

**Columbia River Distinct Population Segment
of the Columbian White-tailed Deer (*Odocoileus virginianus leucurus*)**

**5-Year Review:
Summary and Evaluation**



**U.S. Fish and Wildlife Service
Washington Fish and Wildlife Office
Lacey, Washington**

November, 2013

5-YEAR REVIEW

Species reviewed: Columbia River Distinct Population Segment of the Columbian White-tailed Deer (*Odocoileus virginianus leucurus*)

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5-YEAR REVIEW

Columbia River Distinct Population Segment of the Columbian white-tailed Deer (*Odocoileus virginianus leucurus*)

1.0 GENERAL INFORMATION

1.1 METHODOLOGY USED TO COMPLETE THE REVIEW

A 5-year review is a periodic analysis of a species' status conducted to ensure that the listing classification of a species as threatened or endangered on the Federal List of Endangered and Threatened Wildlife and Plants (50 CFR §§ 17.11-17.12) is accurate. On November 24, 2010, the U.S. Fish and Wildlife Service (USFWS or Service) published a Notice of Review in the Federal Register (75 FR 71726) soliciting any new information on the Columbia River distinct population segment of the Columbian white-tailed deer (CWTD) that may have a bearing on its classification as endangered or threatened. The Service did not receive any comments in response to the Federal Register notice. This 5-year review was primarily written by the Service's Washington Fish and Wildlife Office (WFWO) and Oregon Fish and Wildlife Office (OFWO) with contributions by the Washington Department of Fish and Wildlife (WDFW) Region 5 Office. Review was provided by the Service's Julia Butler Hansen (JBH) National Wildlife Refuge (NWR) for the Columbian White-tailed Deer, Ridgefield NWR, and the Pacific Regional Office (RO). To begin this review, the WFWO contracted with the WDFW to evaluate all current and available scientific information on CWTD. The 5-year review summarizes and evaluates information provided in the Revised CWTD Recovery Plan (USFWS 1983), current scientific research, and surveys related to the species. All pertinent literature and documents related to this review are on file at the WFWO (see References section).

1.2 REVIEWERS

Lead Regional or Headquarters Office:

Pacific Regional Office, Portland, OR, Sarah Hall, (503) 231-6868

Lead Field Office:

Washington Fish and Wildlife Office, Lacey, WA, Brad Thompson, (360) 753-9440

Cooperating Field Office(s):

Oregon Fish and Wildlife Office, Portland, OR, Jody Caicco, (503) 231-6179

Willapa National Wildlife Refuge Complex, Ilwaco, WA, Jackie Ferrier, (360) 484-3482

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Other Cooperating Office(s):

Washington Department of Fish and Wildlife, Olympia, WA

Oregon Department of Fish and Wildlife, Clackamas, OR

Cowlitz Indian Tribe, Longview, WA

1.3 BACKGROUND

1.3.1 Federal Register Notice citation announcing initiation of this review:

On November 24, 2010, the Service published a Notice of Review in the Federal Register (75 FR 71726) soliciting any new information on the Columbia River distinct population segment of the Columbian white-tailed deer, along with 58 species in Washington, Oregon, California, and Hawaii.

1.3.2 Federal Listing history:

First Notification in the Federal Register of Endangered Status

FR notice: 32 FR 4001

Date listed: March 11, 1967

Entity listed: Columbian white-tailed deer, *Odocoileus virginianus leucurus*

Classification: Endangered, under the authority of the Endangered Species Preservation Act of 1966.

Original Listing

FR notice: 35 FR 16047

Date listed: October 13, 1970

Entity listed: Columbian white-tailed deer, *Odocoileus virginianus leucurus*

Classification: Endangered, under the authority of the new regulations implementing the Endangered Species Conservation Act (ESCA) of 1969. Species listed as endangered under the ESCA of 1969 were automatically included in the List of Endangered and Threatened Wildlife when the Endangered Species Act was enacted in 1973 (Act).

Revised Listing

FR notice: 68 FR 43647

Date listed: July 24, 2003

Entity listed: Columbia River Distinct Population Segment of the Columbian white-tailed deer, *Odocoileus virginianus leucurus*

Classification: Endangered

1.3.3 Review history

This is the first 5-year status review for Columbia River DPS of CWTD. Information that has become available since it was listed in 1967 has been used to determine the current status of the species. Below is a chronological list of the Service's actions related to this species:

March 11, 1967	The Secretary of the Interior identified the CWTD as an endangered species (32 FR 4001), under the authority of the Endangered Species Preservation Act of October 15, 1966 (80 Stat. 926: 16 U.S.C. 668aa(c)).
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March 8, 1969 The Secretary of the Interior again identified the CWTD as an endangered species (34 FR 5034) under section 1(c) of the Endangered Species Preservation Act of 1966.

August 25, 1970 The Director of the Bureau of Sport Fisheries and Wildlife proposed to list the CWTD as an endangered subspecies (35 FR 13519) under the authority of the new regulations implementing the Endangered Species Conservation Act (ESCA) of 1969.

October 13, 1970 The Director of the Bureau of Sport Fisheries and Wildlife listed CWTD as an endangered subspecies (35 FR 16047) under the authority of the new regulations implementing the ESCA of 1969. Species listed as endangered under the ESCA of 1969 were automatically included in the List of Endangered and Threatened Wildlife when the Endangered Species Act was enacted in 1973 (Act).

December, 1971 The Service established the Julia Butler Hansen National Wildlife Refuge for the Columbian White-tailed Deer, in Cathlamet, Washington.

October 21, 1976 The Service released the Columbian White-tailed Deer Recovery Plan.

June 14, 1983 The Service released the Revised Columbian White-tailed Deer Recovery Plan. The plan addressed each main population of CWTD, Columbia River and Douglas County, separately.

May 11, 1999 The Service published a proposed rule to delist (64 FR 25263) the Douglas County Population of CWTD and indicated both the Douglas County and Columbia River populations qualified as distinct population segments (DPS) under the Service's 1996 Policy Regarding the Recognition of Distinct Vertebrate Population Segments under the Act.

June 21, 2002 The Service published a supplemental proposal to delist (67 FR 42217) the Douglas County population of CWTD. It was determined that recovery criteria for the Douglas County population had been met, as it achieved benchmarks in both population size and amount of secure habitat.

July 24, 2003 The Service published a final rule to delist (68 FR 43647) the Douglas County DPS of CWTD. At the time of this 2003 publication, two DPSs were established for the deer (Douglas County DPS and Columbia River DPS), and the DPS found in Douglas County, Oregon was removed from the Federal List of Endangered and Threatened Wildlife under the Act.

November 24, 2010 The Service announced the initiation of a 5-year review (75 FR 71726) for the Columbia River DPS of CWTD along with 58 species in Washington, Oregon, California, and Hawaii.

1.3.4 Species' Recovery Priority Number at the start of this 5-year review:

The CWTD was assigned a recovery priority number of 9. A priority number 9 means the DPS has a moderate degree of threat and a high potential for recovery (Table 1).

Table 1. Ranking system for determining Recovery Priority Numbers (48 FR 43098).

Degree of Threat	Recovery Potential	Taxonomy	Priority	Conflict
High	High	Monotypic Genus	1	1C
		Species	2	2C
		Subspecies/DPS	3	3C
	Low	Monotypic Genus	4	4C
		Species	5	5C
		Subspecies/DPS	6	6C
Moderate*	High*	Monotypic Genus	7	7C
		Species	8	8C
		Subspecies/DPS*	9*	9C
	Low	Monotypic Genus	10	10C
		Species	11	11C
		Subspecies/DPS	12	12C
Low	High	Monotypic Genus	13	13C
		Species	14	14C
		Subspecies/DPS	15	15C
	Low	Monotypic Genus	16	16C
		Species	17	17C
		Subspecies/DPS	18	18C

1.3.5 Current Recovery Plan

Name of Plan: Revised Columbian White-tailed Deer Recovery Plan

Date Issued: June 14, 1983

Previous Revisions: Columbian White-tailed Deer Recovery Plan

Date Issued: October 21, 1976

2.0 REVIEW ANALYSIS

2.1 APPLICATION OF THE 1996 DISTINCT POPULATION SEGMENT (DPS) POLICY

2.1.1 Is the species under review a vertebrate?

 X Yes

2.1.2 Is the species under review listed as a DPS?

 X Yes

2.1.3 Was the DPS listed prior to 1996?

 X No

2.1.3.1 Prior to this 5-year review, was the DPS classification reviewed to ensure it meets the 1996 policy standards?

 X Yes

A complete review of the DPS classification was published in the final rule to delist the Douglas County DPS of CWTD (68 FR 43647) on July 24, 2003.

2.1.3.2 Does the DPS listing meet the discreteness and significance elements of the 1996 DPS policy?

 X Yes

2.1.4 Is there relevant new information for this species regarding the application of the DPS Policy?

 X No

2.2 RECOVERY CRITERIA

2.2.1 Does the species have a final, approved recovery plan containing objective, measurable criteria?

 X Yes

2.2.2 Adequacy of recovery criteria.

2.2.2.1 Do the recovery criteria reflect the best available and most up-to-date information on the biology of the species and its habitat?

 X Yes

2.2.2.2 Are all of the 5 listing factors that are relevant to the species addressed in the recovery criteria (and is there no new information to consider regarding existing or new threats)?

 X Yes

2.2.3 List the recovery criteria as they appear in the recovery plan, and discuss how each criterion has or has not been met, citing information:

The following information pertains solely to the Columbia River DPS of CWTD; the Douglas County DPS was delisted in 2003 (68 FR 43647). Reclassification of the Columbia River DPS of CWTD will be considered when the following conditions have been met (as listed in the Revised Columbian White-tailed Deer Recovery Plan (USFWS 1983)):

2.2.3.1 Downlisting criteria (from Endangered to Threatened)

Criterion 1: **Abundance**

Maintain a minimum of at least 400 CWTD across the Columbia River DPS.

Accomplished

The total population of the Columbia River DPS has been maintained at over 400 deer every year since 1984 (Table 2).

Criterion 2: **Distribution**

Maintain three viable subpopulations, two of which are located on secure habitat.

- Definition of Viable: A minimum November population of 50 individuals or more.
- Definition of Secure Habitat: Free from adverse human activities in the foreseeable future and relatively safe from natural phenomena that would destroy its value to the CWTD. Habitat may be secured through means such as purchase, easements, leases, conservation agreements, landowner incentives, memorandums of understanding, and local land use planning or zoning ordinances.

Accomplished

There are currently 3 viable subpopulations of CWTD: Tenasillahe Island at 90 deer, Puget Island at 159 deer (171 minus 12 translocated in 2013), Westport/Wallace Island at 163 deer (Table 2). The Tenasillahe Island and Puget Island subpopulations are now considered to be located on secure habitat, as explained in the following discussion.

Table 2. Estimated population size of the Columbia River DPS of CWTD by subpopulation.

Year	Puget Island	Tenasillahe Island	Westport/Wallace Island	JBH Mainland Unit	Upper Estuary Islands ^c	Ridgefield NWR	Total
1984	170	40	150	360	0		720
1985	215	40	125	480	0		860
1986	195	55	125	500	0		875
1987	185	70	150	500	0		905
1988	205	80	150	410	0		845
1989	205	90	150	375	0		820
1990	200	105	150	345	0		800
1991	200	130	150	280	0		760
1992	200	165	175	280	0		820
1993	200	195	200	175	0		770
1994	200	205	225	140	0		770
1995	200	205	225	120	0		750
1996	200	125	225	60	0		610
1997	200	150	200	100	0		650
1998	200	200	200	110	0		710
1999	150	160	140	110	25		585
2000	150	135	150	120	55		610
2001	125	135	150	120	55		585
2002	125	100	140	125	55		545
2003	125	100	140	115	80		560
2004	110	100	140	110	95		555
2005	125	100	140	100	100		565
2006 ^a	n/a	86	104	81	67		
2007 ^a	n/a	82		59	41 ^e		
2009 ^a	138	97 ^b	146	74 ^b	28		593 ^d
2010 ^a	n/a	143	163	68	39		630 ^d
2011	171	90	n/a	83	18 ^f		603 ^d
2012	no FLIR surveys this year						
2013 ^g	159			46		25	

^aEstimates from 2006- 2010 are derived from FLIR survey results but survey results from 2008 produced anomalous data because an alternative technique was used. These data are not considered representative of actual numbers, and are thus not included in this table (USFWS 2012a); ^bNumbers reflect a post-survey translocation of 16 deer from Tenasillahe Island to the Refuge mainland; ^cIncludes Lord, Walker, Fisher, Hump, and Crims Islands; ^dIncludes estimates from residual populations in Clatskanie Flats, Brownsmead, Willow Grove, and Barlow Point; ^eDoes not include Fisher and Hump Islands; ^fAssuming a white-tailed:black-tailed deer ratio of 20:1; this includes only Crims Island; ^gApproximate population as of August 21, 2013. Note: Totals are not given in 2006, 2007, 2012, and 2013 due to incomplete data.

At the time of the Revised Recovery Plan's publication in 1983, the JBH Mainland Unit subpopulation was the only subpopulation considered viable and secure. The Revised Recovery Plan recommended increasing the Tenasillahe Island subpopulation to a minimum viable herd of 50 deer, maintaining a total population minimum of 400 deer, and securing habitat for one additional subpopulation (USFWS 1983). In the 30 years since the Revised Recovery Plan was developed, the Service based recovery decisions on a narrow interpretation of "secure" habitat; to meet these recovery criteria, habitat would have to be protected by some type of conservation easement or land title that sets it aside for the benefit of CWTD. This interpretation led the Service to focus most CWTD recovery efforts towards increasing and maintaining the subpopulations within the boundaries of the JBH NWR. These efforts resulted in some successful recovery projects such as growing and stabilizing the subpopulation on Tenasillahe Island, currently one of the largest subpopulations in the DPS. However, it also led the Service to put significant resources and time toward efforts that have shown less consistent success, such as establishing viable and stable herds on smaller protected islands called the Upper Estuary Islands. As of April 24, 2013, a total of 292 deer have been translocated in an effort to move CWTD to "secure" habitats (Table 5).

While the JBH Mainland Unit subpopulation has shown the ability to increase beyond the assessed carrying capacity of approximately 125 individuals, the Unit has been hit with catastrophic flooding events that have led to the loss of up to 50 percent of the subpopulation. More recently, in March of 2011, JBH NWR personnel discovered erosion of the dike that protects the JBH Mainland Unit from flooding by the Columbia River. The erosion has progressively worsened, leading to the closure of Steamboat Slough Road, which runs on top of the dike. A geotechnical assessment determined that the dike was in "imminent risk" of failure (USFWS 2013a). A dike breach at that location would result in the flooding of the JBH Mainland Unit at high tides. It is expected that daily flooding from a breach at this location could substantially reduce or eliminate this subpopulation to where it could not recover. The imminent threat of dike failure led the Service, in early 2013, to implement an emergency translocation of 37 CWTD from the JBH Mainland Unit to Ridgefield NWR in an effort to limit the potential adverse effects that a dike failure would have on the subpopulation (USFWS 2013a).

The declining population trend seen in the JBH Mainland Unit subpopulation over the last 30 years (Figure 1A) was largely the result of overpopulation that occurred in the years after the area became a refuge. During 1985 to 1988, the JBH Mainland subpopulation ranged from 410 to 500 animals, which represented a density of about 117 to 143 deer per square mile (m^2). Densities in populations outside the State of Washington have approached this figure and then declined. The George Reserve in Michigan reached 123 deer/ m^2 in 1933, but caused severe vegetation damage (McCullough 1984). Hansen and Beringer (1997) recommended that deer density be around 39 deer/ m^2 , and Tymkiw (2010) recommended a density less than 52 deer/ m^2 . Decalesta (1994) documented negative effects on avian species when deer densities rose to 39 to 65 deer/ m^2 , and Augustine and Frelich (1998) found negative effects on the forb understory in Minnesota at deer densities of 65 to 90 deer/ m^2 . White-tailed deer densities in an un hunted population on the Huntington Wildlife Forest in upstate New York ranged from about 16 to 31 deer/ m^2 during a 30-year period (McNulty et al. 1997). The population goal for the JBH Mainland Unit is 35 deer per square mile. The high densities seen in the late 1980s represented

an overpopulation of the area and were unsustainable. Subsequently, the population rapidly dropped to a more normal level over the next 5 years.

While flooding has caused short-term population declines, the population tends to return to prior levels within a few years. From 1997 until the 2013 translocation, the JBH Mainland Unit subpopulation had stabilized above the minimum 50-deer threshold in the recovery plan criteria; the current population is estimated at 46 CWTD. The major threat to this subpopulation would be several floods in consecutive years. The Upper Estuary Islands have yet to maintain the target population of 50 deer despite numerous CWTD translocation efforts to populate the islands. While the overall DPS population trend appears to decline along a similar trajectory as the JBH Mainland Unit subpopulation, in actuality, the overall trend is disproportionately influenced by the decline of the unsustainable highs that the JBH Mainland Unit experienced in the late 1980s (Figure 1A). The other subpopulations did not undergo this decline, and when the JBH Mainland Unit is taken out of the picture, the overall population shows a more stable trend (Figure 1B).

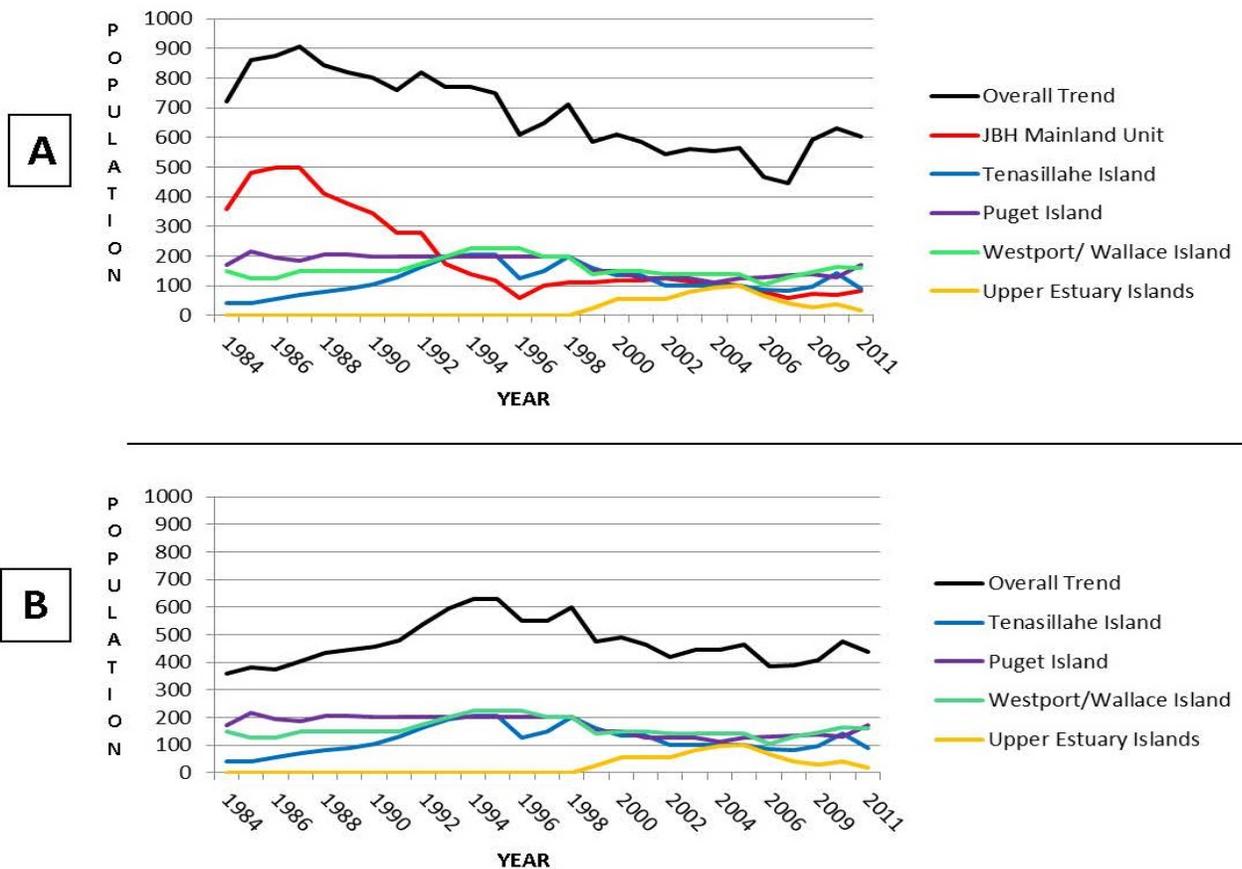


Figure 1A. CWTD subpopulation estimates and overall Columbia River DPS population trend.

Figure 1B. CWTD subpopulation estimates and overall Columbia River DPS population trend excluding JBH Mainland Unit estimates.

Two subpopulations, Puget Island and Westport/Wallace Island, have maintained relatively large and stable numbers over the last three decades in spite of the fact that these areas have never been “secured” according to our past interpretation of the Revised Recovery Plan criteria (Figure 1B). The CWTD in these two areas demonstrate a measure of security in the habitat regardless of the title/ownership of the land. If we look only at population trends and stability, these two locations have provided more biological security to CWTD than the flood prone JBH Mainland Unit, which is protected for the conservation of CWTD.

While Puget Island and Westport/Wallace Island are not fully protected for the recovery of CWTD and therefore had previously not been considered “secure” habitat, they have been supporting two of the largest and most stable subpopulations in this DPS since listing. While CWTD numbers at these 2 locations have fluctuated, the Westport/Wallace Island subpopulation was at 150 deer in 1984 and at 163 deer in 2010, and the Puget Island population was at 170 deer in 1984 and at 171 deer in 2011 (Table 2). The Revised Recovery Plan identified Puget Island and the Westport area as suitable sources for CWTD translocations and over the last 30 years they have been the donor source for numerous translocations (see section 2.3.1.5 below for a summary of all translocations), including the removal of 12 CWTD from Puget Island as part of the 2013 translocation effort. Removal of CWTD from these two locations for the purpose of translocation over the years has not resulted in any sustained decrease in population numbers (Figure 2).

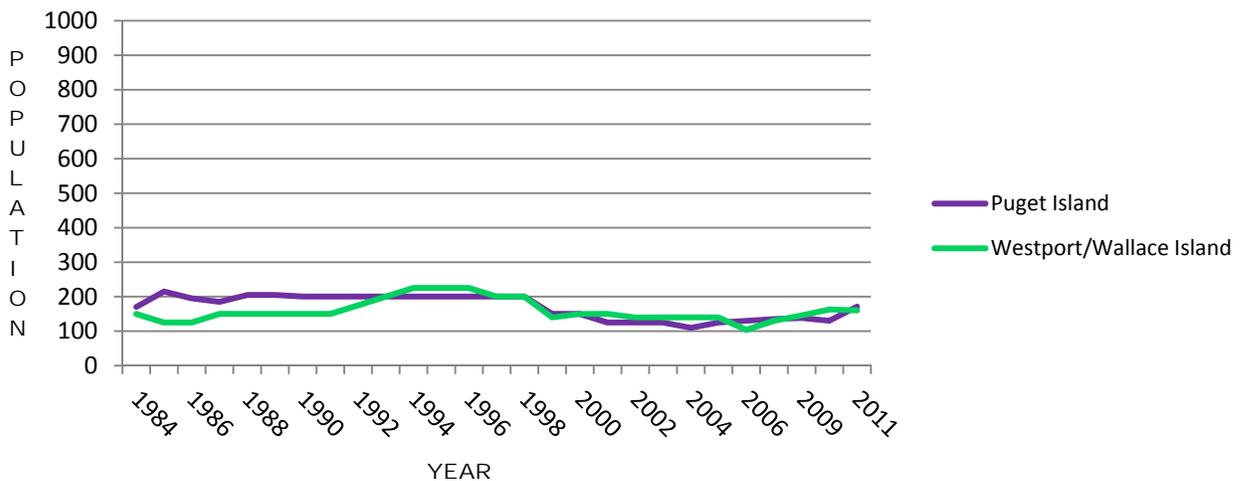


Figure 2. CWTD Population trends for Puget Island and Westport/Wallace Island subpopulations.

Puget Island is a mix of private and public land. The private land consists mainly of pasture land for cattle and goats, residential lots, and hybrid cottonwood plantations that provide food and shelter for the deer. Farmers and ranchers on the island often implement predator control on their lands. Since the late 1980s, though, the total acreage of tree plantations on Puget Island decreased by roughly half (Rick Stonex, Greenwood Resources, Portland, Oregon, pers. comm., 2012). However, a proportional decrease in the numbers of CWTD has not occurred. Though CWTD did reach a peak count of 205 in the late 1980s, the last survey estimated the population at 171. The 2013 translocation removed 12 CWTD so the current estimate is likely

approximately 159 deer (USFWS unpublished data). Furthermore, though Puget Island is experiencing changes in land use and increases in development over time, such as the break-up of large agricultural farms into smaller hobby farms, the changes have not inhibited the ability of CWTD to maintain a stable population on the island and are not expected to impact CWTD for the foreseeable future (Paul Meyers, Biologist, JBH NWR, Cathlamet, Washington, pers. comm., 2013a).

Habitat in the Westport area consists mainly of cottonwood/willow swamp and scrub-shrub tidal wetlands. Although a small portion of this area including Wallace Island was acquired by the Service and set aside for the protection of CWTD, most of the area where the CWTD are found in the Westport/Wallace Island subpopulation is under private ownership and a large portion of that land is owned and managed by one individual family. The family has managed the land for duck hunting for many years, and implemented intensive predator control as part of their land management activities. The Service suspects that CWTD reproduction in the Westport/Wallace Island subpopulation has significantly benefited from this intensive predator control (P. Meyers, pers. comm., 2013a). If the property owners change management schemes or the property should change hands, the Westport/Wallace Island subpopulation could be negatively affected (P. Meyers, pers. comm., 2013a). Because the stability of CWTD in this area appears to be so closely tied to one private landowner and their land management choices, there is less certainty as to the long-term security of this subpopulation and its associated habitat. As a result, although a small portion of the habitat for this subpopulation is protected for CWTD, the Service does not currently consider Westport/Wallace Island secure habitat.

The 30-year population trends from Puget Island and Westport/Wallace Island make it clear that CWTD can maintain stable populations on suitable habitat that is not formally set aside by acquisition or agreement for the protection of the species. Within this context, we have re-evaluated the current status of CWTD under a broadened framework of what constitutes “secure” habitat to include locations that, regardless of ownership status, have supported viable subpopulations of CWTD for 20 or more years and have no anticipated change to land management in the near future that would make the habitat less suitable to CWTD. Therefore, with respect to the recovery criteria (USFWS 1983), and in the context of our broadened definition of secure habitat, we currently have 3 viable subpopulations of CWTD: Tenasillahe Island at 90 deer, Puget Island at approximately 159 deer, and Westport/ Wallace Island at 163 deer (Table 2). Furthermore, two of these viable populations are now considered secure, Tenasillahe Island and Puget Island. The Westport/Wallace Island subpopulation has shown consistent stability over the last 30 years on par with Puget Island and Tenasillahe Island but its long-term security is less certain. Though the JBH Mainland Unit was previously considered secure, the current environmental threat of dike failure at this location negates the security provided by the Refuge landholding. The construction of a setback dike, which is scheduled for the fall of 2013, will restore the secure status of this subpopulation and it is expected that the subpopulation will quickly return to over 50 animals.

2.2.3.2 Delisting Criteria

Criterion 1: **Abundance**

Maintain a minimum of at least 400 CWTD across the Columbia River DPS.

Accomplished

See section 2.2.3.1

Criterion 2: **Distribution**

Maintain three viable subpopulations, all located on secure habitat.

Partially accomplished

As noted above in Section 2.2.3.1, there are currently three viable subpopulations of CWTD in the Columbia River DPS. However, only two of these subpopulations are considered secure, Tenasillahe Island and Puget Island. One additional subpopulation must be considered secure in order to fully meet delisting criteria.

2.3 UPDATED INFORMATION AND CURRENT SPECIES STATUS

2.3.1 Biology and Habitat

2.3.1.1 New information on the species' biology and life history:

Habitat selection by fawns in the Columbia River DPS remains largely undocumented, although observations by Refuge biologists suggest that fawns on the JBH Mainland Unit are most often associated with pastures of tall, dense reed canary grass (*Phalaris arundinacea* L.) and tall fescue (*Festuca arundinaceae*), as well as mixed deciduous and Sitka spruce (*Picea sitchensis*) forest (USFWS 1983, Brookshier 2004). In the Douglas County DPS, Smith (1982) summarized habitat selection based on 45 marked fawns and associated thermoregulation and escape/hiding cover with habitat choice. Ricca *et al.* (2003) further studied habitat selection and spatial use by CWTD fawns in the Douglas County DPS using radiotelemetry. Average fawn home range was 45 acres (ac) (18 hectares (ha)), 13 percent of which (6 ac (2.4 ha)) was considered a concentrated use area. Nearly 75 percent of concentrated use areas fell within 656 feet (ft) (200 meters (m)) of a stream. Fawns used predominantly oak-madrone (*Quercus garryana*-*Arbutus menziesii*) woodland and riparian cover types.

White-tailed deer are considered generalist browsers that also graze on grasses and forbs. However, Suring and Vohs (1979) and Gavin *et al.* (1984) reported that CWTD on the JBH Mainland Unit were primarily grazers. A diet and nutrition study was conducted by Refuge staff from 1996 to 1998 (USFWS 2010c). The study area included the JBH Mainland Unit, Tenasillahe Island, and off-Refuge habitat near Westport, Oregon. Microhistological techniques were used to identify vegetative content in monthly fecal samples. In addition, samples were

analyzed for fecal nitrogen and fecal diaminopimelic acid (DAPA), which are indicators of protein and energy in the diet.

Data showed some differences among sites (Table 3), probably due to food availability. In addition, the data demonstrated the importance of both browse and forage, with a heavy reliance on forage during much of the year. This emphasis on grazing may be due to a combination of forage quality and availability.

Table 3. Percent of browse and forage (grass and forbs) in CWTD diets at three locations in southwestern Washington and northwestern Oregon, 1996 to 1998.

Season	FORAGE CLASS (percent*)								
	Browse			Forage					
				Grass			Forbs		
Fall	10.77	48.72	49.28	50.65	36.77	32.77	36.00	12.62	17.10
Winter	17.03	30.32	31.90	69.58	52.78	47.42	6.52	1.83	19.07
Spring	23.78	30.42	26.08	38.10	28.00	24.88	35.57	40.07	46.32
Summer	24.65	36.23	44.98	19.05	4.13	9.72	55.10	58.90	44.27
Annual	19.06	36.42	38.06	44.35	30.42	28.70	33.30	28.35	31.69

* Note- percentages do not add up to 100 because of the presence of other food items in small amounts.

Fecal nitrogen and DAPA values for CWTD showed seasonal variation but indicated adequate dietary protein and energy for growth and reproduction. Phosphorus and calcium availability also appeared sufficient. Selenium (Se) showed marginal deficiency during some months, but Se deficiencies can be counterbalanced with adequate vitamin E, which was abundant. “In summary, analyses of the deer’s diet and the nutritional content of the forages on Julia Butler Hansen Refuge over a two-year period, indicates deer are generally well nourished based upon macro nutrients, protein, energy, calcium, and phosphorus. The Se content of the Julia Butler Hansen Refuge diets also seems adequate although dietary levels of deer on private lands at Westport were lower. Deficiencies of other trace elements such as iodine, copper, zinc, and cobalt are possible, but would be difficult to assess because the requirements of deer for these elements are not known. The concentrations of trace elements in forage plants are usually related to concentrations in the soil, thus animals living on those soils for sustained periods are obviously able to cope with any shortages” (USFWS 2010c).

Other new information includes genetic comparisons of the Columbia River DPS and Douglas County DPS populations (described in section 2.3.1.3), and a genetic analysis of hybridization on Lord/Walker and Crims Islands (described in section 2.3.2.5).

2.3.1.2 Abundance, population trends (e.g., increasing, decreasing, stable), demographic features (e.g., age structure, sex ratio, family size, birth rate, age at mortality, mortality rate, etc.), or demographic trends:

The Columbia River DPS has experienced population fluctuations and its overall trend has been strongly influenced by large shifts in the abundance of the JBH Mainland Unit subpopulation (Clark *et al.* 2010; Figure 1A, Table 2). The peak of abundance occurred in 1987 when the DPS population reached 905; this peak coincided with the peak of abundance at the JBH Mainland Unit of 500 deer. However, a similar population trend is not evident when looking only at the other subpopulations in the DPS. During the same period in which a 76 percent decrease was observed in the JBH Mainland Unit subpopulation (1988 to 2005), the other three main subpopulations of CWTD, Tenasillahe, Puget Island, and Westport/Wallace Island, remained stable showing a slight increase from an estimated 435 deer in 1985 to 465 deer in 2005. Excluding the JBH Mainland Unit subpopulation, the number of CWTD in the Columbia River DPS has shown an increase over time, from an estimated 305 deer in 1984 to an estimated 451 deer counted in the latest surveys (2010 and 2011) (Figure 1B). Every year since 1986, Tenasillahe Island, Puget Island, and Westport/Wallace Island have maintained numbers above the Revised Recovery Plan's viable population minimum of 50 individuals. Furthermore, Puget Island and Westport/Wallace Island have maintained populations of three to four times the viable standard for most of the last 30 years (Table 2). Initial analysis from a minimum viable population model (Skalski 2012) suggests that the probability of extinction for the Columbia River DPS with 3 subpopulations of 50 CWTD each is less than 1 percent over the next 50 years. In addition, given the current population distribution, the model suggests a less than 1 percent likelihood of extinction for this DPS over the next 100 years.

At the time of the Revised CWTD Recovery Plan publication in 1983, the estimated number of deer in the Columbia River DPS was 300 to 400. The first comprehensive survey effort in 1984 resulted in an estimate of 720 deer. Beginning in 1996, the Service began using Forward-Looking Infrared (FLIR) thermography camera systems affixed to a helicopter (or, in 2008, a fixed-wing Cessna 206) to conduct aerial CWTD surveys in the Columbia River DPS region in addition to annual fall ground counts. Fall ground counts have been conducted since 1985 and have been used to provide more clarity in establishing long-term population trends by indicating gross population changes. In years when FLIR surveys are not completed, ground counts can be used to suggest whether there has been any unusual drop or increase in a subpopulation. The current (2011) Columbia River DPS population estimate is 603 deer (Table 2).

In 2010, the Service conducted a controlled trial for FLIR using humans on the ground in pre-arranged locations over the three habitat types normally found during surveys. The unpublished information suggests that the Service has been underestimating the deer population (Paul Meyers, Biologist, JBH NWR, Cathlamet, Washington, pers. comm., 2013b). When estimating the population, FLIR counts are typically increased by 10 percent to adjust for undetected deer. Data from the 2010 control test suggest that the adjustment should actually be 25 percent in forested and reed canary grass habitats (i.e., about 25 percent of the deer in those habitats go undetected) (P. Meyers, pers. comm., 2013b). This test indicates that our previous population estimates are probably low. Until another control test is conducted to confirm this outcome, this remains the best data available on FLIR detection, and therefore 25 percent is the most reliable

correction factor at this time. The detection rate was lower in cottonwood woodlots, so without knowing the FLIR counts by habitat type for previous counts, previous estimates cannot simply be increased across the board by an additional 15 percent to get to the 25 percent correction factor, but it is safe to assume that prior estimates are low and may be up to 15 percent too low in areas where forest and reed canary grass are the predominant habitats (including JBH Mainland Unit and Tenasillahe Island) (P. Meyers, pers. comm., 2013b).

The JBH Mainland Unit subpopulation has experienced a significant decrease in size since a peak of an estimated 500 CWTD in 1986 and 1987, when the JBH's carrying capacity was considered to be exceeded (USFWS 1992). Numbers subsequently fell below the desired goal of 125 CWTD, to a low of 59 in 2007. In 2006, translocation efforts began to augment the declining JBH Mainland Unit subpopulation. CWTD were relocated from Puget Island, Washington in 2006, Tenasillahe Island, Oregon in 2009, and from Roseburg, Oregon in 2010. Consistent coyote (*Canis latrans*) predation and significant flooding events in 1996, 2006, and 2009 have been partially implicated in the decline of the JBH Mainland Unit subpopulation, which, prior to the 2013 translocation, supported approximately 83 CWTD (Table 2). The current population should be approximately 46 CWTD due to the recent translocation of 37 CWTD from JBH NWR to Ridgefield NWR.

Fawn:doe (F:D given per 100 does) ratios are monitored closely with the goal of maintaining ratios above 37:100 when CWTD numbers are below population objectives, and maintaining 20:100 when CWTD numbers are greater than 25 percent above population objectives (USFWS 2010c). Since 1986, three subpopulations have had an average F:D ratio of 36:100 or above (Tenasillahe Island, Puget Island, and Westport) (Table 4). All four subpopulations have averaged above 37:100 for the last 5 years. The JBH Mainland Unit has shown the highest volatility in F:D ratio among all the subpopulations. Consistent summer coyote control and increased pasture management over the past 5 years appear to have increased and stabilized F:D ratios on this unit. Given its past volatility, however, we may not be completely confident that this parameter has stabilized for several more years. In the past decade, the F:D ratio has dropped below five twice and one of those times followed a significant flooding event that occurred during the 2006 rut, disrupting normal breeding behavior. Given that this subpopulation is below the current objective of 125 animals, the F:D ratio over the past 5 years is just at the goal of 37:100. Aside from flooding, young fawns are extremely susceptible to coyote predation; strong pressures from these predators have led Refuge staff to adopt coyote control measures (see Section 2.3.2.3) in an attempt to improve the F:D ratio. The more recently established Upper Estuary Islands subpopulation lacks the historical data to calculate an average F:D ratio.

Puget Island has typically recruited a higher number of fawns than the other subpopulations (Table 4) and has shown less volatility. On average from 1986 to 2006, the F:D ratio on Puget Island was 44, with a range of 22 to 70. Several factors may contribute to the higher-than-average fawn recruitment and overall robust CWTD population on Puget Island, including coyote control, availability of quality forage, and a larger local range protected from flooding (USFWS 2009b).

Table 4. Number of fawns per 100 does (F:D ratio) for the Columbia River DPS of Columbian white-tailed deer subpopulations from 1986 to 2008.

Year	Puget Island	Tenasillahe Island	Westport/ Wallace Island	JBH Mainland Unit	Upper Estuary Islands ^a
1986	40	27	40	43	
1987	58	43	56	34	
1988	53	53	66	14	
1989	40	43	29	29	
1990	55	63	56	30	
1991	38	55	30	21	
1992	58	67	58	28	
1993	48	47	41	11	
1994	55	52	57	1	
1995	47	53	23	14	
1996	27	35	45	15	
1997	39	39	16	61	
1998	45	12	30	43	
1999	52	7	10	16	
2000	70	8	23	34	
2001	49	18	40	49	
2002	40	0	29	25	
2003	27	0	24	21	
2004	36	32	33	12	42
2005	22	24	14	4	28
2006	22	39	18	24	15
2007	36	50	37	3	
2008	45	39	39	30	
2009	45	46	51	26	
2010	41	35	80	58	
2011	25	36	34	30	
2012	35	52	53	43	
Average	43	36	38	27	28
Most Recent 5-yr Average	43	42	38	37	

^aIncludes Lord, Walker, Fisher, Hump, and Crims Islands.

2.3.1.3 Genetics, genetic variation, or trends in genetic variation (e.g., loss of genetic variation, genetic drift, inbreeding, etc.):

New information has surfaced regarding the genetic associations of the northeastern Oregon white-tailed deer (*Odocoileus virginianus ochrorous*) and the Douglas County and Columbia River DPS CWTD populations since the publication of the Revised Recovery Plan. Piaggio and Hopken (2009) studied mitochondrial DNA (mtDNA) and microsatellite loci to determine the genetic relationships and diversity of northeastern Oregon white-tailed deer and the two DPSs of CWTD. The study suggests that the three deer populations were once connected, and found that

the Douglas County and Columbia River DPS populations each had a greater genetic similarity toward the northeastern Oregon population than to each other. The authors suggest two hypotheses to explain this observation: (1) the northeastern Oregon population historically ranged over all of Oregon but ultimately diverged into distinct populations in the Umpqua and Willamette valleys and the lower Columbia River; or (2) white-tailed deer ranged broadly over Oregon and through changes in climate or anthropogenic pressures, the two CWTD DPSs became geographically isolated from the broader-ranged eastern subspecies, eliminating gene flow among groups. The ultimate genetic isolation between the Douglas County and Columbia River DPS populations has led to a decrease in observed genetic diversity in each population compared to the northeastern Oregon population. Low genetic diversity, as measured by losses in heterozygosity and allelic richness, can correlate to a reduction in measures of fitness such as resistance to disease and fecundity (in Ennen *et al.* 2010; Lacy 1997). In an attempt to increase genetic diversity in the JBH population, eight deer were translocated from the Roseburg, Oregon, population (part of the Douglas County DPS) to the JBH Mainland Unit in 2010. Of these eight deer, five remained on the JBH Mainland Unit or contiguous Columbia Land Trust lands (USFWS 2010a). Piaggio and Hopken (2009, p. 19) also suggested augmenting the Columbia River DPS population with individuals from the Douglas County DPS and northeastern Oregon white-tailed deer population, if the northeastern Oregon deer are first tested for evidence of black-tailed deer (*Odocoileus hemionus columbianus*) hybridization.

Due to the observed genetic similarity between all CWTD and *Odocoileus virginianus ochrorous*, Gavin and May (1988, pp. 7-8) and Piaggio and Hopken (2009, p. 15) suggested a distinction in taxonomic classification may not be warranted. Gavin and May (1988, p. 9) indicated that deer in the Columbia River DPS may be different enough from *O. v. ochrorous* to warrant continued separate subspecific status, but Piaggio and Hopken (2009) didn't examine that possibility. Piaggio and Hopken (2009) could not determine to which subspecies the populations (Columbia River DPS, Douglas County DPS, and other white-tailed deer in Oregon) should be considered members of, *O. v. leucurus* or *O. v. ochrorous*, because they didn't have genetic samples from the broader distribution of *O. v. ochrorous*. In addition, Piaggio and Hopken (2009) determined that contemporary gene flow between Columbia River DPS deer, Douglas County DPS deer, and *O. v. ochrorous* deer in Oregon is limited, and sampled deer fell into three highly differentiated and distinct populations. Although deer from both CWTD DPSs appear to be more closely related to *O. v. ochrorous* deer than to each other, the three populations have been isolated for some time and have lost a large proportion of shared diversity through genetic drift (Piaggio and Hopken 2009). Even though there are genetic similarities between the various subspecies, taxon listings under the Act are based not only on genetics but also on morphologic/morphometric differences, biogeography, behavior, and ecology.

2.3.1.4 Taxonomic classification or changes in nomenclature:

No current changes in nomenclature or taxonomic status are proposed. See section 2.3.1.3 for a discussion of recent research.

2.3.1.5 Spatial distribution, trends in spatial distribution (e.g., increasingly fragmented, increased numbers of corridors, etc.), or historic range (e.g., corrections to the historical range, change in distribution of the species within its historic range, etc.):

Historically, CWTD occupied a range of approximately 23,170 square miles (mi²) (60,000 square kilometers (km²)) west of the Cascades Mountains; from Grants Pass, Oregon, in the south to The Dalles, Oregon, in the east and along the Cowlitz River to the north (Smith 1985; Figure 3).



Figure 3. Historical range of the Columbian white-tailed deer (USFWS 1983).

That range has been reduced to approximately 93 mi² (240 km²) for the Columbia River DPS (Smith 1985, p. 247; Figure 4) in limited areas of Clatsop and Columbia counties in Oregon, and Cowlitz, Wahkiakum, and now Clark counties in Washington.

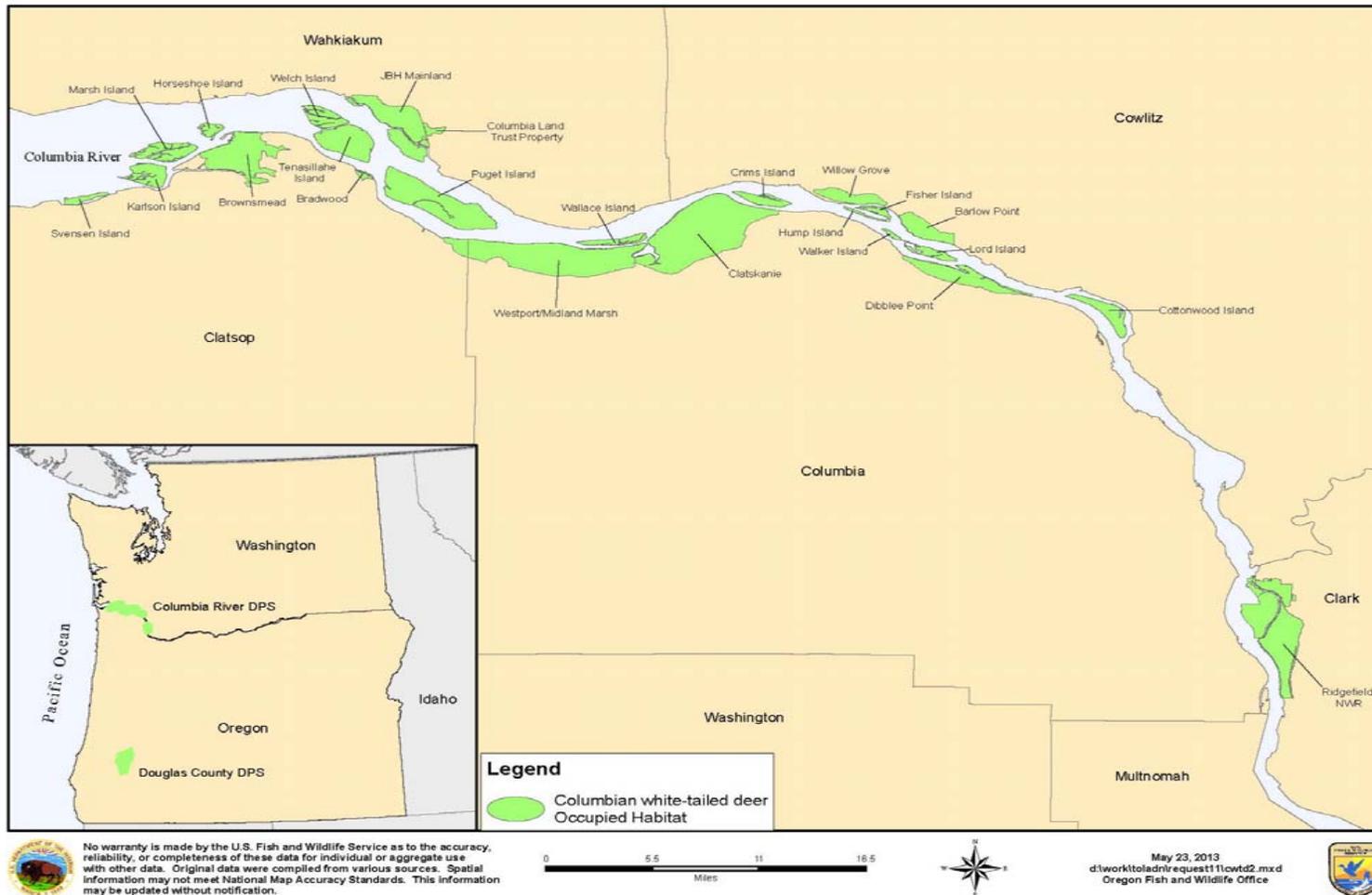


Figure 4. Current range of the Columbia River DPS of CWTD including subpopulations, as well as known CWTD occurrence (note: CWTD can periodically occur outside these boundaries due to their mobility). Inset map shows the geographic isolation between the Columbia River DPS (top) and the delisted Douglas County DPS (bottom).

Recent gains in range for the Columbia River DPS population have been achieved largely by land acquisitions, conservation agreements, and translocation activity. Natural range expansion has been limited due to the dearth of contiguous suitable habitat (NPCC 2004). In 1983, five main subpopulations occurred in what is now the Columbia River DPS range: the JBH Mainland Unit, Tenasillahe Island, Puget Island, Westport/Wallace Island, and Karlson Island, but only one was considered viable and secure (JBH Mainland Unit). The population on Karlson Island was small (8 to 12 CWTD). Since that time, the dike on Karlson Island has breached, and CWTD only occasionally use the island. The Tenasillahe Island subpopulation was estimated at only 30 to 40 CWTD in 1984. The Revised Recovery Plan recommended that the establishment of new subpopulations should be considered if other recovery efforts (e.g., increasing population in current range and/or securing habitat) cannot achieve the primary recovery objective (USFWS 1983). Puget Island and Westport/Wallace Island were identified as suitable donor sources for CWTD translocations.

In 1995, Wallace Island, Oregon, was purchased by the Service for CWTD habitat. Though the habitat is now protected for the recovery of CWTD, the 562-acre (ac) (227-hectare (ha)) island alone is considered too small to support a viable population (USFWS 2010c, WDFW 2013). Because it is located adjacent to Westport, Oregon, Wallace Island is considered part of the Westport/Wallace Island CWTD subpopulation. JBH NWR acquisitions also include the following: a 173 ac (70 ha) area of Westport called the Westport Unit; approximately 2/3 or 473 ac (191 ha) of Crims Island which was secured in a 1999 agreement between the Bonneville Power Administration, the Columbia Land Trust, and the Service (USFWS 2010c, WDFW 2013); two small islands, Anunde and Gull totaling 174 ac (70 ha); and other additions to the JBH Mainland Unit totaling 267 ac (108 ha) (WDFW 2013). Additionally, the Columbia Land Trust acquired a 250-ac (101-ha) parcel of cottonwood plantation across US Highway 4 from the JBH Mainland Unit (USFWS 2010c) and a 312-ac (126-ha) parcel near Longview, Washington, to be managed for CWTD habitat and other restoration and conservation goals (McGewan 2008). Finally, Cottonwood Island is a 948-ac (384-ha) island of which about 650 acres (263 ha) were secured for the protection of CWTD through an agreement with the owners (a coalition of several ports and the U.S. Army Corps of Engineers (USACE)) (USFWS 2010c).

An examination of population trends for each subpopulation in the DPS leads us to the understanding that our recovery efforts over the last 30 years may have been hampered by the narrow focus on habitat secured through formal land title or easement. Out of many recovery activities aimed at maintaining CWTD in certain locations, or translocating CWTD to other locations all in the name of “secure” habitat, only one of those locations, Tenasillahe Island, has proven to provide CWTD with the suitable habitat they need to grow and maintain a stable and viable subpopulation. The 1983 Revised Recovery Plan recommended increasing the Tenasillahe Island subpopulation to a minimum viable herd of 50 CWTD. The Service has accomplished this recovery goal through several translocation efforts and habitat enhancement, and the Island’s subpopulation, though still affected by flood events, has remained relatively stable. The most current FLIR survey at this location (in 2011) estimated the population at approximately 90 deer (Table 2).

Other translocation efforts aimed at moving CWTD to “secure” habitat have not led to such stable subpopulations. The Revised Recovery Plan identified a series of islands near Longview,

Washington, as suitable habitat to create a third subpopulation. These islands, known as the Upper Estuary Islands, included Fisher and Hump (400 ac (162 ha) total), Lord (480 ac (194 ha)), and Walker (109 ac (44 ha)), for a total area of 989 ac (400 ha), under a mix of private and State ownership. Fisher Island is a naturally-occurring tidal wetland dominated by black cottonwood (*Populus trichocarpa*), willow (*Salix* spp.) and dogwood (*Cornus nuttalli*) (USFWS 2005). The remaining three islands are dredge material sites with dense cottonwood and shrub habitat. Translocations of CWTD to Lord/Walker and Fisher/Hump Islands began in 2003, and a total of 66 CWTD (33 to each set of islands) have been relocated there to date (USFWS 2010b) (Table 5). The population goal for this island complex is at least 50 CWTD (USFWS 2005). According to 2010 aerial survey estimates, these islands currently contain 10 CWTD (USFWS 2011), although telemetry data indicate that CWTD frequently move between the island complex and adjacent areas of Willow Grove, the Barlow Point industrial area, and Dibblee Point (USFWS 2004). These adjacent areas averaged 44 CWTD between 2009 and 2011 (USFWS 2012a). However, range expansion in this area is limited by its direct proximity to urban development. Efforts to expand CWTD range in this area would require collaborative efforts to address local landowner concerns regarding potential resulting damage to agriculture.

Table 5. Summary of CWTD translocation actions.

Name of Unit	Translocation History			
	Year	# CWTD moved to this area	Source of CWTD	Translocation/Post Translocation Mortalities (within 2 months)
JBH Mainland Unit	2006	5	Puget Is/Westport	unknown
	2009	20	Tenasillahe Is	4
	2010	8	Roseburg, OR	2
Tenasillahe Island (part of JBH NWR)	1986	21	Puget Island	3
	1987	20	Puget Island	2
	1988	22	Puget Island	2
Crims Island	1999	30	Puget Is/Westport	5
	2000	31	Puget Is/Westport	5
	2006	5	Puget Is/Westport	unknown
Lord/Walker Island	2003	16	Westport	5
	2004	8	Westport	0
	2006	9	Westport	unknown
Fisher/Hump Island	2003	12	Puget Is/JBH	1
	2004	11	Puget Island	3
	2006	10	Puget Island	unknown
Cottonwood Island	2010	15	Westport	7
	2013	12	Puget Island	3
Ridgefield NWR	2013	37	JBH Mainland Unit	8
Total		292		56

Crims Island, also designated in the Revised Recovery Plan as a suitable translocation site, has received 66 CWTD through several translocation efforts (USFWS 2010b). Now considered part of the Upper Estuary Islands subpopulation, Crims Island lies 1 mile downstream from the Fisher/Lord Island complex, and contributes to the interchange among CWTD of neighboring islands and mainland subpopulations (USFWS 2005). The protected portion of the island (approximately 473 ac (191 ha)) contains about 300 ac (121 ha) of deciduous forest (black cottonwood, Oregon ash (*Fraxinus latifolia*), and willow), pasture, and marsh. The island was formerly grazed, but remains undeveloped. In 1999, 2000, and 2006, a total of 66 CWTD were relocated to Crims Island from Puget Island, Washington, and Westport, Oregon. This area was originally considered able to support 50 to 100 CWTD (USFWS 2000b, p. 2) but has only supported between 8 and 33 CWTD since 2000, with the latest estimate at 18 CWTD.

In the fall of 2010, 15 CWTD were moved to Cottonwood Island, an area also listed in the Revised Recovery Plan as a potential relocation site (Cowlitz Indian Tribe 2010; USFWS 1983). Seven confirmed mortalities resulted from vehicle collisions as CWTD migrated off the island. Telemetry monitoring by WDFW personnel in the spring of 2011 detected three radio-collared CWTD on Cottonwood Island and two on the Oregon mainland near Rainier, Oregon. A second translocation of 12 CWTD to Cottonwood (from Puget Island) occurred in conjunction with the 2013 emergency translocation effort (USFWS 2013a). All but three of these new CWTD have subsequently moved off the island (USFWS unpublished data). Habitat quality may be a factor in the movement of CWTD off the Island so habitat restoration efforts are ongoing. JBH NWR and Cowlitz Indian Tribe staff are conducting periodic monitoring of Cottonwood Island translocated CWTD. As a unit, the Upper Estuary Islands have yet to maintain over time the target population of 50 CWTD.

In early 2013, the Service conducted an emergency translocation of 37 CWTD from the JBH Mainland Unit to Ridgefield NWR in Clark County, Washington (USFWS 2013a). Though seven of these deer moved off refuge, most translocated CWTD have remained within roughly 2 km of their release site. Eight of the CWTD suffered either capture related mortality or post release mortality within 2 months, mainly due to predation; four subsequent mortalities put the current population estimate for Ridgefield (on or near the refuge) at approximately 25 CWTD (USFWS unpublished data). While the Service recognizes this population is small and vulnerable, and will require further supplementation and management to help it establish as a viable population, its location in more upland, secure habitat contributes greatly to the conservation needs of the species. Ridgefield NWR is approximately 67 miles southeast of JBH NWR, and is comprised of 5,218 acres of marshes, grasslands, and woodlands with about 3,800 acres of terrestrial habitat. With the addition of the 2013 translocation, a total of 292 CWTD have been translocated in an effort to move them into “secure” habitat (Table 5). The fate of all the translocated CWTD is unknown; however, population estimates for all subpopulations have been calculated (Table 2). Of these translocation efforts, Tenasillahe Island has shown the most success to date.

2.3.1.6 Habitat or ecosystem conditions (e.g., amount, distribution, and suitability of the habitat or ecosystem):

Currently CWTD occupy an area of approximately 16,000 ac (6,475 ha). Over 8,000 ac (3,237 ha) have been acquired or otherwise protected for the purpose of CWTD conservation since 1983 (see section 2.3.1.5) including JBH NWR (itself over 6,000 ac (2,428 ha)). In 2010, the Service published a Final Comprehensive Conservation Plan for the Julia Butler Hansen and Willapa National Wildlife Refuges (USFWS 2010c). This plan provides updated habitat classifications for areas under Refuge ownership based on National Agriculture Imagery Program maps (Figure 5). The maps show that the JBH Mainland Unit and Tenasillahe Island portions of the JBH NWR, largely a tidal spruce community, are predominantly grasslands interspersed with riparian forest and shrub habitat. This area is 25 percent mixed species forest, 47 percent old fields, 20 percent mowed fields, and 5 percent emergent wetlands (Phillips 2009, USFWS 1993). The remaining Refuge islands are dominated by Sitka spruce intertidal swamp and scrub-shrub tidal wetland (Hunting and Price islands), cottonwood/willow swamp and scrub-shrub tidal wetlands (Wallace Island and portions of the Westport, Oregon mainland), and a mix of tidal marsh, reed canary grass pasture, old growth nonnative blackberry (*Rubus laciniatus*), cottonwood (*Populus trichocarpa*), and tidal wetland (Crims Island). CWTD use this mix of habitat; additional forage enhancements in old fields could enhance forage production.

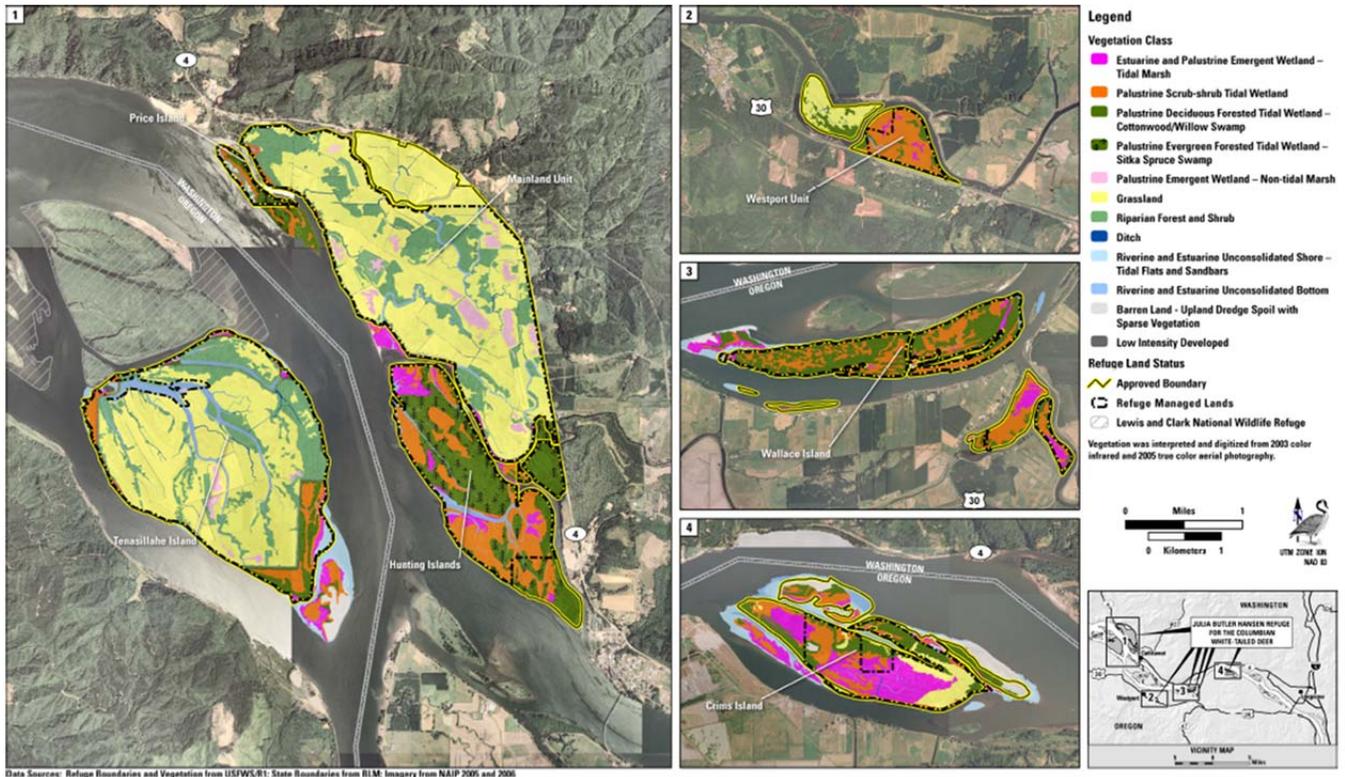


Figure 5. Habitat classification on the Julia Butler Hansen National Wildlife Refuge for Columbian White-tailed Deer (USFWS 2010c).

Restoration activities on the JBH Mainland Unit have improved the quality of habitat since the publication of the Revised Recovery Plan in 1983. The Service is actively restoring Refuge habitat to establish cover and provide forage for CWTD. CWTD are closely associated with woodland cover (Smith 1987), and often prefer open canopy and park-forest habitat. Roughly 100 ac (40.5 ha) were planted to establish woodland cover from 2000 to 2007, and an additional 200 ac (81 ha) were planted from 2007 to present. Currently about 300 ac (121 ha) of pasture enhancement occurs on a 5 to 7-year rotation (USFWS 2010c). Cover species include willow, red alder (*Alnus rubra*), black cottonwood, Sitka spruce, western red cedar (*Thuja plicata*), cascara (*Rhamnus purshiana*), and big-leaf maple (*Acer macrophyllum*). An active cattle grazing regime on the JBH Mainland Unit reduces the presence of decadent reed canary grass and keeps pasture grasses young and high in protein, which is preferable to CWTD (Gavin 1979). Cattle graze approximately 600 ac (243 ha) of the JBH Mainland Unit annually (USFWS 2010c). Between 2004 and 2005, a habitat restoration project on Crims Island restored 76 ac (30.8 ha) of fields dominated by nonnative reed canary grass to a native tidal wetland plant community (USFWS 2010c). As discussed above, there has been considerable effort in securing suitable habitat off of Refuge lands for CWTD; however, the habitat condition in many of these areas still produces poor quality forage, which ultimately influences the condition and survival of the CWTD occupying these areas (refer to Section 2.3.1.2).

Ridgefield NWR is separated into five units, including the Carty, Roth, and Bachelor Island units where the translocated CWTD were released in early 2013. The Carty Unit supports mixed deciduous habitat with oak savannah comprising a large portion of the unit. The area contains some areas of moderate to sparse reed canary grass, with upland meadows supporting a variety of grasses and forbs. This area also contains large areas of dry soils above the normal flood level. The Roth unit represents more of a parkland mosaic, with dense deciduous tree stands and open meadows. The topography within this unit consists of fingers of high ground separated by swales. The three remaining units (Bachelor Island, River S, and Ridgeport Dairy) all contain large areas of low-lying meadow or seasonally-flooded wetlands with pockets of woody cover. Most of the open areas in the River S and Bachelor Island units consist of low-lying meadows and wetlands (see USFWS 2013a for more information on Ridgefield NWR).

2.3.1.7 Other: None

2.3.2 Five-Factor Analysis (threats, conservation measures, and regulatory mechanisms)

2.3.2.1 Present or threatened destruction, modification or curtailment of its habitat or range:

CWTD evolved as a prairie edge/woodland-associated species with historically viable populations that were not confined to river valleys. CWTD were then extirpated in all but two areas of their historical range: the Columbia River DPS area and the Douglas County DPS area. The remnant Columbia River DPS population has been forced by anthropogenic factors (residential and commercial development, roads, agriculture, etc., causing fragmentation of natural habitats) into the lowland areas it now inhabits. Urban, suburban, and agricultural areas now limit population expansion, and existing occupied areas support densities of CWTD

indicative of moderate to low-quality habitats, particularly lower lying and wetter habitat than the species would typically be associated with.

Loss of habitat is suspected as a key factor in historical CWTD declines, as over 30,000 ac (12,140 ha) of habitat along the lower Columbia River were converted for residential and agricultural use from 1870 to 1970 (NPCC 2004). Over time, CWTD were forced into habitat that was fragmented, wetter, and more lowland than what would be ideal for the species. The recovery of the Douglas County CWTD DPS reflects the availability of more favorable habitat (managed upland oak savannah) and land use practices (intensive sheep grazing with very high levels of predator control). Though limited access to high quality upland habitat in the Columbia River DPS remains the most prominent hindrance to CWTD recovery today, the majority of habitat loss and fragmentation has already occurred. Significant future changes to currently available habitat for the Columbia River DPS is not anticipated.

CWTD recovery efforts have in large part focused on formally protecting land for the recovery of the species in the form of acquisitions and agreements. This effort has added to the available suitable habitat for the DPS and helped to offset some of the impact from other habitat loss. CWTD habitat under Refuge ownership or secured through landowner agreements is undergoing restoration favorable for deer (see section 2.3.1.6), though much of the occupied habitat in the Columbia River DPS is fragmented, wetter than the species prefers and more vulnerable to flooding. Many variables influence how CWTD survive in fragmented habitats. A mosaic of ownerships and protection levels does not necessarily hinder the existence of CWTD when land-use is compatible with deer habitat needs. For example, on Puget Island, which is not formally set aside for the protection of CWTD, the F:D ratios are higher than on the protected JBH Mainland Unit and the area has supported a stable CWTD population without active management. Additionally, the Westport/Wallace Island subpopulation has long maintained stable numbers, even though most of the area is not managed for the protection of CWTD. The presence of predators, disturbance, habitat type, etc., will all influence how CWTD can survive in non-contiguous habitats. Fragmentation will need to be monitored to understand the long-term impacts of this factor on CWTD.

Flooding is a threat to CWTD habitat when grazing and fawning grounds become inundated for prolonged periods, and the risk of large flooding events could increase with impacts of climate change. In the past, significant flooding events have caused large-scale CWTD mortality and emigration from the JBH Mainland Unit (USFWS 2007). The JBH Mainland Unit has experienced three storm-related floods since 1996. These flooding events have been associated with a sudden drop in population numbers and a recovery over the following few years. During some historical flooding events, CWTD have left low-lying areas and did not return (particularly in areas which continued to sustain frequent flooding, for example Karlson Island). A large proportion of occupied CWTD habitat is land that was reclaimed from tidal inundation by construction of dikes and levees for agricultural use in the early twentieth century (USFWS 2010c). In recent years, there has been interest in restoring the natural tidal regime to some of this land, mainly for fish habitat enhancement. This restoration could pose a threat to CWTD in certain areas where the majority of the subpopulation relies upon the reclaimed land. Since 2009, three new tidegates were installed on the JBH Mainland Unit to increase fish passage and facilitate drainage in the event of another large-scale flood. Because of the imminent failure at a

point of erosion in the Steamboat Slough Road dike, a setback dike is scheduled for construction in fall of 2013. When this dike is complete, the original dike under Steamboat Slough Road will be breached and the estuarine buffer created will provide additional protection from flooding to the JBH Mainland Unit. It is important to note however that breaching of the old dike will result in the loss or degradation of about 100 acres of CWTD habitat.

The persistence of invasive species, especially reed canary grass, has reduced forage quality over much of the CWTD range but it remains unclear as to how much this change in forage quality is affecting the overall status of CWTD. While CWTD will eat the grass, it is only palatable for about 2 months in spring, and it is not a preferred forage species. Cattle grazing has been used on JBH NWR lands to control the growth of reed canary grass along with tilling and planting of pasture grasses and forbs. This management entails a large effort that will likely be required on a continual basis unless other control options are discovered. Reed canary grass is often suppressed in agricultural and suburban landscapes, but remote areas, such as the upriver islands, experience little control. Reed canary grass thrives in wet soil. Increased groundwater due to sea level rise or subsidence of diked lands may exacerbate this problem by extending the area impacted by reed canary grass. However, where groundwater levels rise high enough, reed canary grass will be drowned out and eradicated, though this rise in water level may also negatively affect CWTD. The total area occupied by reed canary grass in the future may therefore decrease, remain the same, or increase, depending on topography and/or land management.

The competition for food and cover with elk (*Cervus canadensis*) on the JBH Mainland Unit has historically posed a threat to CWTD (USFWS 2010c). To address these concerns, the JBH NWR trapped and removed 291 elk during the period from 1984 to 2001. Subsequently, the JBH NWR conducted two antlerless elk hunts, resulting in a harvest of eight cows. The combination of these efforts and elk emigration reduced the elk population to fewer than 20 individuals. The JBH NWR considers their elk reduction goal to have been met. Future increases in the population above 25 individuals may be controlled with a limited public hunt (USFWS 2010c). Additionally, Refuge personnel have constructed roughly 4 miles of fencing to deter elk immigration onto the JBH NWR (USFWS 2010c).

Habitat loss from human development still remains a threat today, though in many instances, the severity of the threat is less than previously thought. Areas, such as Puget Island, have supported stable and persistent CWTD populations despite changes in land use. In addition, persistent CWTD populations have been established in semi-rural, privately owned lands near Willow Grove and Dibblee Point. Historical habitat loss was mainly centered on development. While development is still a limiting factor, we acknowledge that the type of development is the main issue in how CWTD respond. Areas such as Puget Island have been and are expected to continue experiencing the breakup of large agricultural farms into smaller hobby farms. This type of change has not inhibited the ability of CWTD to maintain a stable population on the island, and is not expected to impact CWTD for the foreseeable future. In addition, the human population of Wahkiakum County has not grown in the past 70 years, and the number of residents on Puget Island has declined by nearly 8 percent since 2006 (based on U.S. census data through 2010). The trend in the type of development on Puget Island and the stagnant growth in the county suggest that overdevelopment on the island is unlikely to occur. In contrast, areas like

Willow Grove and Dibblee Point, which are near a larger urban center will likely see a continued change from an agricultural to a suburban landscape, and this development may have a negative impact on CWTD depending on the density of development. While the Westport subpopulation has demonstrated similar stability to the Puget Island subpopulation, the likelihood of major development or habitat loss on Westport is more difficult to predict because the majority of CWTD habitat is owned by a single entity.

The Service has also focused recovery efforts on acquiring new habitat and seen an increase in the amount of habitat specifically protected for the benefit of CWTD. Furthermore, habitat in many areas of the Columbia River DPS has improved over time through targeted restoration efforts that increased the quality of browse, forage, and cover. The greatest restoration effort has occurred on JBH Mainland Unit, followed by Tenasillahe Island and Crims Island. Finally, CWTD now have access to the upland areas at Ridgefield NWR and it is expected that they will respond positively to the higher quality habitat. Overall, although the threat of habitat loss and modification from development still remains, it is much lower than previously thought and does not put the Columbia River DPS of CWTD at risk of extinction.

2.3.2.2 Overutilization for commercial, recreational, scientific or educational purposes:

While overharvest of CWTD historically contributed to CWTD population decline, all legal harvest has ceased. Just after the establishment of the JBH NWR, poaching was not uncommon. Public understanding and views of CWTD have gradually changed, however, and poaching has decreased. If subpopulations should decline, poaching could have an impact on CWTD numbers and would need to be monitored. Regulations and enforcement are in place to protect the CWTD; however, poaching still occurs and the level of poaching is not a threat that can be completely alleviated. However, overall, the threat of overutilization has likely decreased since the development of the Revised Recovery Plan and does not put the Columbia River DPS at risk of extinction.

2.3.2.3 Disease or predation:

Disease

The Revised Recovery Plan lists necrobacillosis (hoof disease) as a primary causal factor in CWTD mortality on the JBH NWR (USFWS 1983). *Fusobacterium necrophorum* is identified as the etiological agent in most cases of hoof disease, although concomitant bacteria such as *Arcanobacterium pyogenes* may also be at play (Langworth 1977; Chirino-Trejo *et al.* 2003). Damp soil or inundated pastures increase the risk of hoof disease among CWTD with foot injuries (Langworth 1977). Among 155 carcasses recovered from 1974 to 1977, hoof disease was evident in 31 percent (n=49) of the cases, although hoof disease only attributed directly to 3 percent (n=4) of CWTD mortalities (Gavin *et al.* 1984).

During elk translocations on the JBH Mainland Unit from 1984 to 2001, an estimated 10 percent of elk showed signs of hoof disease. Refuge biologists noticed a decline in hoof disease cases observed among CWTD since the early 1980s (USFWS 2010c.). Currently, CWTD on the JBH

Mainland Unit have occasionally displayed visible evidence of hoof disease, and recent cases have been observed on Puget Island, but its prevalence is not known to be a limiting factor in population growth (USFWS 2010c). Of the 49 CWTD captured from the JBH Mainland Unit and Puget Island in 2013, none displayed evidence of hoof disease. However, with the increased threat of flooding events predicted by climate models and the possible increase in ground water levels due to sea-level rise, hoof disease presents a persistent threat.

Deer Hair Loss Syndrome (DHLS) was documented in Columbian black-tailed deer (CBTD) in northwest Oregon from 2000 to 2004 (Biederbeck 2004). DHLS results when a deer with an immune system weakened by internal parasites is plagued with ectoparasites, such as deer lice *Damalinia (Cervicola)* spp. The weakened deer suffer increased inflammation and irritation, which result in deer biting, scratching, and licking affected areas and, ultimately, removing hair in those regions. This condition is found most commonly among deer occupying low-elevation agricultural areas (below 600 ft. (183 m) elevation). While the study found a higher instance in CBTD, cases in CWTD were observed. Most cases (72 percent) of DHLS were detected in the Saddle Mountain Wildlife Management Unit (WMU) in northwest Oregon. Among CBTD, 13 percent of deer surveyed in the Saddle Mountain Wildlife Management Unit showed symptoms of DHLS while 7 percent of CWTD were symptomatic. Additionally, cases were identified in CWTD only in 2002 and 2003. CWTD captured during translocations in recent years have occasionally exhibited evidence of hair loss. On the JBH NWR, DHLS is most often observed among fawns and yearlings during winter months (USFWS 2010c).

DHLS is not thought to be highly contagious, nor is it considered to be a primary threat to CWTD survival, although it has been associated with deer mortality (Biederbeck 2002, 2004). Reports of DHLS among CBTD in Washington have indicated significant mortality associated with the condition. In 2006, a high number of Yakima area mule deer (*Odocoileus hemionus*) mortalities were reported with symptoms of DHLS (WDFW 2010). In Yakima and Kittitas counties, the mule deer population has decreased an estimated 50 percent since the arrival of the lice. It remains unclear whether the lice infestations are the proximate cause of the stark decrease in population.

Parasite loads were tested in 16 CWTD on the JBH Mainland Unit and Tenasillahe Island in February of 1998 (Creekmore and Glaser 1999). All CWTD tested showed evidence of the stomach worm, *Haemonchus contortus*, in fecal samples. Lung worm (*Parelaphostrongylus* spp.) and trematode eggs, possibly from liver flukes (*Fascioloides* spp.) were also detected. These results are generally not a concern among healthy populations, but for a population under nutritional stress, such as the Columbia River DPS of CWTD with less than optimal forage and habitat quality available, a high parasite load can increase the likelihood of mortality, especially among fawns (Creekmore and Glaser 1999).

Diseases naturally occur in wild ungulate populations. Diseases such as hoof disease or DHLS can often work through a population without necessarily reducing the overall population. When compounded with additional stressors such as poor quality forage, flooding, etc., diseases could potentially affect long term productivity and viability. However, the threat of disease does not in itself put the Columbia River DPS of CWTD at risk of extinction.

Predation

Since 1983, studies have been conducted to determine the primary factors affecting fawn survival throughout the Columbia River DPS of CWTD range. The pregnancy rate for adult does from three translocations conducted in late winter/early spring is approximately 90 percent (n=29) (USFWS unpublished data). This is comparable to a study conducted in Yellowstone, which indicated a 93 percent pregnancy rate (Dusek *et al.* 1989). Coyote predation is thought to be the most significant impact on fawn recruitment. On the JBH Mainland Unit, Clark *et al.* (2010) fitted 131 fawns with radio collars and tracked them for the first 150 days of age from 1978 to 1982 and 1996 to 2000 (16 CWTD were dropped from the analyses due to collar issues). The authors found only a 23 percent survival rate. Coyote predation was determined to be the primary cause of fawn mortality, accounting for 69 percent (n=61) of all documented mortalities. In comparison, disease and starvation accounted for 16 percent of known fawn mortalities.

Refuge staff have attempted to control coyote numbers on the JBH Mainland Unit. Between 1997 and 2008, 46 coyotes were removed from the JBH Mainland Unit by the USDA Animal and Plant Health Inspection Service (USFWS 2010c). In some cases, removal has been correlated with an increase in fawn survival. In 1996, the estimated JBH Mainland Unit F:D ratio was 15:100. The following year, after nine coyotes were removed, the F:D ratio increased to 61:100 (USFWS 2010c, p. 4-54). On Tenasillahe Island, the average F:D ratio between 2001 and 2003 was 6:100. No coyotes were removed during that time. Over the next 5 years (2004 to 2008), 31 coyotes were removed and the F:D ratio averaged 37:100. While removal efforts have met with some success, Clark *et al.* (2010) suggested shifting the timing of coyote removal from winter/early spring to the critical fawning period of June-September. This suggestion has been included in the Comprehensive Conservation Plan for the JBH NWR and has been implemented since 2008 and a F:D ratio of 37:100 has been maintained during that timeframe. Due to the evident success of predation control efforts at JBH NWR, Ridgefield NWR began implementing a coyote control program in May 2013, to support the newly translocated CWTD.

The poor fawn survival of the Columbia River DPS of CWTD may also be indicative of poor habitat quality. The scientific literature on wild cervids tends to show that deer and elk in favorable (medium to high quality) habitat are rarely depressed by predation pressures. Coyote population estimates do not exist for the Columbia River DPS area. If there were a general decline in sport predator hunting over the years and reduced predator hunting by livestock owners due to the development of agricultural areas to residential and commercial areas, a decline of predator harvest may be locally offset by predator control on the Refuges. However, coyotes are ubiquitous and predator control does not occur in all CWTD habitat. Fawn predation within other subpopulations is most likely influenced by coyote population cycles. A large portion of the land occupied by the Westport/Wallace Island subpopulation has been managed in the past by a single landowner whose intensive predator control has been beneficial to the CWTD. It is unclear whether the new landowner will continue this management regime and a change in management activities could potentially affect deer numbers.

While coyote predation exerts strong pressures on fawn recruitment, Phillips (2009) observed that long-term gains in population size may require management efforts that emphasize survival across age-classes, or at a minimum include strategies for increasing doe survival, rather than

focusing only on fawn recruitment. Results emphasize that the focus for managing a successful population should fall on doe survival rather than solely on fawn recruitment. Doe survival relies more heavily on the availability of nutritious forage than predation pressures. An intermediate focus on coyote control (and monitoring of predation by other species such as bobcat), used in conjunction with long-term improvement of habitat conditions, should yield larger population increases, soonest. Managing predation and habitat to enhance across-age-class survival will provide the most benefit to the Columbia River DPS of CWTD.

Since the listing of CWTD, the Service and our partners have developed the ability to implement predator management. The positive effects to subpopulations resulting from predator management implementation demonstrate that the threat of predation to a subpopulation can be neutralized. While predation remains a potential threat to subpopulations if predator management is not in place, at the DPS scale predation is manageable and does not put the DPS at risk of extinction.

2.3.2.4 Inadequacy of existing regulatory mechanisms:

The following section includes a discussion of Federal, State, or local laws, regulations, or treaties that apply to the CWTD. It includes legislation for Federal land management agencies and State and Federal regulatory authorities affecting land use or other relevant management.

Federal Laws and Regulations

National Environmental Policy Act

All Federal agencies are required to adhere to the National Environmental Policy Act (NEPA) of 1970 (42 U.S.C. § 4321 *et seq.*) for projects they fund, authorize, or carry out. The Council on Environmental Quality's regulations for implementing NEPA (40 CFR 1500-1518) state that agencies shall include a discussion on the environmental impacts of the various project alternatives (including the proposed action), any adverse environmental effects which cannot be avoided, and any irreversible or irretrievable commitments of resources involved (40 CFR 1502). NEPA itself is a disclosure law, and does not require subsequent minimization or mitigation measures by the Federal agency involved. Although Federal agencies may include conservation measures for CWTD as a result of the NEPA process, any such measures are typically voluntary in nature and are not required by the statute.

National Wildlife Refuge System Improvement Act of 1997

The National Wildlife Refuge System Improvement Act of 1997 (16 U.S.C. 668dd *et seq.*) establishes the protection of biodiversity as the primary purpose of the National Wildlife Refuge (NWR) system. This has led to various management actions to benefit the federally listed species, including development of Comprehensive Conservation Plans (CCPs), on NWRs. CCPs typically set goals and list needed actions to protect and enhance populations of key wildlife species on Refuge lands. Where CWTD occur on National Wildlife Refuge lands, they and their habitats are protected from large-scale loss or degradation due to the Service's mission "to

administer a national network of lands... for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats.”

The JBH NWR was established in Washington in 1971 specifically to protect and manage the endangered CWTD. Approximately one third of the population of CWTD occurs on this Refuge. The JBH NWR’s CCP includes goals for: protecting, maintaining, enhancing, and restoring habitats for the CWTD; contributing to the recovery of the CWTD by maintaining minimum population sizes on their properties; and conducting survey and research activities, assessments, and studies to enhance species protection and recovery (USFWS 2010c, pp. 2-48 to 2-76). Despite these goals, current forage conditions are only poor to fair, which can negatively influence CWTD condition and survival. Fawn:doe ratios for the JBH Mainland Unit subpopulation are below population goals, despite periodic predator control measures. More frequent and longer-term predator control actions, or predator control in combination with forage habitat quality improvement projects, may resolve these problems.

As of early 2013, Ridgefield NWR is now home to a new subpopulation of CWTD. Habitat conditions on the Refuge are favorable for CWTD and predator control is being implemented. Regular monitoring will occur to assess the viability of the subpopulation over time.

Clean Water Act

The U.S. Army Corps of Engineers (USACE) and the EPA jointly administer section 404 of the Clean Water Act. The main purpose of the program is to regulate the discharge of fill material into waters of the United States, which include navigable and isolated waters, headwaters, and adjacent wetlands (33 U.S.C. § 1344). In general, the term “wetland” refers to areas meeting the USACE’s criteria of hydric soils, hydrology (either sufficient annual flooding or water on the soil surface), and hydrophytic vegetation (plants specifically adapted for growing in wetlands). The USACE interprets “the waters of the United States” expansively to include not only traditional navigable waters and wetlands, but also other defined waters that are adjacent or hydrologically connected to traditional navigable waters. Wetlands separated from other waters of the United States by man-made dikes or barriers, natural river berms, beach dunes and the like are considered “adjacent wetlands.” This type of wetland is often associated with CWTD habitat; a good portion of the Columbia River DPS of CWTD occupies habitat that is protected from flooding by man-made dikes. Any action with the potential to impact waters of the United States must be reviewed under the Clean Water Act, NEPA, and the Endangered Species Act. These reviews require consideration of impacts to listed species and their habitats, and recommendations for mitigation of significant impacts.

Endangered Species Act of 1973, as amended (Act; 50 CFR § 1431 et seq.).

The Act is the primary Federal law providing protection for this species. The Service’s responsibilities include administering the Act, including sections 7, 9, and 10.

Section 7 of the Act

Section 7 of the Act directs all Federal agencies to use their existing authorities to conserve threatened and endangered species and, in consultation with the Service, to ensure that their actions do not jeopardize listed species or destroy or adversely modify critical habitat. Section 7 applies to management of Federal lands as well as other Federal actions that may affect listed species, such as Federal approval of private activities through the issuance of Federal permits, licenses, or other actions. A jeopardy determination is made for a project that is reasonably expected, either directly or indirectly, to appreciably reduce the likelihood of both the survival and recovery of a listed species in the wild by reducing its reproduction, numbers, or distribution (50 CFR § 402.02). A no-jeopardy opinion may include reasonable and prudent measures that minimize the amount or extent of incidental take of listed species associated with a project. In some cases, methods to relieve a jeopardy opinion can include purchase or easement on a property to protect that species.

Section 9 of the Act

Section 9 prohibits the taking of any federally listed endangered or threatened species. Section 3(18) defines “take” to mean “to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct.” Service regulations (50 CFR § 17.3) define “harm” to include significant habitat modification or degradation which actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering. Harassment is defined by the Service as an intentional or negligent action that creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering. The Act provides for civil and criminal penalties for the unlawful taking of listed species. Incidental take refers to taking of listed species that results from, but is not the purpose of, carrying out an otherwise lawful activity by a Federal agency or applicant (50 CFR § 402.02).

Section 10 of the Act

For projects without a Federal nexus that would likely result in incidental take of listed species, the USFWS may issue incidental take permits to non-Federal applicants pursuant to sections 10(a)(1)(A) and 10(a)(1)(B). Section 10(a)(1)(A) permits allow take of a listed species for scientific purposes for the enhancement of survival of the species. The Service has issued 10(a)(1)(A) permits for the taking of CWTD to JBH NWR, Ridgefield NWR, WDFW, USDA Wildlife Services, and the Cowlitz Indian Tribe. To qualify for an incidental take permit under section 10(a)(1)(B), applicants must develop, fund, and implement a Service-approved Habitat Conservation Plan (HCP) that details measures to minimize and mitigate the project’s adverse impacts to listed species. Regional HCPs in some areas now provide an additional layer of regulatory protection for covered species. A Safe Harbor Agreement (SHA) is a voluntary agreement whereby a section 10(a)(1)(B) permit is also granted and involves private or other non-Federal property owners whose actions contribute to the recovery of species listed as threatened or endangered under the Act. In exchange for actions that contribute to the recovery of listed species on non-Federal lands, participating property owners receive formal assurances from the Service that if they fulfill the conditions of the SHA, the Service will not require any

additional or different management activities by the participants without their consent. Central to this approach is that the actions taken under the SHA will provide a net conservation benefit that contributes to the recovery of the covered species.

- Washington: The Washington Department of Natural Resources (WDNR) implemented an HCP that covers 1.6 million acres (647,500 ha) of State land in five planning units and an experimental forest. Their HCP technically includes the CWTD, as their land ownership overlaps the range of the deer. Some of these lands are leased to private entities for agricultural uses (WDNR 1997, p. III-51). However, the WDNR HCP does not address agricultural activities and the leasing of agricultural lands. Any take of CWTD that may result from agricultural activities, or any other non-timber resource activities on those lands, is not authorized under the HCP. At the time of signing of the HCP, WDNR also leased lands to the JBH NWR. However, those lands have since been purchased by the JBH NWR (Paul Meyers, Biologist, JBH, Cathlamet, Washington, pers. comm., 2011). There are no SHAs currently covering the CWTD in Washington.
- Oregon: There are no HCPs or SHAs currently covering the CWTD in Oregon.

State Laws and Regulations

Washington

Although there is no State Endangered Species Act in Washington, the Washington Fish and Wildlife Commission has the authority to list species (RCW 77.12.020) and they listed CWTD as endangered in 1980. State listed species are protected from direct take, but their habitat is not protected (RCW 77.15.120). Under the Washington State Forest Practices Act the Washington State Forest Practices Board has the authority to designate critical wildlife habitat for State listed species affected by forest practices (WAC 222-16-050, WAC 222-16-080), though there is no critical habitat designated for CWTD.

The Washington Department of Fish and Wildlife's (WDFW) hunting regulations remind hunters that CWTD are listed as endangered by the State of Washington (WDFW 2011, p. 71). This designation means it is illegal to hunt, possess, or control CWTD in Washington. This designation adequately protects individual CWTD from direct harm, but offers no protection to CWTD habitat.

The Washington State Legislature established the authority for Forest Practices Rules (FPR) in 1974. The Forest Practices Board established rules to implement the Forest Practices Act in 1976 and has amended the rules continuously over the last 30 years. The Washington Department of Natural Resources (WDNR) is responsible for implementing the FPR and is required to consult with WDFW on matters relating to wildlife, including CWTD. The FPR do not specifically address CWTD, but they do address threatened and endangered species under their "Class IV-Special" rules (WAC 222-10-040; WDNR 2011, pp. 10-2 to 10-3). If a landowner's forestry-related action would "reasonably...be expected, directly or indirectly, to reduce appreciably the likelihood of the survival or recovery of a listed species in the wild by

reducing the reproduction, numbers, or distribution of that species...” the landowner would be required to comply with the State’s Environmental Policy Act (SEPA) guidelines before they could perform the action in question. SEPA guidelines can require the landowner to employ mitigation measures or they may place conditions on the action such that any potentially significant adverse impacts would be reduced. Compliance with the FPR does not substitute for or ensure compliance with the Federal Endangered Species Act. A permit system for the scientific taking of State-listed threatened and endangered wildlife species is managed by the WDFW.

Oregon

The Oregon Department of Fish and Wildlife (ODFW) does not allow hunting of CWTD in all of western Oregon, except for controlled hunt areas near Roseburg, Oregon (ODFW 2011a). CWTD (Columbia River DPS) are not listed by the State of Oregon (ODFW 2011b), but because they are federally listed as endangered, they fall under the hunting regulations’ “protected mammal” status (ODFW 2011a.). This designation adequately protects individual CWTD from direct harm, but offers no protection to CWTD habitat.

Oregon Revised Statutes (ORS) 564.100 to 564.135 are pursuant to State-listed threatened or endangered plant species and are implemented, interpreted, and/or prescribed in Oregon Administrative Rule (OAR) Chapter 603, Division 73. ORS 564.120(1) states that “no person shall take, import, export, transport, purchase or sell, or attempt to take, import, export, transport, purchase or sell any threatened species or endangered species” listed by the State. All federally listed plant species are automatically protected under State law as well. State agencies shall consult and cooperate with the Oregon Department of Agriculture (ODA) prior to implementation of any ground- or vegetation-disturbing land action or project to conserve and protect State-listed species. State agencies are defined in OAR 603-073-0002(16) as “any publicly funded governmental subdivision of the State of Oregon including, but not limited to, state, county, and municipal agencies, public utility districts, state institutions of higher learning, public school districts, port authorities, public irrigation districts, and publicly owned airports.”

The State may authorize a permit for the scientific taking of a threatened or endangered species for “activities associated with scientific resource management such as research, census, law enforcement, habitat acquisition and maintenance, propagation and transplantation.” State agencies are responsible for ensuring that ORS 564 (and its related OAR) requirements are satisfied before any land action is initiated, whether that action is conducted by the agency itself or by another party.

According to ORS 496.004(19), the term “wildlife” means “fish, shellfish, wild birds, amphibians and reptiles, feral swine as defined by State Department of Agriculture rule and other wild mammals.” The term is further defined in OAR 635-100-0001(5) as “fish and wildlife species, subspecies and populations.” State-listed threatened and endangered wildlife species are addressed in ORS 496.171 to 496.192 and ORS 498.026, and these statutes are implemented, interpreted, or prescribed in OAR Chapter 635, Division 100. Upon listing of a species in the State, the State Fish and Wildlife Commission establishes guidelines that it considers necessary to ensure the survival of individual members of the species. These guidelines may include take

avoidance and protecting resource sites such as spawning beds, nest sites, nesting colonies or other sites critical to the survival of individual members of the species (ORS 496.182(2)). ORS 498.026(1) states that “no person shall take, import, export, transport, purchase or sell, or attempt to take, import, export, transport, purchase or sell any threatened or endangered species, or the skin, hides or other parts thereof, any article made in whole or part from the skin, hide or other parts of any threatened or endangered species.” A permit system for the scientific taking of State-listed threatened and endangered wildlife species is managed by the ODFW. An incidental taking permit or statement issued by a Federal agency for a species listed under the Federal Endangered Species Act “shall be recognized by the State as a waiver for any state protection measures or requirements otherwise applicable to the actions allowed under the federal permit” (ORS 96.172(4)).

The Oregon Forest Practices Act (ORS 527.610 to 527.992 and OAR Chapter 629, Divisions 600 to 665) lists protection measures specific to private and State-owned forested lands in Oregon. These measures include specific rules for resource protection, including threatened and endangered species. Compliance with the forest practice rules does not substitute for or ensure compliance with the Federal Endangered Species Act.

The Oregon Department of Forestry recently updated their Northwest Oregon Forest Plan (ODF 2010). There is no mention of CWTD in their Forest Plan, but they do manage for elk and black-tailed deer. Many management recommendations that benefit elk and back-tailed deer will also benefit CWTD, where the species coexist.

Landowners and operators are advised that Federal law prohibits a person from taking certain threatened or endangered species which are protected under the Act (OAR 629-605-0105).

Summary of Section 2.3.2.4

Based on our analysis of the existing regulatory mechanisms, we have found a diverse network of laws and regulations that provide varied protections to the CWTD and its habitat rangewide. Specifically, CWTD habitat that occurs in the United States on National Wildlife Refuges is protected under the National Wildlife Refuge System Improvement Act of 1997. On Federal lands, the Act protects both the species and its habitat, and “take” of CWTD is prohibited on all lands without a permit from the Service. NEPA requires a rigorous analysis of impacts from activities with a Federal nexus. Additionally, the CWTD receives some protection under State laws in Washington and Oregon. Both States have regulations that protect CWTD from direct harm, but do not offer protection to CWTD habitat. Based on our review of the best available scientific information, we conclude that adequate regulatory mechanisms are in place to protect the species, now and in the foreseeable future. However, protection of CWTD habitat off of Federal lands is not required by any such regulations.

2.3.2.5 Other natural or manmade factors affecting its continued existence:

Hybridization

Hybridization with CBTD was not considered a significant threat to the Columbia River DPS of CWTD at the time of the development of the Revised Recovery Plan (USFWS 1983). However, later studies raised concerns over the presence of BTB genes in the isolated Columbia River DPS population. Gavin and May (1988) found evidence of hybridization in 6 of 33 samples of CWTD on the JBH Mainland Unit and surrounding area by analyzing electrophoretic loci. A later study employing mtDNA analysis revealed evidence of hybridization on Tenasillahe Island, but not the JBH Mainland Unit (Piaggio and Hopken 2009). On Tenasillahe Island, 32 percent (n=8) of deer tested and identified as CWTD contained BTB haplotypes. Preliminary evidence shows no morphological differences in WTD/BTB hybrids, suggesting molecular analysis may be the only evaluative tool in tracking hybridization trends. These data suggest that these genes may have been due to a single hybridization event that is being carried through the Tenasillahe Island population.

Translocation efforts have at times placed CWTD in areas that support BTB populations. While few BTB inhabit the JBH Mainland Unit or Tenasillahe Island, the Upper Estuary Islands population may experience more interspecific interactions. Aerial FLIR survey results in 2006 detected 44 deer on the 4-island complex of Fisher/Hump and Lord/Walker. Using the proportion of CWTD to BTB sightings on trail cameras on these islands, Refuge biologists estimated that at most, 14 of those detected were CWTD (USFWS 2007). A study conducted in 2010 by the JBH NWR and the National Wildlife Research Center (Piaggio and Hopken 2010) using fecal samples collected on Crims, Lord, and Walker Islands showed no hybridization in any of the samples collected, suggesting a low tendency to hybridize even in island situations.

The actual threat of hybridization has probably not changed since listing the CWTD. However, hybridization can affect the genetic viability of the Columbia River DPS and additional research regarding hybridization could give broader insight to the implications and occurrence of this phenomenon, and how it may influence subspecies designation.

Vehicle collisions

Collision with vehicles remains a concern, especially with respect to newly translocated CWTD. In 2010, 15 CWTD were translocated to Cottonwood Island, Washington, from Westport, Oregon. Seven of those translocated CWTD were killed by collisions with vehicles on US Highway 30 in Oregon and on Interstate 5 in Washington (Cowlitz Indian Tribe 2010). JBH NWR personnel recorded four CWTD killed by vehicle collisions in 2010 along Highway 4 and on the JBH Mainland Unit. These were deer that were either observed by Refuge personnel or reported directly to the JBH NWR. The Washington Department of Transportation removes road kills without reporting species details to the JBH NWR, so the actual number of CWTD struck by cars in Washington is probably higher. Since the 2013 translocation, ODFW has requested that Oregon Department of Transportation (ODOT) personnel assigned to stations along Hwy 30 report any CWTD mortalities that they find. So far, they have been contacting the Oregon State Police and occasionally ODFW staff when they find one with collars or ear tags. It is uncertain

if the ODOT staff report un-marked CWTD mortalities (Don VandeBergh, Biologist, Oregon Department of Fish and Wildlife, Salem, Oregon, pers. comm., 2013). Given that the JBH Mainland Unit currently supports approximately 35 to 46 CWTD, this could be a significant source of adult mortality. The threat of deer collisions may increase over time as CWTD are translocated closer to urban areas and agricultural areas see increased housing development, but it is unlikely to ever rise to the level of putting the DPS at risk of extinction.

Climate Change

Although in the foreseeable future, climate change and rising sea levels will not put the Columbia River DPS at risk of extinction, they could potentially represent a longterm future threat to CWTD occupying low lying habitat that is not adequately protected by well-maintained dikes. Climatic models have predicted significant sea level rise over the next century (Glick *et al.* 2007). Rising sea levels could degrade or inundate current habitat, forcing CWTD to move out of currently used habitat along the Columbia River into marginal or more developed habitat. A rise in groundwater levels could lower forage quality and allow invasive plants to expand their range into new areas. Maintaining the integrity of existing flood barriers that protect CWTD habitat will be important to the recovery of the Columbia River DPS until greater numbers of CWTD can be relocated to upland habitat. The JBH Mainland Unit has experienced three storm-related floods since 1996. While this could be a cluster of storms in the natural frequency of occurrence, it could also indicate increased storm intensity due to climate change. These flooding events have been associated with a sudden drop in the CWTD population, which then slowly recovers. An increased rate of occurrence of these events, however, could hinder recovery and permanently reduce this subpopulation. The potential for increased numbers of flooding events could also lead to increases in the occurrence of hoof disease and other deer maladies. There are no known existing regulatory mechanisms currently in place at the local, State, national, or international level that effectively address these types of climate-induced threats to CWTD habitat.

The National Wildlife Federation has employed a model to predict changes in sea level in Puget Sound, Washington, and along areas of the Oregon and Washington coastline. The study predicted an average rise of 2.26 ft (0.69 m) in the Columbia River region, compared to a global average rise of 0.92 ft (0.28 m) by 2050 (Glick *et al.* 2007). The local rise in sea level translates into an estimated loss of over 11,000 ac (4,452 ha) of undeveloped dry land by 2050. Tidal and inland fresh marsh habitats also face high losses according to this model. By 2050, these low lying habitats could lose from 17 to 37 percent of their current area due to an influx of saltwater. In addition, since the JBH Mainland Unit and Tenasillahe Island were diked in the early 1900s, the land within the dikes has subsided, causing the land in those areas to drop to a level near or below groundwater levels. This in turn has degraded CWTD habitat quality. Although salt-water intrusion does not extend this far inland, the area experiences 7- to 8-foot tidal shifts due to a backup of the Columbia River. Sea-level rise may further increase groundwater levels on both of these units. The long-term stability of the Columbia River DPS of CWTD may rely on the availability of and access to high quality upland habitat protected from the effects of sea-level rise; however, in the foreseeable future, climate change is not a threat that puts the Columbia River DPS at risk of extinction.

Social Factors in Expanded Distribution

One of the challenges in expanding the distribution of the species, and therefore ensuring its longevity, is the perception that the “endangered” status of this species will affect land management decisions and hamper efforts to deal with human/animal conflicts. Thorough outreach and coordination with local landowners and state entities responsible for dealing with animal damage mitigation, has been critical to the success of prior translocation efforts. While adequate habitat exists in areas outside of the current range, habitat barriers between these sites often prevents natural distribution to these areas. Where possible, the Service has physically translocated animals past these barriers, but the social and political environment over much of the historical range has presented a challenge to expanding further translocation efforts as long as the CWTD remains listed as endangered. While these social factors are not a threat that puts the Columbia River DPS at risk of extinction they are important to consider with respect to long-term recovery strategy, and they highlight the need for enhanced landowner incentives and overall partnership development.

2.4 SYNTHESIS

2.4.1 Summary of Threats

Based on the most recent comprehensive survey data from 2010 and 2011, the Columbia River DPS has approximately 600 CWTD in 3 viable subpopulations, 2 of which are considered secure, Tenasillahe Island and Puget Island. The Service has expanded the range of the DPS upriver from its eastern-most range of Wallace Island in 1983 to Ridgefield, Washington, presently. The Ridgefield NWR population is expected to grow and represent a sixth subpopulation, and potentially the third secure and viable subpopulation. In addition, the JBH Mainland unit is expected to return to a level above 50 animals after the levee is repaired. The Columbia River DPS population has consistently exceeded the minimum population criteria of 400 CWTD over the past two decades, but the JBH Mainland Unit subpopulation has experienced a decline since the late 1980s. Due to the lack of contiguous habitat along much of its range, CWTD have been translocated to establish new subpopulations.

Although the Columbia River DPS has certainly been negatively affected by habitat loss, fragmentation, and modification in the past, it appears that many of the changes currently occurring in land use patterns within the current range are compatible with the habitat needs of CWTD. The 30-year population trends from Puget Island and Westport/Wallace Island suggest that CWTD can maintain stable populations on suitable habitat that is not formally set aside by acquisition or agreement for the protection of the species. Within this context, we evaluated the current status of CWTD under a broadened framework of what constitutes “secure” habitat to include locations that, regardless of ownership status, have supported viable subpopulations of CWTD for 20 or more years and for which the type of development expected in the future is unlikely to adversely affect CWTD numbers. Under this new definition, Puget Island is now considered secure habitat for CWTD. The Westport/Wallace Island has the potential to be considered secure, but the majority of this subpopulation occurs on land owned by a single entity, and future development of this land is unknown. Secure status would require a

commitment by the main landholder to maintain sufficient CWTD habitat into the foreseeable future.

Coyotes have consistently been identified as the main cause in fawn mortalities, and lethal control of these predators appears to have shown some success. Research indicates that greater population gains may be achieved with increases in doe survival plus fawn recruitment than with increases in fawn recruitment alone. Predator control has less of an impact on doe survival than does improving habitat quality. Continuing predator control until subpopulation abundance objectives are reached, as well as improving the quality of forage habitat, should remain primary management objectives at both JBH and Ridgefield NWRs.

Hybridization and low genetic diversity recently have been identified in the Columbia River DPS. Evidence of low-level hybridization was detected among CWTD on JBH NWR, but future genetics work could give a broader insight to the implications and occurrence of this phenomenon. New information revealed a low genetic diversity among CWTD, which compounds the threat of hybridization. An increase in the incidence of hybridization beyond current levels could potentially affect the subspecies designation of the CWTD.

The predicted rise in sea level by climate change models could be the greatest future threat to any low-lying habitat of the Columbia River DPS not adequately protected by dikes. Maintenance of dikes and tidegates is paramount to protecting currently occupied lowland habitat on and off Refuge lands in the DPS. However, to ensure the long-term recovery of the species, priority must be placed on identifying suitable high quality upland habitat and to develop partnerships with state wildlife agencies to facilitate the translocation of CWTD to these areas.

Based on our review of the best available scientific information, we conclude that adequate regulatory mechanisms are in place to protect the species, now and in the foreseeable future. But protection of CWTD habitat off of Federal lands is not required by any such regulations.

From this review, it is apparent that since the publication of the Revised Recovery Plan in 1983, threats from habitat loss or degradation still remain but are less severe than previously thought and do not rise to the level of putting the entire DPS at risk of extinction. The threat of predation can exist at a subpopulation level if predator control is not implemented but does not rise to the level of putting the entire DPS at risk of extinction. Vehicle collisions, disease and hybridization, and social resistance to expanded distribution do not pose a threat of extinction to the DPS. Finally, the threat of sea-level rise due to climate change could potentially be a long term threat to subpopulations that reside on low lying land that is not adequately protected by dikes, but this threat does not rise to the level of putting the DPS at risk of extinction in the foreseeable future.

Despite the continued threats to the Columbia River DPS population, a clear path to delisting, as it is currently defined with regard to population and distribution goals, does exist and could occur in several ways. The first possibility is to carefully manage the population at Ridgefield NWR so that the new subpopulation grows and stabilizes somewhere over the viability threshold. Management needs at Ridgefield include, but are not limited to, monitoring, continued predator

control, and possibly another translocation of CWTD to supplement the new population. The second could occur after the setback dike at the JBH Mainland Unit is constructed; this dike would provide the habitat security needed for the JBH Mainland Unit subpopulation to return to secure status. A third option may exist in the Westport/Wallace Island subpopulation. If the Service can find a way to ensure that management activities in this area remain compatible with CWTD, then that subpopulation could potentially be considered secure. Finally, a fourth option would be for the Service, in partnership with ODFW and WDFW, to identify potential translocation areas outside of the current occupied range of CWTD that contain high quality upland habitat, and subsequently establish new subpopulations in these areas.

The Columbia River DPS has two viable and secure subpopulations and still needs a third viable population to reach the Revised Recovery Plan delisting goals. However, this review has highlighted the fact that CWTD are on an upward trajectory toward recovery and there are several possible pathways that will lead the DPS to meet the Revised Recovery Plan's delisting criteria. Furthermore, by reclassifying the DPS to threatened, additional tools and partnerships will become available that we believe will promote and facilitate full recovery and delisting of the DPS. Downlisting would facilitate the development of a 4(d) rule that would tailor take prohibitions to better match the activities associated with this species' recovery. State, tribal, and other partners would be inclined to work with the Service on a wider array of recovery actions if a 4(d) rule was in place. Additionally, reclassification would increase the potential for implementation of actions such as a 10(j) experimental reintroduction of CWTD into habitat outside of their current range.

2.4.2 Application to Endangered Species Act (Act) Definitions and Service Regulations/ Policy

To translate the available biological information and threats into a regulatory/policy recommendation under the Act, we considered terminology embedded in the regulatory definitions, including endangered and threatened, listable entity, foreseeable future, and significant portion of its range.

The Act defines an “endangered” species as one that is in danger of extinction throughout all or a significant portion of its range. A “threatened” species is one that is likely to become endangered in the foreseeable future.

The “foreseeable future” definition is applicable to the threatened species definition. This term is not defined in the Act and the Service has not promulgated rules to define foreseeable future. What we can reasonably predict in the future varies by species, and depends on the scientific information available, species status and historic trends, threats (type, distribution, rate, and permanence), current conservation measures, etc. There is no single, straightforward methodology to describe foreseeable future, which complicated our efforts to define this term. Additionally, there have been no population viability analyses for this species to help inform our definition. As such, we defined the foreseeable future for CWTD as 50 years.

This species has not fully recovered and still faces some threats. While recovery efforts have been ongoing and have made some progress, there are still gains to be made before the species

meets delisting criteria. Translocation efforts have proved promising to help ultimately recover this species. Future recovery activities that include translocation will target areas with higher quality upland habitat to provide CWTD with greater potential for a robust recovery.

2.4.3 Conclusion

We recommend that CWTD be reclassified as threatened, because the status has improved, the downlisting criteria have been met, and threats have decreased since listing to a point where no threat puts the DPS at risk of extinction. There are currently three viable subpopulations and two of them are secure, Tenasillahe Island and Puget Island. The other viable subpopulation, Westport/Wallace Island, is not currently considered secure but has the potential to meet that criterion in the near future. The main threats continuing to affect CWTD populations throughout its range are habitat fragmentation, loss, and modification, though these are less of a threat than previously thought.

3.0 RESULTS

3.1 RECOMMENDED CLASSIFICATION

- Downlist to Threatened
- Uplist to Endangered
- Delist
- Extinction*
- Recovery*
- Original data for classification in error*
- No change is needed

3.2 NEW RECOVERY PRIORITY NUMBER: 15

Brief Rationale:

The Columbia River DPS of CWTD has met the downlisting criteria in the Revised Recovery Plan (USFWS 1983) as redefined in this review. The DPS has maintained a minimum of 400 CWTD since 1984. There are currently 3 viable subpopulations of CWTD: Tenasillahe Island with 90 deer; Puget Island with 159 deer; and Westport/Wallace Island with 163 deer. Finally, two of these viable subpopulations, Tenasillahe Island and Puget Island, are considered secure.

Tenasillahe Island, Puget Island, and Westport/Wallace Island subpopulations have also shown long-term stability over the last 30 years. The Columbia River DPS has a high recovery potential due to the following: the establishment of a new subpopulation in higher quality upland habitat at Ridgefield NWR, the likely recovery of the JBH Mainland Unit subpopulation after the construction of the set-back dike in summer/fall of 2013, and the long-term stability exhibited by the Westport/Wallace Island subpopulation.

3.3 LISTING AND RECLASSIFICATION PRIORITY NUMBER, if reclassification is recommended

Reclassification (from Threatened to Endangered) Priority Number:

Reclassification (from Endangered to Threatened) Priority Number: 2

Delisting (Removal from list regardless of current classification) Priority Number:

Brief Rationale:

The recommended reclassification of CWTD from Endangered to Threatened is an unpetitioned action but it would have a high management impact. Maximum protection under the Act is no longer necessary because the DPS has met downlisting criteria. Furthermore, if the take prohibition for CWTD were appropriately modified, our State partners would have more flexibility in implementing CWTD recovery actions.

4.0 RECOMMENDATION FOR FUTURE ACTIONS

Suggested recommendations to address and implement, in an effort to search for enhanced approaches to realize recovery goals of the Columbia River CWTD DPS, are listed below. These actions should occur prior to the next 5-year review or longer as needed, given the timeline or complexity of completing a particular recommendation.

- 1) Conduct a population viability analysis (PVA) of the Columbia River DPS of CWTD to address adequacy of recovery priorities and activities (this recommendation should be conducted as soon as possible as the results will affect other recovery action items for CWTD). Given that such a large proportion of CWTD reside on unprotected habitats, consideration should be given to whether the overall population, minimum secure subpopulations, and distribution of the deer within the subpopulations are still adequate to achieve recovery.
- 2) Identify high quality upland habitat in areas that might support populations of CWTD regardless of land ownership:
 - a) Develop a broad-based GIS map to identify potential suitable habitat over a large part of the Lower Columbia River basin, regardless of land ownership.
 - b) Work closely with ODFW, WDFW, CLT, and the Cowlitz Tribe to identify additional high quality upland habitat within the historic range of CWTD.
 - c) Conduct outreach to landowners/managers to determine the potential for translocation and restoration activities.
- 3) Explore the feasibility of recovery tools that facilitate the relocation of species into higher quality habitat such as:
 - a) Section 10(j) of the Act to establish an experimental population of CWTD onto other Federal, State, Tribal, or private lands within CWTD historical range (consider habitat and land use practices that are similar to Douglas County DPS, as well as

- habitat that is not subject to rising sea levels and the associated stressors of disease and poor-quality forage).
- b) Habitat Conservation Planning under section 10(a)(1)(B) of the Act to work with non-federal partners in establishing conservation objectives and planning that would help protect CWTD
 - c) Discuss a partnership with ODFW and WDFW to facilitate the translocation of CWTD into areas of higher quality upland habitat.
 - d) Due to past high rates of capture-related mortality, review translocation methods with regard to target habitat types, locations, timing, etc., to evaluate effectiveness. Discuss the pros and cons of various methods currently used and, if warranted, revise/develop methodology to enhance translocation methods, including evaluation of variables such as site specificity, timing, changes in technology and methods (e.g., soft release techniques), etc.
 - e) Work with State, Federal, Tribal, and non-governmental entities to overcome barriers to establishing populations in new areas, being sure to address adequate habitat needs as well as potential damage concerns.
 - f) Develop habitat restoration and management guidelines that will benefit CWTD for private, State, Federal, Tribal, and non-governmental landowners.
- 4) Continue habitat restoration and enhancement efforts on currently occupied CWTD habitat as well as on potential future CWTD translocation areas.
 - a) Continue habitat restoration and enhancement efforts on the JBH Mainland Unit, including pasture restoration, tree planting for browse and cover, and invasive species control.
 - b) Increase restoration efforts on the Upper Estuary Islands to promote a sustainable subpopulation of animals there.
 - 5) Continue predator control on the JBH and Ridgefield NWRs.
 - 6) Monitor translocated CWTD.
 - 7) Work with ODFW and WDFW to address potential animal damage issues as CWTD expand their range.
 - 8) Explore options to conduct additional translocations of CWTD (especially females) to Ridgefield NWR.
 - 9) Conduct a second controlled trial for FLIR using humans on the ground in pre-arranged locations over the three habitat types normally found during surveys. This will help confirm the previous trial and its finding that FLIR undercounts CWTD by an average of 25 percent.
 - 10) Explore opportunities for the Service or State, Federal, Tribal, and non-governmental partners to acquire lands or conservation easements in areas where CWTD already exist or in areas adjacent to current CWTD subpopulations.

- 11) Evaluate CWTD body condition on JBH lands:
 - a) Capture, collar, and recapture CWTD repeatedly to assess body fat and pregnancy condition in different habitat types over time and evaluate differences, especially after habitat improvements have been made (e.g., JBH Mainland Unit, Tenasillahe Island, Crims Island, etc.).
 - b) Compare body condition results to Douglas County DPS CWTD conditions.
 - c) Continue documenting diet composition especially as habitat enhancements are implemented.
 - d) Understanding diet composition of CWTD can be useful in understanding forage use and body condition. Given this understanding, habitat manipulations could be implemented and diet information could be re-collected in time increments to understand changes in body condition. This information could provide input to management decisions regarding habitat and forage type, quality, and quantity.

- 12) Conduct studies at Ridgefield NWR.
 - a) Continue population estimation methods (e.g., FLIR surveys, ground counts) to monitor population trends for the Columbia River DPS.
 - b) Review current population estimation methods, to determine if they are robust enough to adequately assess both true population size and to identify trends in the subpopulations. This includes area that may not have been surveyed before, but which may contain CWTD. The BTD:CWTD ratio may vary from site-to-site, complicating population estimates.

- 13) Assess the long-term recovery value of working toward either securing the habitat that maintains the Westport/Wallace Island subpopulation, or obtaining a landowner agreement that provides a management commitment to continue predator control.
 - a) How important is it to ensure the current management at Westport continues?
 - b) Should the Service or State, Federal, Tribal, and non-governmental partners invest time and money to do so?

- 14) Review implications of the lack of genetic distinctness between northeastern Oregon white-tailed deer and Columbia River DPS deer.
 - a) Researchers suggest augmenting the Columbia River DPS gene pool with individuals from the Douglas County DPS and the northeastern Oregon population of *Odocoileus virginianus ochrorous*, the latter of which has proven to be genetically similar to, but more diverse than the CWTD.
 - b) Researchers suggest that subspecific designation may not be warranted for CWTD due to the observed genetic similarity between CWTD and *O. v. ochrorous*. This potential should be further investigated.
 - c) Gather genetic information of CWTD at different sites.
 - d) Cooperate with ODFW and WDFW to gather additional white-tailed deer genetic samples from southeast Washington and northeast Oregon.
 - e) Consider the efficacy and feasibility of augmenting the Columbia River DPS with deer from the Douglas County population or the northeastern Oregon population.

- 15) Address fawn predation and doe survival.
 - a) Determine whether predator control needs to continue indefinitely at JBH NWR, Ridgefield NWR, Westport, and other sites.
 - b) Determine if predator control needs to occur prior to translocation efforts, or in conjunction with those efforts.
- 16) Determine why sex ratios in some areas are skewed: natural mortality rate of CWTD on JBH – does 20 percent, bucks 40 percent.
- 17) Review the current range of the Columbia River DPS as described in the Revised Recovery Plan and re-evaluate whether additional areas/counties should be included.
- 18) Discuss the status of the Upper Estuary Islands subpopulation and its potential to become a 3rd secure subpopulation.
 - a) Is it possible to include Wallace Island in the Upper Estuary Islands numbers with the requirement that manual genetic interchange would occur over the long-term if necessary?
 - b) Evaluate CWTD movement off of Cottonwood Island following the 2010 and 2013 translocations. Attempt to identify why most CWTD leave the island after translocation. Determine whether or not it is worth continuing to try and establish a stable population on Cottonwood Island.
- 19) Recommendations on future management, research, or recovery actions should be developed to address the potential threats that need evaluation given the discussion in this status review:
 - a) Habitat loss/degradation
 - b) Fawn survival
 - c) Predation pressures
 - d) Climate change/flooding
 - e) Hybridization
 - f) Genetic diversity
 - g) Doe survival

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Signature Page
U.S. Fish and Wildlife Service

5-YEAR REVIEW of the
Columbia River Distinct Population Segment of the
Columbian White-tailed Deer (*Odocoileus virginianus leucurus*)

Current Classification: Endangered

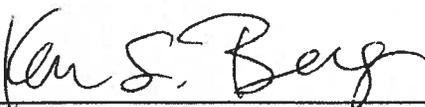
Recommendation resulting from the 5-year Review:

- Downlist to Threatened**
- Uplist to Endangered**
- Delist**
- No change needed**

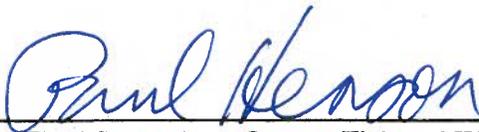
Appropriate Listing/Reclassification Priority Number, if applicable: 2

Review Conducted by: Theodore Thomas, Washington Fish and Wildlife Office
 Rebecca Toland, Oregon Fish and Wildlife Office

FIELD OFFICE APPROVAL:

Approve 
Lead Field Supervisor, Washington Fish and Wildlife Office

Date 11/4/13

Concur 
Cooperating Field Supervisor, Oregon Fish and Wildlife Office

Date 11/5/13