STATE OF WASHINGTON October 2016

Periodic Status Review for the Peregrine Falcon

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Washington Department of
FISH AND WILDLIFE
Wildlife Program

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). In 1990, the Washington Wildlife Commission adopted listing procedures developed by a group of citizens, interest groups, and state and federal agencies (Washington Administrative Code 232-12-297). The procedures include how species listings will be initiated, criteria for listing and delisting, a require¬ment for public review, the development of recovery or management plans, and the periodic review of listed species.

The Washington Department of Fish and Wildlife is directed to conduct reviews of each endangered, threatened, or sensitive wildlife species at least every five years after the date of its listing by the Washington Fish and Wildlife Commission. The periodic status reviews are designed to include an update of the species status report to determine whether the status of the species warrants its current listing status or deserves reclassification. The agency notifies the general public and specific parties who have expressed their interest to the Department of the periodic status review at least one year prior to the five-year period so that they may submit new scientific data to be included in the review. The agency notifies the public of its findings at least 30 days prior to presenting the findings to the Fish and Wildlife Commission. In addition, if the agency determines that new information suggests that the classification of a species should be changed from its present state, the agency prepares documents to determine the environmental consequences of adopting the recommendations pursuant to requirements of the State Environmental Policy Act.

The draft periodic status review for peregrine falcon was reviewed by researchers and federal agencies. This was followed by a 90-day public comment period from July 12, 2016 to October 10, 2016. All comments received were considered during the preparation of the final periodic status review. The Department will present the results of this periodic status review to the Fish and Wildlife Commission for action at the November 2016 meeting.

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EXECUTIVE SUMMARY

Peregrine falcons (*Falco peregrinus*) exhibited well-documented population declines across North America and much of their global range following the widespread use of DDT shortly after the Second World War. The peregrine falcon was listed nationally as an endangered species by the U.S. Fish and Wildlife Service (USFWS) in 1970 and by the Washington Fish and Wildlife Commission in 1980 when only five pairs were found to be nesting statewide. With the restriction placed on the use of DDT, the peregrine population has recovered and was removed from the federal endangered species list in 1999. In 2002 the species was reclassified as a state sensitive species after >70 territories were found occupied.

In 2004, the USFWS and Washington Department of Fish and Wildlife began allowing small numbers of peregrine falcon nestlings to be taken for falconry, and in 2010 the regulations were modified to include trapping of first-year Washington falcons. WDFW last completed comprehensive surveys of peregrine falcon territories in 2009. In that year, the Department identified 108 occupied territories, an increase from 91 occupied territories in 2006, and a continued linear increase in the number of occupied territories since 1990. In 2012 as a response to state down-listing of the peregrine, the Washington Forest Practices Board approved the removal of peregrine falcon critical habitat from Forest Practice Rules (WAC 222-16-080).

The species no longer meets the definition of a state sensitive species under Washington law, which is described as "*..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"* (WAC 232-12-297). WDFW therefore recommends that peregrine falcon be delisted at the state level in Washington. The species will remain classified as "protected wildlife" under state law (WAC 232-12-011) and will continue to be protected under the federal Migratory Bird Treaty Act.

INTRODUCTION

The peregrine falcon (*Falco peregrinus*) (Figure 1) is divided taxonomically into three subspecies in North America, two of which breed in Washington State, the Peale's peregrine (*F. p. pealei*) and American peregrine (*F. p. anatum*) and the third, the Arctic peregrine (*F. p. tundrius*) occurring as a migrant or rare winter resident (Varland et al. 2012). The Peale's peregrine falcon occurs in coastal regions of the state, primarily along the outer coast, northern coast of the Olympic Peninsula and the San Juan Islands but always within a half mile of salt water. The American peregrine falcon breeds in the Cascade Mountains, the San Juan Islands, the major cities of the Puget Sound basin, and across eastern Washington. Some peregrines breeding along the outer coast and islands of Puget Sound south to central coastal Oregon may be intergrades between the two subspecies (Sheppard 1983, Brown et al. 2007; J. Pagel, pers. comm.). The peregrine was federally listed as endangered in 1970 after dramatic declines following the widespread use of DDT in the 1940's and 50's. In 1980, the peregrine was listed as endangered in Washington when only five pairs could be found nesting. Nationally, restrictions on DDT use combined with releases of young American peregrines to the wild facilitated population recovery (Enderson et al. 1995, White et al. 2002) and the Arctic peregrine falcon and American peregrine falcon were removed from the federal endangered species list in 1994 and 1999, respectively (Mesta 1999). The restriction on DDT use was the primary factor in the eventual recovery of peregrines in Washington. Releases of 145 young peregrines from 1982-1997 in the Cascade Mountains, Columbia Gorge, and Columbia Basin may have contributed to the eventual establishment of some nesting pairs in these areas (Hayes and Buchanan 2002). In Washington, the population increased to 72 occupied territories by 2001, and in 2002 the peregrine was down-listed to a state sensitive species.

Figure 1. Peregrine falcon.

SPECIES BACKGROUND

Distribution-breeding. Peregrines can now be found nesting throughout much of the state (Figure 2). Peregrine falcon nesting is dependent upon availability of abundant prey in proximity to adequate nesting sites, usually near large water bodies (Ratcliffe 1993, White et al. 2002). The greatest numbers of nesting sites in the state occur in the San Juan Islands, the lowlands of northern Puget Sound, particularly in the cities, and along the outer northern coast. In these

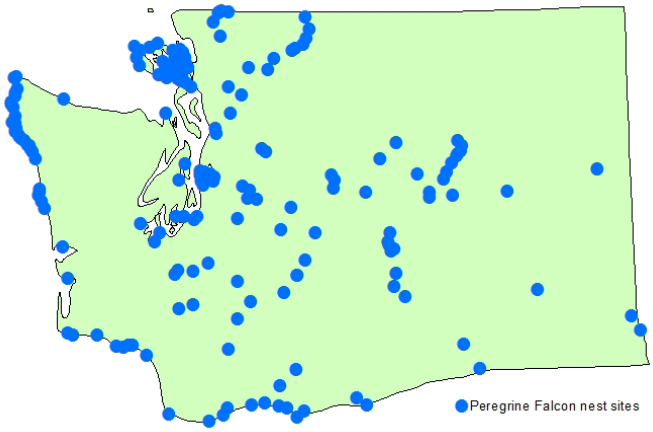

Figure 2. Distribution of peregrine falcon nesting territories in Washington, 2016.

regions, peregrines usually nest on islands, "sea stacks", or shoreline cliffs associated with seabird colonies, waterfowl concentrations, and other prey species. In this region, peregrines also nest in the urban areas of Seattle and Tacoma of central Puget Sound. Lower numbers occur along the forested slopes of the Cascade Mountains and in the Columbia River Basin, where peregrines nest on cliffs that are typically in close proximity to large lakes, or overlook river valleys such as Columbia and Snake Rivers.

Distribution-winter. Western Washington is noted for its high density of wintering peregrines (Anderson and Herman 2005). The mild maritime climate and extensive habitat supports high densities of prey, including shorebirds and waterfowl, rock pigeons (*Columba livia*), and European starlings (*Sturnus vulgaris*). Peregrine wintering areas in western Washington include Grays Harbor, Willapa Bay, the estuaries of Puget Sound, the Columbia River estuary, the outer coastal beaches, low-lying agricultural and pasture lands, the Columbia Gorge, and many urban areas (Anderson and Herman 2005). Peale's and American peregrines both are found in these habitats throughout spring and fall migration as well as in winter (Anderson and Herman 2005).

Migration. Evidence of a west coast peregrine migration was first described by Anderson et al. (1988). The arctic subspecies was formerly considered an uncommon migrant in the region, but several recent records from British Columbia, Washington, Oregon, and California, demonstrated that they do migrate and winter in the region. In addition, Varland et al. (2012) later described an immature female overwintering on the Long Beach Peninsula in 2000-2001 and another at Ocean Shores in 2010 confirming earlier reports ranging from British Columbia to California that Arctic peregrines are a rare winter resident in Washington (Varland et al. 2008a, Varland et al. 2012). In eastern Washington, the peregrine is now also found in widely scattered localities in open habitats (the channeled scablands, agricultural areas, etc.), but had been considered rare in this area during winter in the late 1990s (Anderson and Herman 2005). Banding data from Washington falcons indicate that at least some resident adult American peregrines generally remain near their nests throughout the year. However, locally produced juveniles may wander widely (C.M. Anderson, unpubl. data). First year banded birds from western Washington have been observed as far south as Los Angeles, California north to Vancouver, British Columbia, and east to Alberta, Canada.

Breeding habitat requirements. The presence of a prominent cliff (Figure 3), tall building, or steel bridge is the most common characteristic of peregrine nesting territories. Cliffs and tall buildings function as both nesting and perching sites and provide unobstructed views of the surrounding landscape. A successful nest site also requires the presence of ledges or potholes that are

Figure 3. Peregrine falcon on nesting cliff and ledge with young.

essentially inaccessible to mammalian predators, provide protection from the elements, and are protected from heavy rain (Campbell et al. 1990, Johnsgard 1990). A source of open water, such as a river, lake, marsh, or marine waters, is typically found in close proximity to the nest site. The primary advantage of an open body of water is that it provides a featureless hunting area where small terrestrial birds have no cover and are thereby more easily captured. However, peregrines will nest at locations other than cliff sites, such as at the apex of steep, grass-covered slopes, rock quarries, trees, on the ground, and man-made structures such as bridges, tall buildings, smoke stacks, and cooling towers in urban areas (White et al. 2002).

Winter habitat requirements. Habitats used by peregrines during the non-breeding season usually support high densities of shorebirds (Figure 4), waterfowl and other small- to medium-sized birds (Anderson and Herman 2005). Coastal and estuarine areas that are used include beaches, tidal flats, islands, and marshes. Human-altered habitats and environs include agricultural fields (particularly when flooded), airports, and cities where rock pigeons and European starlings are abundant (White et al. 2002). Roost sites are also an important element of wintering habitat. The first radio telemetry study on peregrines conducted in Washington (Anderson and DeBruyn 1979) discovered that adult female peregrines wintering on the Samish Flats (Skagit County) showed strong fidelity to their roost sites and used them continuously during the winter. Two of these tagged peregrines used different nearby offshore islands as their roost sites. During another wintering peregrine telemetry study on the Lummi Flats in Whatcom County (Anderson et al. 1984) a tagged adult female flew from Sandy Point to Orcas Island each night, a distance of 8.4 miles over open-ocean. Dobler (1993) later reported another peregrine flying 15 miles to a roost.

Figure 4. Peregrine falcon in pursuit of shorebirds.

Diet and foraging. Peregrine falcons prey on a variety of birds (Figure 5) found near cliffs and aquatic features in the vicinity of eyries. During migration and at wintering sites their prey is usually captured near large bodies of water. Studies of Peale's peregrine food habits on Tatoosh Island (Paine et al. 1990), located off the northwestern tip of the Olympic Peninsula, indicated that many species were taken, but Cassin's (*Ptychoramphus aleuticus*) and rhinoceros auklets (*Cerorhinca monocerata*), were by far the most common prey encountered. This was despite higher densities of common murre (*Uria aalge*), and glaucous-winged gulls (*Larus glaucescens*), presumably less preferred because of their larger size. Smaller gull species, such as ring-billed (*L. delawarensis*) and mew gulls (*L. canus*), are frequently taken by peregrines on the outer coast and at inland sites in central Washington along the Columbia and Snake Rivers (Dobler 1993). Other species commonly taken by peregrines in Washington include various species of waterfowl, shorebirds, swallows, and swifts. American robins

(*Turdus migratorius*), European starlings, rock pigeons, and cedar waxwings (*Bombycilla cedorum*) were the most common prey of peregrines breeding in the San Juan Islands (Anderson 1995, 1996, 1997). These same species constitute the main diet of urban nesting peregrines in Seattle, Tacoma, and Everett sites as well (Ed Deal, pers. comm.). Cade et al. (1996) also lists these species as common prey in cities across North America, and starlings and rock pigeons are common near peregrine nest sites in the Columbia Basin.

Figure 5. Peregrine falcon with prey.

Home range and movements. Home ranges of peregrines during the breeding season can be expansive and large size seems closely dependent on distant foraging sorties from eyries. In Colorado, the largest home ranges averaged 450 mi^2 (1,251 km^2) for three females while those of two males averaged 405 mi^2 (1,126 km^2) (Enderson and Craig 1997); hunting flights within these home ranges extended as far as 12-26 mi (20-43 km) from the eyrie. The home ranges of two females in the United Kingdom were 8.3 mi^2 (23 km^2) and 42.1 mi^2 (117 km^2) and a hunting female was observed 11 mi (18 km) from the nest (Mearns 1985). On Cape Peninsula, South Africa, two female and two male peregrines had an average home range size of 44.3 mi^2 (123.0 km^2) (Jenkins and Benn 1998); hunting excursions from nest sites averaged 10 mi (16.7 km) per flight. Two other studies reported average hunting excursions of 12 and 16 mi (20 and 27 km), a potential indication of substantial home range size, but they did not determine home range size (Porter et al. 1973, Kumari 1974 cited *in* Mearns 1985).

During winter, peregrines can range over extensive areas when hunting prey. In Washington, in the vicinity of Sequim, where three birds were monitored for most of a single winter, home range size was 23.7 mi^2 (65.8 km^2) for an immature female and 30.9 mi^2 (85.7 km^2) for an immature male (Dobler 1993). Core areas (areas of concentrated activity) were 4.9 mi^2 (13.5 km^2) and 9.1 mi^2 (25.3 km^2) for the female and male, respectively. At Grays Harbor, an immature male peregrine had a home range of 28 mi^2 (78 km^2) and core area of 7.1 mi^2 (19.8 km^2) during a single winter (Dobler and Spencer 1989).

Mortality. Mortality factors represented for peregrines in Washington include: unhatched eggs, eggs killed by flooded substrates from rain or improper substrate selection, premature fledging, drowning after fledging, flying into windows in urban environments, collisions with vehicles and aircraft, electrocution and collision with powerlines, mammalian and golden eagle predation at nest sites, territorial battle with other peregrines during nesting, occasional shooting, infection by pigeon sourced *Trichomonas gallinae*, and avian influenza.

Juvenile and adult survival. Peregrines may live up to 20 years (White et al. 2002). In Colorado, Craig et al. (2004) estimated survival rates for three age classes of peregrines: 54% for 0-1 year olds, 67% for 1-2 year olds, and 80% for birds older than 2 years of age. In California, first year survival was estimated as 38%, second year survival as 86% and adult survival (>2 years old) as 85% (Kauffman et al. 2003). For peregrines using coastal beach habitat along the Washington coast, Varland et al. (2008b) estimated an annual apparent survival rate of 59.7%, which included both juvenile (<1 yr old) and adult (≥1 yr old) peregrines. Wooton and Bell (1992) modeled the peregrine falcon population in California and determined that adult survivorship was the most important factor affecting population growth. With the continued growth of the peregrine population in Washington, we surmise that adult survivorship is not limiting the population, and survivorship and productivity are sufficient to support an increasing population.

POPULATIONS AND HABITAT STATUS

North America

The peregrine falcon is found throughout North America from the Canadian arctic to Mexico. It occurs wherever suitable nest sites and prey populations are found. While many historical sites in the eastern United States have yet to be recolonized, the eastern population has adapted to the use of urban areas and artificial structures and the numbers of nesting birds in most states are believed to rival historical estimates (Carter et al. 2003, Katzner et al 2012, Faccio et al. 2013, Gahbauer et al. 2015, Watts et al. 2015), although the estimates may be biased low. In the western United States, most historical (pre-1970-1975) peregrine eyries have been reoccupied across their range, and the population now is recovered beyond documented historical levels. This is in part due to the addition of urban and artificial nest sites, artificial habitat alterations (e.g., reservoirs), and increased availability of alternative prey species (Bond 1946, Enderson et al. 2012, Sharpe 2014, Barnes et al. 2015). Certainly the introduction of the rock pigeon and European starling has also had a major effect on increasing the population. Historical baseline estimates of peregrine populations for North America are poorly known due to lack of systematic surveys (Enderson et al. 1995), however, based on more complete records and new surveys, the pre-decline population has been estimated as: 7,000-10,000 nesting territories with an 80-90% occupancy rate (Kiff 1988), 7,300 pairs (Enderson et al. 1995), and 10,600-12,000 pairs (Cade 2003). By the mid-1990s an estimated 7,169 pairs were estimated breeding in North America (Enderson et al. 1995), an estimated 8,000-10,000 pairs by the late 1990s (White et al. 2002:32) and the most recent upper population estimate is 10,368 breeding pairs based on an analysis by the USFWS to determine a harvest quota for falconry (USFWS 2008).

Territory occupancy, nest success and productivity are indices of the overall health of peregrine populations (USFWS 2003). The breeding "territory," or "breeding site," refers to an area containing, or historically contained, one or more nest ledges where a peregrine falcon pair have been observed, at least once, in reproductive activity (Postupalsky 1974, Steenhof and Newton 2007). The rate of occupancy is defined as the percentage of the total known territories where activity patterns indicate the presence of a mated, territorial pair of potential breeders (Postupalsky 1974). Nest success is defined as the percentage of occupied territories which produce one or more young to an advanced stage of development (Postupalsky 1974, USFWS 2003, Steenhof and Newton 2007). Productivity is another measure of reproductive success and is defined as the

number of young (fledging or advanced age of development) per occupied nest (Postupalsky 1974, Steenhof and Newton 2007). These three indices of population health were low between 1950 and 1980 when populations declined severely but rebounded during population recovery (Cade et al. 1988, Enderson et al. 1995, White et al. 2002).

The federal post-delisting monitoring plan for the American peregrine falcon populations was designed to detect a significant decline in territory occupancy, nest success, or productivity in six recovery regions across the U.S. Data were to be collected at a random sample of peregrine territories for five sampling period, at three year intervals, beginning in 2003 and ending in 2015. Therefore, to meet the mandate of the USFWS to monitor peregrines for not less than five years after delisting, the plan called for continued monitoring in 2003, 2006, 2009, 2012, and 2015 (USFWS 2003). Results of federal post-delisting monitoring have been made available for the 2003 survey year (Green et al. 2006). In 2003, territory occupancy across six recovery regions in the United States ranged from 67% to 98% and averaged 87% for all regions combined. Nest success across the regions ranged from 56% to 90% and averaged 71%, and productivity ranged from 1.27 to 2.32 fledglings/occupied territory with an average productivity of 1.64 fledglings/occupied territory (Green et al. 2006). These values are consistent with stable or expanding populations (Craig et al. 2004, Enderson et al. 2012).

Washington

Following the state down-listing of the peregrine falcon in February of 2002, WDFW conducted a comprehensive survey of peregrines in the 2002 breeding season that included both the Peale's peregrine and American peregrine nest sites. In 2003, the USFWS implemented a federal post delisting monitoring plan (USFWS 2003) nationwide to monitor the status of the American peregrine following federal delisting. Twenty five nesting territories were randomly selected in Washington by USFWS for the national monitoring project (hereafter the "USFWS" sample) in 2003, 2006, 2009, and 2012. The minimum USFWS sample in Washington (n=25) was designed to detect declines in regional peregrine populations. To provide more complete information on the status of Washington's American peregrine population, the Department surveyed, in addition to the USFWS sample sites, as many additional nest sites as possible in 2003, 2006, and 2009. In 2012, WDFW only surveyed the USFWS sample sites.

Occupancy rate. Overall, the rate of occupancy of eyries in Washington has been high. Over the 10-year period from 1992-2001, the occupancy rate averaged 79%, and even higher for the five-year period from 1997-2001 (82%), with some regional variation: Outer Coast (84%), Puget Sound (89%), Upland Forested (74%), and Arid (72%) (Hayes and Buchanan 2002). Similarly, high occupancy rates continued to be observed during comprehensive surveys in 2006 (79%) and 2009 (82%), and also during the federal post-delisting monitoring of the species that began in 2003 at a random sample of nest sites. These sites were monitored at three year intervals (Appendix A). The overall high occupancy rates compare well with that of stable populations (Herbert and Herbert 1969, Rice 1969, Craig et al. 2004, Enderson et al. 2012).

Nest success. A nesting pair is considered successful if it raises at least one young to 28 days (USFWS 2003). However, in Washington, a nesting pair was considered successful if young were

observed in the nest, regardless of age. This produces inflated success rates when compared to studies using the standard definition. Even taking this into account, we believe actual nest success has been high. Over the 10-year period from 1992-2001, nest success averaged 62%. During the five-year period from 1997-2001, nest success averaged 64% with some regional variation: Outer Coast (57%), Puget Sound (65%), Upland Forested (76%), and Arid (69%) (Hayes and Buchanan 2002). Comparable nest success rates were observed during recent comprehensive surveys in 2006 (68%) but nest success was lower in 2009 (37%). During the federal post-delisting monitoring of the species that began in 2003, nest success was ≥50% at a random sample of nest sites (Appendix A). Nest success rates observed for other recovering populations include an average of 73% (1984-1996) for a cliff-nesting population in northern New England and New York (Corser et al. 1999), 62% (1991-1995) for a population in the Midwest (Tordoff and Redig 1997), and 70-83% (2005-2009) for populations in Colorado, Montana, and Wyoming (Enderson et al. 2012).

Productivity. In Washington over the five-year period from 1997-2001, productivity averaged 1.53 young/occupied territory. Productivity at six urban nest sites averaged 1.65 young/ occupied territory over that same time period (Hayes and Buchanan 2002). More recently, during comprehensive surveys in 2006 and 2009, productivity was 2.09 and 1.79 young/occupied territory, respectively. In the federal post-delisting monitoring of the species that began in 2003 productivity was >1.00 young/ occupied territory at a random sample of nest sites (Appendix A). Overall productivity rates compare well with increasing peregrine populations in the eastern United States (Corser et al. 1999), the Midwest (Tordoff and Redig 1997), and Colorado, Montana, and Wyoming (Enderson et al. 2012).

WDFW last completed comprehensive surveys of peregrine falcon territories in 2009. In that year, the Department identified 108 occupied territories, an increase from 91 occupied territories in 2006, and a continued linear increase in the number of occupied territories since 1990 (WDFW, WSDM database; Figure 6). In addition, the number of occupied territories successfully producing at least one fledgling has continued to increase, and although decreasing to 40 of 108 (37% nest success) occupied sites in 2009, nest success rebounded in 2012 (76% nest success) based on nest surveys at a random sample of sites

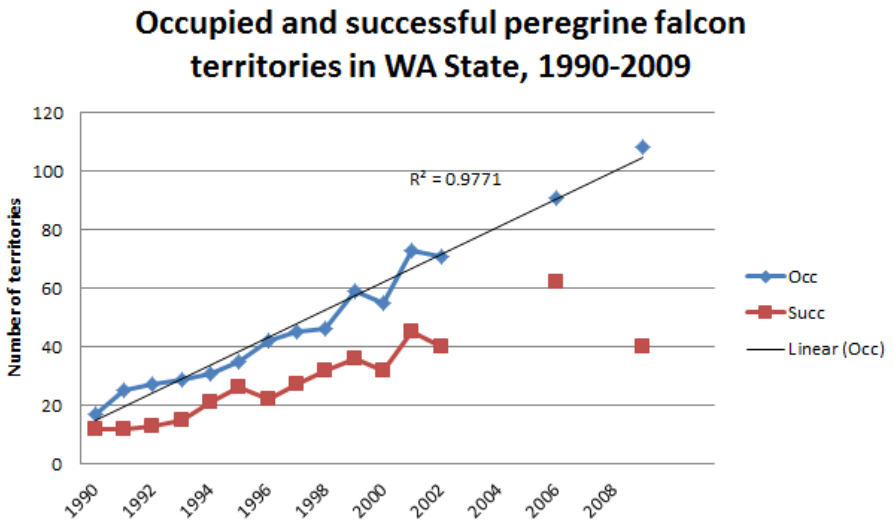

Figure 6. Trend in the number of occupied territories and number of successful territories. 1990-2009.

(n=25) (Appendix A). The long-term trend of increasing numbers of nesting territories, high occupancy rates, and moderate fledging rates are consistent with a stable or increasing population.

Historical estimates of territories in Washington (Bond 1946) vary and likely underestimated the actual number of territories, but only nine territories were identified from a 1980 survey, although Herman (*in* Porter and White 1977) reviewed the existing literature and other sources and estimated as many as 25 historical territories. Although surveys were not conducted in 2016, the Department has 181 nesting territories documented in its peregrine falcon nesting territory database (WSDM database); applying the 2009 occupancy rate of 82% to the 181 known territories, we estimate 148 territories currently occupied statewide. The estimated 148 occupied territories in 2016 far exceeds the 25 historical sites documented during the pre-DDT era and the minimum of 30 pairs established for Washington as part of the federal delisting criteria for the Pacific Coast American peregrine population (USFWS 1982).

Habitat-nesting. The number of available natural nesting sites has likely changed little from the number available historically. There have been some habitat changes at a few sites that have made cliffs unattractive or unavailable to nesting pairs, while a few may have been created by rock quarries, logging, and fire (Bell 2001, Hayes and Buchanan 2002). Many pairs have become established on human-made structures, such as buildings, and bridges (Cade and Bird 1990).

Habitat-foraging. The net effect of human modification on peregrine foraging habitat in Washington is difficult to determine because the peregrine is a generalist predator. As human populations have increased, peregrine foraging habitats (e.g., wetlands, marine waters, coastal barrier islands, and river valleys) have been destroyed or degraded. During the same period, humans have created opportunities in urban areas where there are alternative artificial nest sites and abundant pigeon and starling populations. The wide variety of habitat types and prey species used by the peregrine and the increasing population trend suggest that foraging habitat and prey availability are not limiting the population in Washington.

FACTORS AFFECTING CONTINUED EXISTENCE

Adequacy of regulatory mechanisms. Peregrines are protected by the Federal Migratory Bird Treaty Act which prohibits take, possession, import, export, transport, selling, purchase, barter, or offering for sale, purchase or barter, any migratory bird, their eggs, parts, nests, except as authorized under a valid permit. There are no federal laws that specifically protect the habitat of this species. However, loss of habitat was not identified as a limiting factor in peregrine recovery (Mesta 1999) and was not a factor identified as contributing to the species' listing.

In 2002, the Washington Fish and Wildlife Commission reclassified the peregrine falcon as a state sensitive species. A sensitive species is defined in the Washington Administrative Code (WAC 232-12-297, Section 2.6) as a species *"native to the state of Washington that is vulnerable or declining and is likely to become endangered or threatened in a significant portion of its range within the state without cooperative management or removal of threats."* Regulatory protection of peregrine falcons as a state sensitive species is the same as that afforded by federal law under the Migratory Bird Treaty Act. In addition, the peregrine is

designated a "priority species" and cliff-nesting habitat is identified as a "priority habitat feature" under the Priority Habitat and Species (PHS) Program. The PHS Program provides important wildlife and habitat information and management recommendations to agencies, landowners, municipalities, and consultants for land use planning (WDFW 2008, Larsen et al. 2004). State Forest Practices Rules identify critical habitat for endangered and threatened species, and in 2012 the Washington Forest Practices Board approved the removal of peregrine falcon Critical Habitat from State forest practices rules (WAC 222-16-080).

Falconry. Washington State has received approval by the USFWS to regulate and issue permits for the take of nestlings and Washington fledglings while adhering to the Code of Federal Regulations (50 CFR Section 21.29). The USFWS has set a maximum allowable harvest of up to 5% of the annual fledgling production. States are under no obligation to issue permits up to the maximum sustainable harvest. In 2008, the USFWS published the Final Environmental Assessment and Management Plan on Take of Migrant Peregrine Falcons from the Wild for Use in Falconry, and Reallocation of Nestling/Fledgling Take (USFWS 2008). The Service allocated "take" of up to 116 wild first-year peregrine falcons, including 41 in Alaska and 75 apportioned among states west of 100° west longitude, with capture period limited to between May 1st and August 31st. In 2009, the Pacific Flyway Council approved the Pacific Flyway Nongame Migratory Bird Technical Committee's recommendation to follow authorizations of the USFWS. Between 2009 and 2014, nine of the eleven Pacific Flyway states (excluding Alaska) authorized an average take of 63 peregrines per year (California and Nevada do not allow any take). An average of 19 peregrines were removed from the wild per year, well below the authorized limit of 75. The Pacific Flyway allocation has not been re-evaluated since 2008, and therefore the allocation remains conservative, and the actual take of first-year peregrines has never achieved the allocation and likely has no population impact. In 2015, WDFW allocated 11 nestlings or fledglings for harvest, and falconers filled seven permits consisting of six nestlings and one fledgling. An average of 4.6 nestlings and fledglings were taken in Washington per year from 2011 through 2015.

Contaminants. An important regulatory mechanism protecting peregrine falcons is the requirement that pesticides be registered with the Environmental Protection Agency (EPA). Under the authority of the Federal Insecticide, Fungicide and Rodenticide Act, the EPA requires environmental testing of all new pesticides. Testing the effects of pesticides on representative wildlife species prior to registration is required, although this testing does not include evaluation of the combined effects of multiple legal pesticides which may have detrimental effects.

DDT and its metabolites were the primary cause of peregrine falcon decline across North America. Despite restriction on the use of DDT in the U.S. and Canada in 1972, peregrine falcon populations were slow to recover. DDT and its metabolites are persistent in the environment with a half-life up to 57 years (Cooke and Stringer 1982). As peregrines are known to accumulate contaminants in wintering areas (Henny et al. 1982), or by consumption of prey that overwinter in those areas (Fyfe et al. 1990), the continued use of DDT south of the U.S. border was an ongoing concern and was addressed in Mexico with the implementation of the North American Agreement for Environmental Cooperation, signed in 1997 by the United States, Canada and Mexico. Mexico met the obligations of the agreement by the year 2000, and no longer produces or permits use of DDT. However, DDT use south of U.S. was much less significant to peregrines breeding in the Pacific Northwest that

don't migrate that far south. In addition, prey species returning from DDT contaminated areas south of the U.S. border arrive on the breeding grounds in the Pacific Northwest after peregrines have already started nesting (J. Pagel, pers. comm.). In Washington, a surface water monitoring program conducted by the Washington State Department of Agriculture found elevated DDT or its metabolites in two streams within seven monitored watersheds (Tuttle and Castro 2015). River, stream, and estuary sediments in many areas are likely still contaminated and may continue to pose an unknown level of environmental risk, although bald eagles, osprey, and peregrine falcons, all impacted by DDT contaminants, continue to show population increases and healthy productivity.

A new environmental contaminant issue that arose in recent years was the detection of widely used flame retardant chemicals, polybrominated diphenyl ethers (PBDEs), in peregrine eggs in Spain, Canada, California, and the Northeastern U.S. (Chen et al. 2008, Park et al. 2009, Guerra et al. 2012). The compounds are classified as persistent, bio-accumulative, and toxic (PBT), and may have neurological and endocrine effects that at high levels could affect reproduction. To date, it has not been demonstrated that these compounds are impacting reproduction of peregrine falcons in the wild. In addition, since 2000, the European Union, the U.S. Environmental Protection Agency, and many states, including Washington, have placed restrictions and bans on the use of PBDEs. In the United States, manufacturers voluntarily stopped production of two of the three most commonly used forms of PBDEs, Penta-BDE and Octa-BDE, in 2004, and agreed to stop production of the third form (Deca-BDE) by the end of 2013 (Washington State Department of Health; http://www.doh.wa.gov/CommunityandEnvironment/Contaminants/PBDEs). In 2007, the Washington State legislature adopted RCW 70.76, a PBDE law that placed many restrictions on the use of products containing PBDEs. In California, detection of the compounds declined by half between 2002-2012 in sport fish, and by 65-95% in bivalves, bird eggs, and pregnant women (Sutton et al. 2015, Zota et al. 2013).

Organophosphates and neonicotinoid insecticides, PCBs, heavy metals, avicides and oil are other chemicals that have the potential to impact peregrines. In addition, it has long been recognized that combinations of various compounds may have far more deleterious effects on wildlife than the individual chemicals themselves. The significance of these synergistic effects is impossible to quantify at present because they are species-specific and also vary as a function of the types and amounts of chemicals present in animal tissues. Needless to say, widespread presence of harmful chemicals or an oil spill off the Washington coast that decimates prey populations could have significant local or regional impacts on the peregrine population, but current regulatory mechanisms are in place to limit environmental exposure to chemical pollutants. Broad scale use of neonicotinoid insecticides in agricultural landscapes could affect local peregrine populations by reducing their local prey base through direct toxic effects by consumption of treated seeds or depletion of insect food resources (Goulson 2013, Mineau and Palmer 2013, Hallmann et al. 2014).

Climate change. Models of climate change indicate changes in precipitation levels and temperature throughout the Pacific Northwest. Although the models vary in their specific predictions, all of them indicate that substantial changes will occur. As a consequence, it appears likely that such changes will alter conditions in the marine and other aquatic environments important to peregrine falcons. In the marine environment, future climate projections for sea surface temperature and upwelling intensity, based on a regional climate model for the California Current Ecosystem, have

forecast accelerated declines of some Cassin's auklet populations (Wolf et al. 2010). Declines in seabird productivity or abundance may impact coastal nesting peregrines, but to what degree is difficult to predict. Inland, late season storms and increased drought and fire could contribute to habitat loss of prey and could negatively affect reproductive success of peregrines.

Other factors. A highly pathogenic avian influenza (HPAI) outbreak in the winter of 2014-2015 was responsible for the deaths of three captive gyrfalcons (*Falco rusticolus*) (Ip et al. 2015) and a wild peregrine falcon (https://www.aphis.usda.gov/aphis/ourfocus/animalhealth/animal-disease-information/avian-influenza-disease/ct_avian_influenza_disease) in Washington and three captive peregrine falcons used for falconry and two privately owned gyrfalcons in Idaho (IDHW 2015). It is believed these birds became infected after feeding on infected wild-caught waterfowl. Captive falcons are highly susceptible to the virus (Lierz et al. 2007), however, large-scale die-offs of wild raptors testing positive for the virus have not been detected, either due to low densities, difficulty in finding carcasses, or some degree of immunity in wild populations. At this time, it does not appear that HPAI is having a population-level effect on peregrines or other raptors.

Avian trichomoniasis (*Trichomonas gallinae*) is an emerging issue with golden eagles in the Snake River Birds of Prey Conservation Area (J. Watson pers. comm.) and is known to have killed several wild peregrines in Washington, particularly nestlings (C. M. Anderson, pers. comm.). However, the northern goshawk (*Accipiter gentilis*), a cosmopolitan species similar in distribution to the peregrine, was shown to have a high incidence of exposure but a low rate of pathological affects, perhaps due to evolutionary adaptations to the parasite (Krone et al. 2005), and the same may apply for the peregrine falcon. Other diseases, human disturbance through recreational (rock climbing, hiking, beach walking, etc.) or industrial (blasting, logging, etc.) activities, illegal shooting, habitat loss, and inbreeding depression are some of the other factors with the potential to impact peregrine falcons, although currently none of these issues are known to be limiting North American peregrine populations.

MANAGEMENT ACTIVITIES

WDFW has developed site specific management recommendations that mainly involve variable buffers to activities around peregrine nest sites, but also include wetland protection and pesticide application limitations around nest sites and wintering areas. In addition, WDFW is consulted on site-specific plans to avoid or reduce disturbance of nesting peregrines, primarily related to recreational activities such as rock climbing and hiking cliffs above eyries. WDFW permits a small number of peregrine falcons (nestlings or fledglings) to be taken each year for falconry purposes. The level of allowed take is currently at 12 individuals per year and is based on federal regulations for the take of this species.

CONCLUSIONS AND RECOMMENDATION

When the peregrine falcon was federally listed in 1970, the primary factor contributing to its status under the Endangered Species Act was dramatic population declines due to low productivity caused by the accumulation of PBT compounds, specifically DDT and its metabolites. DDT use was restricted in the U.S. in 1972 (37 FR 13369), with a single exception made in 1974 of use for Douglas-fir tussock moth (*Orgyia pseudotsugata*) control in the Blue Mountains of Washington, Oregon, and Idaho (Henny 1977). Following the banning of DDT, peregrine populations slowly recovered in response to 1) regulatory actions on DDT and other PBT compounds, 2) natural productivity of known and unknown nest sites, and 3) protection of some nest sites from disturbance. PBT compounds probably remain the greatest potential threat to peregrine populations worldwide. Climate change could adversely affect peregrine populations by affecting their prey base. HPAI is another emerging issue that has the potential to impact peregrine populations. Falconry birds have been especially sensitive to infection, which indicates the potential for infection in the wild, but so far it does not appear to have had a detrimental effect on wild populations of peregrines. Although a number of threats remain, peregrine falcon numbers in Washington State have been increasing in a linear fashion for over two decades with no indications of leveling off. Peregrine falcons breeding in Washington have likely recovered well beyond pre-DDT levels, and the population continues to increase.

The species no longer meets the definition of a state sensitive species under Washington law, which is described as "*..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"* (WAC 232-12-297). WDFW therefore recommends that the peregrine falcon be delisted at the state level in Washington. The species will remain classified as "protected wildlife" under state law (WAC 232-12-011) and will continue to be protected under the federal Migratory Bird Treaty Act.

References Reviewed for the *Periodic Status Review for the Peregrine Falcon in Washington*

Table B presents the 74 references cited in the *Periodic Status Review for the Peregrine Falcon in Washington*. Each reference is categorized for its level of peer review pursuant to section 34.05.271 RCW, which is the codification of Substitute House Bill 2661 that passed the Washington Legislature in 2014. A key to the review categories under section 34.05.271 RCW is provided in Table A.

Individual papers cited in the *Periodic Status Review for the Peregrine Falcon in Washington* cover a number of topics discussed in the report, including information on: 1) the species' taxonomy, distribution, and biology; 2) habitat requirements; 3) population status and trends; 4) conservation status and protections; 5) management activities; and 6) factors affecting the continued existence of the species.

Table A. Key to 34.05.271 RCW Categories:

Category Code	34.05.271(1)(c) RCW
i	(i) Independent peer review: review is overseen by an independent third party.
ii	(ii) Internal peer review: review by staff internal to the department of fish and wildlife.
iii	(iii) External peer review: review by persons that are external to and selected by the department of fish and wildlife.
iv	(iv) Open review: documented open public review process that is not limited to invited organizations or individuals.
v	(v) Legal and policy document: documents related to the legal framework for the significant agency action including but not limited to: (A) federal and state statutes; (B) court and hearings board decisions; (C) federal and state administrative rules and regulations; and (D) policy and regulatory documents adopted by local governments.
vi	(vi) Data from primary research, monitoring activities, or other sources, but that has not been incorporated as part of documents reviewed under the processes described in (c)(i), (ii), (iii), and (iv) of this subsection.
vii	(vii) Records of the best professional judgment of department of fish and wildlife employees or other individuals.
viii	(viii) Other: Sources of information that do not fit into one of the categories identified in this subsection (1)(c).

Table B **Reference**	**34.05.271 RCW Review Category**
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Appendix A. Occupancy and reproductive success at American peregrine falcon nesting territories included in the federal post-delisting monitoring, Washington, 2003-2012.

	Nesting Sites							Number of Young		
	Sites Checked	Occupied		Occupied With Known Outcome		Successful		Observed	/Occupied Known	/Successful Nesting Attempt
Year	(n)	(n)	%	(n)	%	(n)	%	(n)	Outcome	(brood size)
2003	24	22	92	22	100	11	50	23	1.04	2.09
2006	24	18	75	18	100	11	61	29	1.61	2.64
2009	25	22	88	22	100	12	54	32	1.45	2.67
2012	25	21	84	21	100	16	76	38	1.81	2.38

Appendix B. WDFW responses to public comments received during the 90-day public review period for the draft *Periodic Status Review for the Peregrine Falcon in Washington* conducted from July 12, 2016 to October 10, 2016. The comments presented here are summaries of the remarks provided by one or more people.

Report Section	Comment and Response
General comments	1. I agree with state delisting of peregrine falcons.
	WDFW is recommending that peregrine falcons be removed from the Washington sensitive species list because the species no longer meets the definition of sensitive under state law (WAC 232-12-292, Section 2.6), thus delisting is the most appropriate action to take regarding the species' legal status. Organochlorine pesticides, mainly DDT, caused the decline in Arctic and American peregrine falcon populations in North America, adversely affecting peregrine falcons by causing direct mortality by poisoning or by adversely affecting reproduction by causing egg breakage and hatching failure. The most significant factor in the recovery of peregrine falcons was the restrictions placed on organochlorine pesticide use in the U.S and Canada in the early 1970's. Aided in some regions by the release of captive bred falcons, peregrine populations have increased and expanded their range. Population indices historically affected by organochlorine contamination, namely territory occupancy rates, nest success, and productivity, have improved over the years and continue to be consistent with values observed in stable or increasing populations.
	2. I agree with state delisting of peregrine falcons. This should be accomplished with continued monitoring to assure that future stressors such as climate change or new pesticides do not negatively impact the bird.
	WDFW agrees with the first remark. See the response to Comment 1. If the Fish and Wildlife Commission agrees with the Departments recommendation to delist the peregrine falcon state law requires a review of the status of the species at least once, five years following the date of delisting (WAC 232-12-292, Section 10.2).
	3. I support maintaining endangered status for the peregrine falcon primarily because of habitat loss.
	See the response to Comment 1. Contamination by organochlorine pesticides, not habitat loss, was the cause of population declines in peregrine falcon populations in North America.
	4. I support the strongest possible protections for the listed species...peregrine falcon...and all other species considered by the WDFW.
	See the response to Comment 1.
	5. I am not in favor of moving species from endangered to threatened. Habitat loss continues for …peregrines. It is known that humans continually demand more areas that these species frequent, causing habitat loss.
	See the response to Comment 1. Contamination by organochlorine pesticides, not habitat loss, was the cause of population declines in peregrine falcon populations in North America.

Report Section	Comment and Response
	6. WDFW has not conducted a population survey of this bird since the Washington Forest Practices Board approved removal of Peregrine Falcon critical habitat from forest practice rules. This bird should continue to be listed as endangered until a new survey can demonstrate if there have been any negative effects to this bird's population. No survey has been done since 2009, so consideration to remove this bird is very premature.
	Washington State Forest Practices Rules identify critical habitat for endangered and threatened species, but not sensitive species (WAC 222-16-080). The peregrine falcon was reclassified to state sensitive status in 2002. Since then, peregrine populations have continued to increase. In 2012, WDFW surveyed a random sample of 25 nesting territories for the American peregrine falcon subspecies and found continued high occupancy rates (84%), high nest success (76%) and high productivity rates (1.81 young per occupied nesting territory) consistent with stable and increasing peregrine populations.

Washington State Status Reports, Periodic Status Reviews, Recovery Plans, and Conservation Plans

Status Reports

2015	Tufted Puffin
2007	Bald Eagle
2005	Mazama Pocket Gopher, Streaked Horned Lark, and Taylor's Checkerspot
2005	Aleutian Canada Goose
2004	Killer Whale
2002	Peregrine Falcon
2000	Common Loon
1999	Northern Leopard Frog
1999	Olympic Mudminnow
1999	Mardon Skipper
1999	Lynx Update
1998	Fisher
1998	Margined Sculpin
1998	Pygmy Whitefish
1998	Sharp-tailed Grouse
1998	Sage-grouse
1997	Aleutian Canada Goose
1997	Gray Whale
1997	Olive Ridley Sea Turtle
1997	Oregon Spotted Frog
1993	Larch Mountain Salamander
1993	Lynx
1993	Marbled Murrelet
1993	Oregon Silverspot Butterfly
1993	Pygmy Rabbit
1993	Steller Sea Lion
1993	Western Gray Squirrel
1993	Western Pond Turtle

Periodic Status Reviews

2016	Taylor's Checkerspot
2016	Columbian White-tailed Deer
2016	Streaked Horned lark
2016	Killer Whale
2016	Greater Sage-grouse
2016	Northern Spotted Owl
2016	Snowy Plover
2016	Western Gray Squirrel
2015	Brown Pelican
2015	Steller Sea Lion

Recovery Plans

2012	Columbian Sharp-tailed Grouse
2011	Gray Wolf
2011	Pygmy Rabbit: Addendum
2007	Western Gray Squirrel
2006	Fisher
2004	Sea Otter
2004	Greater Sage-Grouse
2003	Pygmy Rabbit: Addendum
2002	Sandhill Crane
2001	Pygmy Rabbit: Addendum
2001	Lynx
1999	Western Pond Turtle
1996	Ferruginous Hawk
1995	Pygmy Rabbit
1995	Upland Sandpiper

Conservation Plans

2013	Bats

Status reports and plans are available on the WDFW website at:
http://wdfw.wa.gov/publications/search.php