 "Threatened" means any wildlife species native to the state of Washington that is likely to become an endangered species within the foreseeable future throughout a significant portion of its range within the state without cooperative management or removal of threats.

2.6 "Sensitive" means any wildlife 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.

2.7 "Species" means any group of animals classified as a species or subspecies as commonly accepted by the scientific community.

2.8 "Native" means any wildlife species naturally occurring in Washington for purposes of breeding, resting, or foraging, excluding introduced species not found historically in this state.

2.9 "Significant portion of its range" means that portion of a species' range likely to be essential to the long term survival of the population in Washington.

Listing criteria

3.1 The commission shall list a wildlife species as endangered, threatened, or sensitive solely on the basis of the biological status of the species being considered, based on the preponderance of scientific data available, except as noted in section 3.4.

3.2 If a species is listed as endangered or threatened under the federal Endangered Species Act, the agency will recommend to the commission that it be listed as endangered or threatened as specified in section 9.1. If listed, the agency will proceed with development of a recovery plan pursuant to section 11.1.

3.3 Species may be listed as endangered, threatened, or sensitive only when populations are in danger of failing, declining, or are vulnerable, due to factors including but not restricted to limited numbers, disease, predation, exploitation, or habitat loss or change, pursuant to section 7.1.

3.4 Where a species of the class Insecta, based on substantial evidence, is determined to present an unreasonable risk to public health, the commission may make the determination that the species need not be listed as endangered, threatened, or sensitive.

Delisting criteria

4.1 The commission shall delist a wildlife species from endangered, threatened, or sensitive solely on the basis of the biological status of the species being considered, based on the preponderance of scientific data available.

4.2 A species may be delisted from endangered, threatened, or sensitive only when populations are no longer in danger of failing, declining, are no longer vulnerable, pursuant to section 3.3, or meet recovery plan goals, and when it no longer meets the definitions in sections 2.4, 2.5, or 2.6.

Initiation of listing process

5.1 Any one of the following events may initiate the listing process.

5.1.1 The agency determines that a species population may be in danger of failing, declining, or vulnerable, pursuant to section 3.3.

5.1.2 A petition is received at the agency from an interested person. The petition should be addressed to the director. It should set forth specific evidence and scientific data which shows that the species may be failing, declining, or vulnerable, pursuant to section 3.3. Within 60 days, the agency shall either deny the petition, stating the reasons, or initiate the classification process.

5.1.3 An emergency, as defined by the Administrative Procedure Act, chapter 34.05 RCW. The listing of any species previously classified under emergency rule shall be governed by the provisions of this section.

5.1.4 The commission requests the agency review a species of concern.

5.2 Upon initiation of the listing process the agency shall publish a public notice in the Washington Register, and notify those parties who have expressed their interest to the department, announcing the initiation of the classification process and calling for scientific information relevant to the species status report under consideration pursuant to section 7.1.

Initiation of delisting process

6.1 Any one of the following events may initiate the delisting process:

6.1.1 The agency determines that a species population may no longer be in danger of failing, declining, or vulnerable, pursuant to section 3.3.

6.1.2 The agency receives a petition from an interested person. The petition should be addressed to the director. It should set forth specific evidence and scientific data which shows that the species may no longer be failing, declining, or vulnerable, pursuant to section 3.3. Within 60 days, the agency shall either deny the petition, stating the reasons, or initiate the delisting process.

6.1.3 The commission requests the agency review a species of concern.

6.2 Upon initiation of the delisting process the agency shall publish a public notice in the Washington Register, and notify those parties who have expressed their interest to the department, announcing the initiation of the delisting process and calling for scientific information relevant to the species status report under consideration pursuant to section 7.1.

Species status review and agency recommendations

7.1 Except in an emergency under 5.1.3 above, prior to making a classification recommendation to the commission, the agency shall prepare a preliminary species status report. The report will include a review of information relevant to the species' status in Washington and address factors affecting its status, including those given under section 3.3. The status report shall be reviewed by the public and scientific community. The status report will include, but not be limited to an analysis of:

7.1.1 Historic, current, and future species population trends

7.1.2 Natural history, including ecological relationships (e.g. food habits, home range, habitat selection patterns).

7.1.3 Historic and current habitat trends.

7.1.4 Population demographics (e.g. survival and mortality rates, reproductive success) and their relationship to long term sustainability.

7.1.5 Historic and current species management activities.

7.2 Except in an emergency under 5.1.3 above, the agency shall prepare recommendations for species classification, based upon scientific data contained in the status report. Documents shall be prepared to determine the environmental consequences of adopting the recommendations pursuant to requirements of the State Environmental Policy Act (SEPA).

7.3 For the purpose of delisting, the status report will include a review of recovery plan goals.

Public review

8.1 Except in an emergency under 5.1.3 above, prior to making a recommendation to the commission, the agency shall provide an opportunity for interested parties to submit new scientific data relevant to the status report, classification recommendation, and any SEPA findings.

8.1.1 The agency shall allow at least 90 days for public comment.

8.1.2 The agency will hold at least one Eastern Washington and one Western Washington public meeting during the public review period.

Final recommendations and commission action

9.1 After the close of the public comment period, the agency shall complete a final status report and classification recommendation. SEPA documents will be prepared, as necessary, for the final agency recommendation for classification. The classification recommendation will be presented to the commission for action. The final species status report, agency classification recommendation, and SEPA documents will be made available to the public at least 30 days prior to the commission meeting.

9.2 Notice of the proposed commission action will be published at least 30 days prior to the commission meeting.

Periodic species status review

10.1 The agency shall conduct a review of each endangered, threatened, or sensitive wildlife species at least every five years after the date of its listing. This review shall include an update of the species status report to determine whether the status of the species warrants its current listing status or deserves reclassification.

10.1.1 The agency shall notify any parties who have expressed their interest to the department of the periodic status review. This notice shall occur at least one year prior to end of the five year period required by section 10.1.

10.2 The status of all delisted species shall be reviewed at least once, five years following the date of delisting.

10.3 The department shall evaluate the necessity of changing the classification of the species being reviewed. The agency shall report its findings to the commission at a commission meeting. The agency shall notify the public of its findings at least 30 days prior to presenting the findings to the commission.

10.3.1 If the agency determines that new information suggests that classification of a species should be changed from its present state, the agency shall initiate classification procedures provided for in these rules starting with section 5.1.

10.3.2 If the agency determines that conditions have not changed significantly and that the classification of the species should remain unchanged, the agency shall recommend to the commission that the species being reviewed shall retain its present classification status.

10.4 Nothing in these rules shall be construed to automatically delist a species without formal commission action.

Recovery and management of listed species

11.1 The agency shall write a recovery plan for species listed as endangered or threatened. The agency will write a management plan for species listed as sensitive. Recovery and management plans shall address the listing criteria described in sections 3.1 and 3.3, and shall include, but are not limited to:

11.1.1 Target population objectives

11.1.2 Criteria for reclassification

11.1.3 An implementation plan for reaching population objectives which will promote cooperative management and be sensitive to landowner needs and property rights. The plan will specify resources needed from and impacts to the department, other agencies (including federal, state, and local), tribes, landowners, and other interest groups. The plan shall consider various approaches to meeting recovery objectives including, but not limited to regulation, mitigation, acquisition, incentive, and compensation mechanisms.

11.1.4 Public education needs

11.1.5 A species monitoring plan, which requires periodic review to allow the incorporation of new information into the status report.

11.2 Preparation of recovery and management plans will be initiated by the agency within one year after the date of listing.

11.2.1 Recovery and management plans for species listed prior to 1990 or during the five years following the adoption of these rules shall be completed within 5 years after the date of listing or adoption of these rules, whichever comes later.

Development of recovery plans for endangered species will receive higher priority than threatened or sensitive species.

11.2.2 Recovery and management plans for species listed after five years following the adoption of these rules shall be completed within three years after the date of listing.

11.2.3 The agency will publish a notice in the Washington Register and notify any parties who have expressed interest to the department interested parties of the initiation of recovery plan development.

11.2.4 If the deadlines defined in sections 11.2.1 and 11.2.2 are not met the department shall notify the public and report the reasons for missing the deadline and the strategy for completing the plan at a commission meeting. The intent of this section is to recognize current department personnel resources are limiting and that development of recovery plans for some of the species may require significant involvement by interests outside of the department, and therefore take longer to complete.

11.3 The agency shall provide an opportunity for interested public to comment on the recovery plan and any SEPA documents.

Classification procedures review

12.1 The agency and an ad hoc public group with members representing a broad spectrum of interests, shall meet as needed to accomplish the following:

12.1.1 Monitor the progress of the development of recovery and management plans and status reviews, highlight problems, and make recommendations to the department and other interested parties to improve the effectiveness of these processes.

12.1.2 Review these classification procedures six years after the adoption of these rules and report its findings to the commission.

Authority

13.1 The commission has the authority to classify wildlife as endangered under RCW 77.12.020. Species classified as endangered are listed under WAC 232-12-014, as amended.

13.2 Threatened and sensitive species shall be classified as subcategories of protected wildlife. The commission has the authority to classify wildlife as protected under RCW 77.12.020. Species classified as protected are listed under WAC 232-12-011, as amended.

[Statutory Authority: RCW 77.12.040. 98-05-041 (Order 98-17), § 232-12-297, filed 2/11/98, effective 3/14/98. Statutory Authority: RCW 77.12.020. 90-11-066 (Order 442), § 232-12-297, filed 5/15/90, effective 6/15/90.]

Appendix C. Museum requests for Washington loon specimens.

A letter was sent (except as noted) to the following museums requesting information on common loon specimens or egg sets collected in Washington and held in their collections. A solid circle (●) indicates a museum held records from Washington, an open circle (○) indicates no records, and a dash (–) indicates no response was received. Specimens collected between May and August are presented in table 3.

○ The Academy of Natural Sciences, Philadelphia
○ American Museum of Natural History, New York
● Burke Museum, University of Washington, Seattle
– Carnegie Museum, Pittsburgh, Pennsylvania
● Central Washington University, Ellensburg
● Charles R. Conner Museum, Washington State University, Pullman
○ Cornell University, Ithaca, New York [via internet, accessed May 6, 1999, gopher://biodiversity.bio.uno.edu/77/.indices/bird/cubird?gavia+AND+immer]
– Field Museum of Natural History, Chicago
● James R. Slater Museum of Natural History, University of Puget Sound, Tacoma
○ Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts
– Museum of Natural History, Oregon State University, Corvallis
○ Museum of Natural History, University of Oregon, Eugene
○ Museum of Natural Science, Louisiana State University, Baton Rouge
● Museum of Zoology, University of Michigan, Ann Arbor
● National Museum of Natural History, Smithsonian Institution, Washington, D.C.
○ Natural History Museum of Los Angeles County, Los Angeles
○ Peabody Museum, Yale University, New Haven, Connecticut
○ Western Foundation of Vertebrate Zoology, Camarillo, California
– Walla Walla College, College Place
○ Whitman College, Walla Walla

Appendix D. Washington lakes and other water bodies where loon locations are recorded from May through August. Locations are presented in alphabetical order under each county. Information was obtained from cited references and unpublished data in the WDFW observation files. C = confirmed sighting, U = unconfirmed sighting.

County	Name	Year	C	Notes
Benton	Blue Ridge Tri Cities	1980	C	2 Loons
	Columbia River- White	1988	U	1 Downy Young
	Pasco	1978	U	Single Adult
Chelan	Eight Mile Lake	1989	C	2 Loons
	Lake Chelan	1994	C	Single Adult
		1979	C	3 Loons
	Lake Wenatchee	1990	U	2 Loons
		1989	C	2 Feathered Young
	Lucerne	1993	C	3 Loons
Clallam	Beaver Lake	1981	C	Single Adult
	Lake Ozette	1999	C	2 Loons
		1998	C	2 Loons
		1997	C	Single Adult
		1995	C	2 Loons
		1989	C	2 Loons
		1985	U	1 Feathered Young
		1921	U	Nest Active, Success Unknown
	Seafield Lake	1997	C	Single Adult
	Wentworth Lake	1989	C	Single Adult
Douglas	Box Canyon	1977	U	Single Adult
	Brewster	1980	C	Single Adult
	Bridgeport Bar	1978	C	Single Adult
	Daroga Park Lake Entiat	1991	C	2 Loons
		1989	U	2 Downy Young
		1986	U	Nest Active, Success Unknown
	Elbow Lake	1975	C	Single Adult
	Entiat	1989	C	Single Adult
	Jameson Lake	1982	C	Single Adult
		1968	C	Single Adult
	Orondo	1989	U	Nest Active, Success Unknown
	Rufus Woods Lake	1984	C	Nest Active, Success Unknown
		1977	C	Single Adult
	Wells Pool	1986	C	3 Loons
		1979	C	Single Adult
	Wentachee	1977	C	5 Loons
	Winesap	1979	U	Single Adult

County	Name	Year	C	Notes
Ferry	Curlew	1993	C	2 Loons
		1996	C	Single Adult
	Ferry Lake	1999	C	1 Young Died
	Keller Ferry	1980	C	Single Adult
	N Twin Lake	1999	C	2 Feathered Young
		1998	C	2 Feathered Young
		1997	C	2 Feathered Young
		1996	C	1 Feathered Young
		1995	C	1 Feathered Young
		1994	C	Nest Attempt Failed
		1993	C	1 Feathered Young
		1992	C	1 Feathered Young
		1991	C	Nest Attempt Failed
		1990	C	Nest Attempt Failed
		1989	C	Nest Attempt Failed
		1988	C	Nest Attempt Failed
		1987	C	Nest Attempt Failed
		1986	C	Nest Attempt Successful, Number of Young Unknown
		1985	C	1 Downy Young
		1984	C	Nest Attempt Successful, Number of Young Unknown
		1983	C	2 Feathered Young
		1982	C	Nest Attempt Successful, Number of Young Unknown
		1981	C	Nest Attempt Successful, Number of Young Unknown
	Roosevelt Lake	1977	C	Single Adult
	S Twin Lake	1999	C	Single Adult
		1998	C	Single Adult
		1997	C	1 Feathered Young
		1996	C	Unoccupied
		1995	C	1 Feathered Young
		1994	C	1 Feathered Young
		1993	C	1 Feathered Young
		1992	C	2 Feathered Young
		1991	C	1 Feathered Young
		1989	C	Nest Attempt Failed
		1988	C	Nest Attempt Failed
		1987	C	Nest Attempt Failed
		1986	C	Unoccupied

County	Name	Year	C	Notes
		1985	C	1 Feathered Young
		1984	C	2 Loons
		1984	C	Nest Attempt Successful, Number of Young Unknown
		1983	C	Nest Active, Success Unknown
		1982	C	Nest Attempt Successful, Number of Young Unknown
		1981	C	Nest Attempt Successful, Number of Young Unknown
	Swan Lake	1992	C	Single Adult
Grant	Banks Lake	1981	C	Single Adult
		1980	U	Single Adult
		1978	C	Single Adult
		1968	C	Single Adult
	Blue Lake - Grand Cou	1994	C	Single Adult
		1979	C	2 Loons
		1966	C	2 Loons
		1965	C	2 Loons
	Cascade Valley	1979	U	Single Adult
	Goose Lake	1972	C	Single Adult
	Lenore Lake	1981	C	Single Adult
		1978	C	Single Adult
	Osborn Bay	1989	U	1 Downy Young
	Osborn Bay Lake	1984	C	75 Loons
	Park Lake - Grand Cou	1981	C	Single Adult
		1960	C	Single Adult
	Potholes Reservoir	1977	U	Single Adult
	Priest Rapids Pool -	1966	C	Single Adult
	Red Alkali Lake	1967	U	2 Loons
		1966	C	2 Loons
	Steamboat Rock	1971	C	Single Adult
	Summer Falls Billy Cl	1981	C	14 Loons
	Vantage Bridge	1996	C	Single Adult
	Warden Lake	1990	C	Single Adult
Grays Harbor	Lake Quinault	1998	C	3 Loons
		1997	C	Single Adult
		1996	C	3 Loons
		1995	C	2 Loons
		1993	C	2 Loons
		1992	C	3 Loons

County	Name	Year	C	Notes
		1991	C	Lake Occupied, Activity Unknown; 2 Loons
		1990	C	2 Loons
		1989	C	3 Loons
		1984	U	1 Feathered Young
Island	Cranberry Lake	1994	C	Single Adult
Jefferson	Penny Creek	1992	U	1 Downy Young
King	Big Eagle Lake	1999	C	Unoccupied
		1998	C	Unoccupied
		1997	C	Lake Occupied, Activity Unknown; 2 Loons
		1996	C	Unoccupied
		1995	C	Unoccupied
		1994	C	Unoccupied
		1993	C	Nest Attempt Failed
		1992	C	2 Feathered Young
		1991	C	1 Feathered Young
	Black Lake	1994	C	Single Adult
		1992	C	Single Adult
	Calligan Lake	1999	C	Unoccupied
		1998	C	Unoccupied
		1997	C	Unoccupied
		1996	C	Unoccupied
		1995	C	Single Adult
		1994	C	Single Adult
		1993	C	Unoccupied
		1992	C	Nest Attempt Failed
		1991	C	Nest Attempt Failed
		1990	C	1 Feathered Young
		1989	C	1 Feathered Young
		1988	C	Nest Active, Success Unknown
	Chester Morse/ Cedar	1999	C	2 Loons
		1998	C	2 Loons
		1997	C	Nest Attempt Failed
		1996	C	1 Feathered Young
		1995	C	2 Feathered Young
		1994	C	1 Feathered Young
		1993	C	Nest Attempt Failed
		1992	C	Nest Attempt Failed
		1991	C	1 Feathered Young
		1990	C	1 Feathered Young

County	Name	Year	C	Notes
		1989	C	1 Feathered Young
	Chester Morse/ Pool	1999	C	1 Feathered Young
		1998	C	2 Feathered Young
		1997	C	2 Feathered Young
		1996	C	1 Young Died
		1995	C	2 Loons
		1994	C	2 Loons
		1993	C	1 Feathered Young
		1992	C	Unoccupied
		1991	C	2 Feathered Young
		1990	C	2 Feathered Young
		1989	C	1 Feathered Young
		1988	C	2 Feathered Young
		1982	C	1 Feathered Young
		1979	C	1 Feathered Young
	Chester Morse/Rex	1999	C	1 Young Died
		1998	C	Nest Attempt Failed
		1997	C	1 Feathered Young
		1996	C	2 Feathered Young
		1995	C	Nest Attempt Failed
		1994	C	1 Feathered Young
		1993	C	Nest Attempt Failed
		1992	C	1 Feathered Young
		1991	C	1 Feathered Young
		1990	C	Nest Attempt Failed
		1989	C	1 Feathered Young
	Eagle Gorge / Howard	1982	C	3 Loons
	Green Lake	1978	C	Single Adult
	Howard Hanson	1999	C	1 Feathered Young
		1998	C	1 Feathered Young
		1997	C	Nest Attempt Failed
		1996	C	Nest Attempt Failed
		1995	C	Nest Attempt Failed
		1994	C	Nest Attempt Failed
	Lake Geneva	1994	C	Single Adult
	Lake Hancock	1994	C	2 Loons
	Lake Sammamish	1980	C	Single Adult
	Lake Wilderness	1886	C	Nest Active, Success Unknown
	Mercer Island	1975	C	Single Adult
	Montlake Fill	1980	C	Single Adult

County	Name	Year	C	Notes
	Mud Lake Snoqualmie T	1995	C	Lake Occupied, Activity Unknown; 1 Loons
		1984	U	Nest Active, Success Unknown
	Rattlesnake Lake	1996	C	Single Adult
		1994	C	3 Loons
	S Fork Tolt Res	1999	C	2 Loons
		1998	C	2 Loons
		1997	C	1 Downy Young
		1996	C	1 Feathered Young
		1995	C	2 Loons
		1994	C	1 Downy Young
		1993	C	1 Feathered Young
		1992	C	2 Loons
		1991	C	2 Loons
		1990	C	Nest Attempt Failed
Kitsap	Wildcat Lake	1979	C	2 Loons
Kittitas	Cooper Lake	1993	C	Single Adult
	I-90 Mile 103	1982	C	Single Adult
	Johnson Slough	1993	C	Single Adult
	Keechelus Lake	1982	C	Single Adult
	Rocky Coulee Boat Ram	1996	C	Single Adult
	Wanapum Dam	1994	C	4 Loons
	Wanapum Pool	1984	C	Single Adult
Lewis	Alder Lake	1996	C	2 Loons
		1990	C	Single Adult
	Packwood Lake	1978	C	2 Loons
Lincoln	Long Lake	1989	C	Single Adult
	Porcupine Bay	1994	C	Single Adult
Mason	Benson Lake	1979	U	4 Loons
	Devereaux Lake	1979	U	Single Adult
	Howell Lake	1979	C	Single Adult
	Isabella Lake	1931	U	Single Adult
	Lake Cushman	1996	C	Single Adult
	Phillips Lake	1986	C	Single Adult
	Phillips Lake	1985	C	Single Adult
	Phillips Lake	1984	C	Single Adult
		1983	C	Single Adult
		1982	C	Single Adult
	Trask Lake	1994	U	Single Adult
Okanogan	Aeneas Lake	1980	C	Single Adult

County	Name	Year	C	Notes
	Alta Lake	1978	C	2 Loons
	Beth Lake	1996	C	Occupancy Unknown; 0 Loons
		1995	C	Single Adult
		1994	U	Nest Active, Success Unknown
		1991	C	Single Adult
	Big Hidden Lake	1999	C	Unoccupied
		1979	U	Nest Active, Success Unknown
		1977	C	Single Adult
		1976	C	Single Adult
		1948	C	Nest Active, Success Unknown
	Big Twin Lake	1999	C	Single Adult
	Black Lake	1996	C	Lake Occupied, Activity Unknown; 2 Loons
	Blue Lake - Wannacut	1998	C	Single Adult
	Blue Lake Sinla	1999	C	2 Loons
		1996	C	1 Feathered Young
		1995	C	Lake Occupied, Activity Unknown; 2 Loons
		1994	U	1 Downy Young
	Bonaparte Lake	1999	C	1 Young Died
		1998	C	2 Downy Young
		1997	C	2 Feathered Young
		1996	C	2 Feathered Young
		1995	C	2 Downy Young
		1994	C	Nest Attempt Failed
	Chopaka Lake	1998	C	Single Adult
	Columbia Methow	1982	C	6 Loons
	Conconully Lake	1996	C	Single Adult
		1979	C	Single Adult
	Cougar Lake	1976	C	2 Loons
	Duck Lake	1993	U	Single Adult
	Fish Lake	1999	C	2 Loons
		1998	C	3 Loons
	Lost Lake	1999	C	2 Young Died
		1998	C	2 Downy Young
		1997	C	2 Feathered Young
		1996	C	2 Feathered Young
		1995	C	2 Downy Young
		1994	C	1 Feathered Young
		1993	C	2 Feathered Young
		1992	C	1 Downy Young

County	Name	Year	C	Notes
		1991	C	2 Feathered Young
		1990	C	2 Feathered Young
		1989	C	1 Feathered Young
		1988	C	2 Feathered Young
		1987	C	2 Loons
		1986	C	3 Loons
	Omak Lake	1979	C	Single Adult
	Osoyoos Lake	1996	C	5 Loons
		1981	C	Single Adult
	Owhi Lake	1991	C	3 Loons
	Palmer Lake	1996	C	2 Loons
		1977	C	Single Adult
	Pearrygin Lake	1995	C	2 Loons
	Sidley Lake	1999	C	Single Adult
		1998	C	3 Loons
		1996	C	Nest Attempt Failed
		1995	C	Lake Occupied, Activity Unknown; 2 Loons
		1984	U	3 Feathered Young
		1980	C	Lake Occupied, Activity Unknown; 2 Loons
		1978	C	Lake Occupied, Activity Unknown; 2 Loons
	Spectacle Lake	1989	U	Nest Active, Success Unknown
		1979	C	Occupancy Unknown; 1 Loons
		1978	C	Occupancy Unknown; 1 Loons
	Starr	1980	C	3 Loons
	Upper Wells Pool	1984	U	17 Loons
	Wannacut Lake	1998	C	Single Adult
	Wells Pool	1980	U	3 Loons
Pacific	Loomis Lake	1979	U	Single Adult
Pend Oreille	Big Meadow Lake	1993	C	2 Loons
		1990	C	Single Adult
	Browns Lake	1991	C	2 Loons
	Crescent Lake	1990	C	Single Adult
		1984	C	Single Adult
	Diamond Lake	1992	C	Single Adult
		1988	C	Single Adult
	Fan Lake	1992	C	Single Adult
	Kings Lake	1991	C	Single Adult
	Leadbetter Lake	1992	C	Single Adult

County	Name	Year	C	Notes
	Lime Lake	1990	C	Single Adult
	Marshall Lake	1991	C	2 Loons
	Mill Pond	1998	C	2 Loons
		1995	C	Single Adult
		1994	C	Single Adult
		1993	C	Single Adult
		1991	C	Single Adult
		1991	C	Single Adult
		1990	C	3 Loons
	Nile Lake	1993	C	Single Adult
		1991	C	Single Adult
		1989	C	Single Adult
	Pend Oreille River	1989	C	Single Adult
	Sacheen Lake	1989	C	Single Adult
	Sullivan Lake	1999	C	Single Adult
		1998	C	Single Adult
		1997	C	Single Adult
		1996	C	Single Adult
		1995	C	2 Loons
		1994	C	2 Loons
		1993	C	3 Loons
		1992	C	2 Loons
		1992	C	2 Loons
		1991	C	2 Loons
		1990	C	2 Loons
		1989	C	2 Loons
		1988	C	2 Loons
		1984	C	2 Loons
		1978	C	2 Loons
Pierce	Echo Lake	1987	U	Single Adult
	Horseshoe Lake	1979	C	Single Adult
	Lake Kapowsin	1898	C	Nest Active, Success Unknown
San Juan	Spencer Lake	1926	U	Single Adult
	Sportsmans Lake	1948	C	2 Feathered Young
Skagit	Big Lake	1981	C	Single Adult
	Clear Lake	1990	C	5 Loons
	Day Lake	1996	C	2 Loons
		1995	C	Single Adult
	Lake Campbell	1990	C	2 Loons
	Lake Cavanaugh	1991	C	9 Loons

County	Name	Year	C	Notes
		1990	C	Single Adult
	Lake Mcmurray	1991	C	Lake Occupied, Activity Unknown; 2 Loons
		1990	C	3 Loons
	Lake Shannon	1986	U	Single Adult
	Shannon Lake	1991	C	7 Loons
Snohomish	Lake Chaplain	1990	C	Single Adult
	Lake Goodwin	1986	C	Single Adult
	Lake Hannan	1956	U	Nest Active, Success Unknown
	Lake Ketchum	1992	C	Single Adult
		1990	C	3 Loons
	Lake Martha	1995	C	2 Loons
	Spada Lake	1981	C	Single Adult
	Storm Lake	1981	U	Single Adult
Spokane	Chapman Lake	1925	C	Nest Active, Success Unknown
	Clear Lake	1989	C	2 Loons
	Long Lake	1985	C	Single Adult
Stevens	Deer Lake	1986	U	2 Loons
	Jumpoff Joe Lake	1989	C	Single Adult
	Lake Roosevelt	1989	C	Single Adult
	Loon Lake	1989	C	4 Loons
		1995	C	Single Adult
	Pierre Lake	1999	C	Single Adult
		1998	C	Single Adult
		1996	C	2 Loons
	Starvation Lake	1990	U	4 Loons
	Summit Lake	1999	C	Single Adult
	Waitts Lake	1989	C	4 Loons
	Williams Lake	1984	C	Single Adult
Thurston	Alder Lake	1991	C	Single Adult
	Black Lake	1983	U	Single Adult
	Elbow Lake	1979	C	Single Adult
	Lake Lawrence	1977	U	Single Adult
	Long Lake	1983	U	2 Loons
	Pattison Lake	1987	C	Single Adult
	Summit Lake	1980	U	Single Adult
Whatcom	Baker Lake	1991	C	9 Loons
		1990	C	Single Adult
		1989	C	10 Loons
		1988	C	Unoccupied

County	Name	Year	C	Notes
	Diablo Lake	1991	C	1 Downy Young
	Hozomeen Lake	1997	C	Lake Occupied, Activity Unknown; 2 Loons
	Hozomeen Lake	1995	C	2 Loons
		1993	C	2 Loons
		1992	C	2 Loons
		1991	C	Lake Occupied, Activity Unknown; 2 Loons
		1990	C	Nest Active, Success Unknown
		1989	C	1 Feathered Young
		1988	C	1 Feathered Young
		1987	C	2 Loons
		1986	C	2 Loons
		1985	C	2 Loons
		1984	C	2 Loons
		1979	C	2 Loons
		1977	U	Nest Active, Success Unknown
		1975	C	2 Loons
		1971	C	3 Loons
	Lake Terrell	1991	C	9 Loons
		1990	C	9 Loons
		1984	C	1 Downy Young
		1983	C	1 Downy Young
	Ross Lake	1983	C	4 Loons
	Ross Lake Devils Creek	1988	U	Nest Active, Success Unknown
	Silver Lake	1991	C	2 Loons
	Whatcom Lake	1994	C	2 Downy Young
		1992	C	2 Downy Young
		1991	C	5 Loons
		1990	C	Single Adult
Whitman	Crooked Knee Lake	1983	C	2 Loons
Yakima	Berglund Lake / Freew	1998	C	Single Adult
	Bumping Lake	1993	C	Single Adult