SPECIES AND HABITAT: WILDLIFE APPENDIX

WL Appendix - A: Acres by Stand Type by Drainage

Table Wild_Apdx: BLM Acres by Stand Age (Wildlife Age Classes) from GIS FOI data updated to 1997

		0-40 yrs	41-80 yrs	81-120 yrs	121-160 yrs	161-200 yrs	201+ yrs	NF	all BLM ac.	BLM ac. with 81 yrs+	percent ac. with 81 yrs+
Acres by drainage in the Panther Ck. Subwatershed	Bear Gulch	309	23	0	0	0	59	0	390	59	15.0%
	Little Cow Ck.	78	0	0	0	0	76	0	154	76	49.6%
	Lost1 Ck.	0	0	0	0	0	0	0	0	0	0.0%
	Panther Ck.	165	260	71	0	0	247	0	743	318	42.8%
	Williams R.	0	0	0	0	0	0	0	0	0	0.0%
	Wilson Ck.	183	0	34	0	0	257	2	477	292	61.2%
Total for Panther Ck. Subwatershed		**734**	**283**	**105**	**0**	0	639	2	1,764	745	42.2%
Acres by drainage in the Cedar Ck. Subwatershed	Arrow Ck.	409	0	0	0	0	453	0	861	453	52.6%
	Goose Gulch	844	0	0	0	0	7	15	866	7	0.9%
	Mid. Williams R	140	6	1	20	0	0	0	168	21	12.7%
	Lower Cedar Ck.	63	2	0	23	0	0	0	88	23	26.0%
	Upper Cedar Ck.	571	162	329	260	0	133		1,455	722	49.6%
Total for Cedar Ck. Subwatershed		**2,027**	**170**	**330**	**303**	**0**	**593**	**15**	**3,439**	**1,226**	**35.7%**
Acres by drainage in the Tioga Ck. Subwatershed	Burnt Ck.	572	242	1,243	0	0	309	2	2,367	1,552	65.6%
	Lower Tioga Ck.	2,578	666	79	0	0	1,818	29	5,170	1,896	36.7%
	Middle Tioga Ck.	1,092	845	1,024	9	0	583		3,554	1,617	45.5%
	Upper Tioga Ck.	2,974	253	44	0	0	1,401	15	4,687	1,445	30.8%
Total for Tioga Ck. Subwatershed		**7,216**	**2,006**	**2,390**	**9**	**0**	**4,111**	**46**	**15,778**	**6,510**	**41.3%**
Acres by drainage in the South Coos Subwatershed	Daniels Ck.	1,576	1,081	732	313	0	54	1	3,757	1,099	29.2%
	Dellwood	0	0	0	0	0	0	0	0	0	0.0%
	Coos Mouth	3	0	256	22	0	0	2	283	278	98.2%
	So. Fk. Coos R.	706	280	0	0	0	460	12	1,458	460	31.6%
	Cox Ck.	487	731	0	0	0	275	0	1,493	275	18.4%
	Coal Ck.	548	0	19	0	0	1,086	0	1,654	1,105	66.8%
	Fall Ck.	0	0	0	0	0	0	0	0	0	0.0%
	Mink Ck.	798	2	54	0	0	620	0	1,473	674	45.7%
	Bottom Ck.	185	0	0	0	5	268	0	457	273	59.6%
	Lower Williams R.	272	9	95	240	0	537	16	1,169	872	74.6%
Total for South Coos Subwatershed		**4,575**	**2,102**	**1,155**	**575**	**5**	**3,300**	**31**	**11,744**	**5,036**	**42.9%**
Total BLM acs. in the South Fork Coos Watershed		**14,553**	**4,562**	**3,981**	**888**	**5**	**8,644**	**94**	**32,726**	**13,518**	**41.3%**
Percent of BLM acs. in each age class		**44.5%**	**13.9%**	**12.2%**	**2.7%**	**0.0%**	**26.4%**				

WL Appendix - B: Northern Spotted Owl Habitat

The WL Appendix-B Map 1:Northern Spotted Owl Habitat was prepared by reclassing Western Oregon Digital Image Product (WODIP) vegetation data. The WODIP vegetation data are satellite data from Landsat Thematic Mapper. We reclassified the WODIP data based on the criteria used when we stratified FOI data (Instruction Memorandum No. OR-91-447) for use in the Spatially Explicit Life-History Simulator for the Northern Spotted Owl (Appendix IV-I USDI 1992). The results from that simulation were used in preparing the Draft Coos Bay District RMP-EIS (USDI 1992).

The reclass options in WODIP do not directly correspond to the query options in FOI. We approximated the earlier sort criteria as shown in Table NSO-1:

Table NSO-1: Northern Spotted Owl Habitat WODIP Reclass

FOI Query for Life-History Simulator:	WODIP Reclass:	reclass #
21 inch+ d.b.h., and 2-bar stocking or better or 21 inch+ d.b.h., 1-bar stocking with an understory	20 inch+ d.b.h., and 35% to 95% crown closure or 20 inch+ d.b.h., 5% to 95% crown closure, and 2-story	conifer: 6 hdwd: 9 mixed: 12
11 to 21 inch d.b.h., 2-bar stocking or better	10 to 19 inch d.b.h., and 35%+ crown closure	conifer: 5 hdwd: 8 mixed: 11
not apply	water	1
	urban and agriculture	2
	clearcuts, nonforest, barren, young plantations, other	3
	Nonsuitable stands: stands averaging <10 inches d.b.h. or stands <35% and 1-story	conifer: 4 hdwd: 7 mixed: 10

Data Limitations (from the WODIP Handbook):
The Landsat data has a pixel size of 30 by 30 meters. Any feature less than 30 meters across will probably not be identified in the imagery. Exceptions include features that are drastically different from their surroundings. Vegetation maps derived from satellite data strive to attain an overall accuracy of 80%. Some cover types have unique energy reflective properties that are easier to identify, and therefore are classified more accurately. Other land cover types have similar reflective characteristics, which leads to mis-classification. Examples of such cover types are agriculture fields and recent clearcuts, dense brush and small hardwoods. For additional information on WODIP, see The WODIP Guidebook (Nighbert *et al*. 1997).

Other Data Limitations:
Young stands with shadowy canopy gaps caused by nonforest-rockland conditions, where the gaps have diameters that approximate the diameters of old-growth tree crowns, have a reflective signature similar to large diameter trees. Depending on how the data are reclassed, this can result in an over estimate of the area occupied by larger diameter trees. Side by side examples of correctly and incorrectly classed "nesting habitat" (reclassed to include conifers greater than 20+ inch average dbh among other criteria) are visible on the WL Appendix-B Map1: Northern Spotted Owl Habitat where nesting habitat is shown in the Goose Gulch Drainage (sections 11, 12, 13, & 14, T.27S, R.9W., Will. Mer.) The old-growth in that area consists of scattered trees and open stands with well stocked understory stands of 40-year old trees. In the same area are 40-year old single-story stands. Those young stands are pocked and dissected by rock outcrops, which appear to have caused those stands to be miss-classed as nesting habitat. While this example suggests the reclassed WODIP data overestimates the "nesting habitat," local knowledge indicates the WODIP estimate of nesting habitat is at least 80% correct. Overall, the WODIP map appears more accurate for BLM land than similar maps created using the FOI data base.

The percent suitable habitat acres shown in Table NSO-3: Suitable Habitat Acres for Northern Spotted Owl Sites in the South Fork Coos Watershed are based on FOI data. These percentages of suitable habitat are a measure of habitat immediately around nest sites.

Table NSO-2. Acres of Northern Spotted Owl Habitat Based on Reclassed 1993 Landsat Data

		acres by reclass										
		no data	NS: nonforest/ young forest			NS: conifer	suitable conifer		NS: hdwd	suitable hdwd	suitable mixed	all classes
			H2O	agr.	nf, cc, young	<10 in. dbh	10-19 in. dbh	20+ in. dbh	<10 in. dbh	10-19 in. dbh	20+ in. dbh	
reclass number			1	2	3	4	5	6	7	8	11	
Acres by drainage in the Panther Ck. Subwatershed	Bear Gulch	0	0	0	792	744	607	168	4	38	17	2,370
	Little Cow Ck.	1	0	0	1,126	600	567	132	5	28	11	2,471
	Lost1 Ck.	0	0	0	2,347	1,279	848	100	9	78	25	4,687
	Panther Ck.	0	0	0	1,060	576	2,626	779	8	52	16	5,118
	Williams R.	0	0	0	2,509	2,184	1,858	681	17	169	61	7,478
	Wilson Ck.	1		0	2,068	1,430	1,191	502	9	96	37	5,336
Panther Ck. Subwatershed Total		**3**	**0**	**0**	**9,903**	**6,814**	**7,697**	**2,362**	**51**	**462**	**167**	27,459
Acres by drainage in the Cedar Ck. Subwatershed	Arrow Ck.	1	0	0	1,915	2,221	1,590	590	16	199	37	6,569
	Goose Gulch	0	0	0	95	662	1,253	644	7	146	42	2,850
	Mid. Williams R.	0	0	0	3,569	2,000	1,764	1,257	29	386	208	9,212
	Lower Cedar Ck.	0	0	0	1,789	963	760	553	12	198	72	4,346
	Upper Cedar Ck.	1	0	0	3,373	2,938	3,018	1,937	35	344	128	11,774
Cedar Ck. Subwatershed Total		**2**	**0**	**0**	**10,741**	**8,784**	**8,385**	**4,981**	**99**	**1,272**	**487**	**34,752**
Acres by drainage in the Tioga Ck. Subwatershed	Burnt Ck.	0	0	0	304	380	1,086	1,003	12	75	58	2,917
	Lower Tioga Ck.	0	0	0	1,099	2,258	2,887	1,816	34	717	151	8,961
	Middle Tioga Ck.	1	0	0	481	1,603	1,750	2,015	45	1,047	133	7,076
	Upper Tioga Ck.	2	0	0	847	1,287	1,949	1,271	18	248	64	5,685
Tioga Ck. Subwatershed Total		**3**	**0**	**0**	**2,731**	**5,528**	**7,671**	**6,104**	**109**	**2,087**	**406**	**24,639**
Acres by drainage in the South Coos Subwatershed	Daniels Ck.	3	1	580	2,820	1,498	1,231	1,979	38	1,462	406	10,018
	Dellwood	3	92	405	3,533	1,751	1,826	2,543	56	1,484	395	12,088
	Coos Mouth	0	75	699	924	339	124	614	9	519	158	3,461
	So. Fk. Coos R.	1	56	0	1,974	2,322	2,552	1,991	58	843	197	9,995
	Cox Ck.	1	0	0	186	360	495	444	13	219	50	1,768
	Coal Ck.	0	0	0	70	592	664	1,007	10	247	51	2,641
	Fall Ck.	2	0	0	2,186	4,183	4,884	1,011	28	540	101	12,935
	Mink Ck.	1	0	0	207	790	985	709	15	250	57	3,013
	Bottom Ck.	1	0	0	2,426	4,348	3,195	957	32	377	98	11,435
	Lower Williams R.	0	0	0	1,956	1,360	1,066	1,292	13	287	107	6,081
So. Coos Subwatershed Total		**13**	**224**	**1,684**	**16,281**	**17,543**	**17,021**	**12,548**	**270**	**6,228**	**1,621**	**73,434**
So. Fk. Coos Watershed Total Ac.		**21**	**224**	**1,685**	**39,656**	**38,669**	**40,774**	**25,995**	**531**	**10,048**	**2,681**	**160,284**
% of So. Fk. Coos Watershed Ac.		**0.0 %**	**0.1 %**	**1.1%**	**24.7%**	**24.1%**	**25.4%**	**16.2%**	**0.3%**	**6.3%**	**1.7%**	**100.0%**

Table NSO-3: Suitable Habitat Acres for Northern Spotted Owl Sites in the South Fork Coos Watershed

Site Name	Master Site Number	Percent Suitable Habitat Acres	Lua Where Site Center Is Located	Pair Status of Site
Bateman Creek	2332	14	LSR	pair
Beaver Slide	2337	10	LSR	pair
Bench Creek	3153	11	LSR	pair
Burma Creek	3150	29	LSR	pair
Callahan	2336	6	CON	pair
Coal Creek	0544	36	LSR	pair
Hog Ranch Creek	2353	13	LSR	pair
Lower Susan Creek	2327	34	LSR	pair
Lower Tioga Creek	2354	30	LSR	pair
MG	2194	19	MMR	pair
Mink Creek	2172	18	LSR	pair
Morgan Ridge	3151	18	CON	pair
North Burnt Creek	2328	38	LSR	pair
Panther Creek	2329	4	GFMA	pair
Shotgun Creek	3161	16	LSR	pair
South Burnt Creek	2335	38	LSR	pair
Susan Creek	0548	29	LSR	pair
Tioga Creek	2170	11	GFMA	pair
Upper Cedar Creek	2330	8	GFMA	pair
Upper Tioga Creek	3152	38	LSR	pair
Watertank Creek	2331	22	LSR	pair
West Arrow Creek	2351	10	LSR	pair
Williams Bend	3956	12	CON	pair
Williams River	2334	13	LSR	pair

References

Nighbert, J.; O'Neil, J.; Byrd, A. 1997. Western Oregon Digital Image Project - WODIP Guidebook, for the Bureau of Land Management. Portland, OR.

USDI Bureau of Land Management. 1992. Final - Coos Bay District Proposed Resource Management Plan and Environmental Impact Statement, 2 Vol. and Map Package (PRMP/EIS). North Bend, OR.

WL Appendix - C: Coarse Wood Debris

Management Direction/ Assessment Recommendations on CWD for Density Management Projects in the LSR:

The Forest Plan ROD says a management assessment should be prepared for each LSR (or group of smaller LSRs) before habitat manipulation activities are planned and implemented. The LSR Assessment (USDI; USDA 1998) prepared in accordance to the Forest Plan contains the following guidance and recommendations on managing CWD in density management projects:

Desired Future Conditions

. . . Maintain and/ or restore key structural components (large trees, snags and down logs) to mimic the abundance, condition and distribution of these structures. . . (pg. 62)

Treatment Guidelines for NSO Home Ranges

. . . When considering treatments of these stands the IDT should maintain . . . CWD. (pg. 70)

Density Management-Commercial thinning

. . . Where necessary, active recruitment of snags/ CWD . . . can be done concurrently [with thinning]. *. . . Besides shaping the overstory, density management may also focus on creating gaps, setting the stage for understory regeneration, and recruiting snags and CWD.* (pg. 80)

Density Management in Riparian Reserves [that are also inside the LSR]

The guidelines shown in Table [below] are recommendations for the coarse wood levels that should exist at stand age 80 [for LSR stands that are also inside the Riparian Reserve].

Recommended Range for Retention Levels of CWD (cu.ft./ac.)

Province	*Within the First Site Potential Tree Height from Any Perennial Stream*	*Within the Second Site Potential Tree Height from Any Perennial or First Site Potential of Any Intermittent Stream*
Coast Range	*3,600 - 9,400* [1]	*1,600 - 2,300* [3]
Klamath	*650 - 1,300* [2]	*650 - 1,300* [2]

[1] *Ursitti, 1990. Includes all wood 4 inches and 1 meter in length and longer*
[2] *Bingham, 1991*
[3] *Spies; Franklin, 1988, 1991* [includes all CWD 4-inches and larger no minimum length]

Prior to management activities, coarse wood surveys should be conducted in order to determine current wood levels. It is expected that in some stands, current levels will not meet the above guidance. Where this is the case, addition of wood during the proposed management activity may be necessary. It may not be possible, nor preferable, to meet the full guidance at the time of entry but rather to calculate the needs for the future stand [and prepare a strategy how the desired levels of CWD will be attained.] (pg. 90-91)

REO Review Exemption Criteria (attached to the LSR Assessment)

. . . Treatments need to take advantage of opportunities to improve habitat conditions beyond "natural conditions." For example, exceeding "natural levels" of CWD within a 35-year-old stand can substantially improve the utility of theses stands for late-successional forest-related species. Treatments must take advantage of opportunities to optimize habitat for late-successional forest-related species in the short term. . . .

. . . Within the limits dictated by acceptable fire risk, CWD objectives should be based on research that shows optimum levels of habitat for late successional forest related-species. And not be based simply on measurements within "natural stands." For example, recent research by Casey and Johnson in young stands on the westside indicates owl prey base increases as CWD (over 4") within Douglas-fir forests increases, up to 8- to 10-percent groundcover south of the town of Drain, Oregon . . .

Estimating Cubic Foot Volumes

The accepted method of estimating cubic foot volume of a tree is to sum the estimate volumes for each log in the tree. Attempts to derive a formula for estimating cubic foot volume of an entire tree have not been satisfactory. However as a rule-of-thumb, one half the dbh squared [$(dbh/2)^2$] gives a rough estimate of the cubic foot volume in a second growth Douglas-fir (Dilworth 1976 pg. 173) and may be useful for estimating cubic foot of CWD in the field and for developing CWD recruitment recommendations while on the project area.

Coarse Wood Debris Data and Analysis Prior to June 1999:

Transects in Candidate Thinning/ Density Management Units

Four stands in the Tioga Creek Subwatershed were selected based on their potential to support a viable thinning/ density management project and the transects were run, in conjunction to the stand exam. The stand exam and transect procedures used are in the H-5250-1 Forest Survey Handbook - BLM Manual Supplement State Office Rel. 5-244. Those results are summarized in Table CWD-2. The transect data were compared with amounts of CWD Spies and Franklin (1991) observed in natural stands, which is shown in Table CWD-1. The two data sets should be compared with each other with caution because the minimum piece size measured in the transects is larger than those counted by Spies and Franklin (1991) in their study (5 inches by 8 feet vs. 4 inches with no minimum length). Also, although Spies and Franklin measured logs in all decay classes, they only included the total volume for all decay classes, and the volume of decay class 2 logs in their paper.

The total CWD volume on all 4 candidate thinning/ density management units exceeded the volume in old-growth stands observed by Spies and Franklin (1991). The volumes of decay class 2 logs observed in 3 of the 4 sets of transects are within the range Spies and Franklin (1991) observed for natural stands 80 to 195-years old. The volume of decay class 2 logs observed in the fourth set of transects is consistent with a natural stands that are 40 to 80-years old. The data, showed 89% to 99% of the CWD in the young managed stands belonging to decay classes 4 and 5. This transect data, though limited, show that some PCTed stands produce a volume of decay class 2 logs, characteristic of mature stands, about 50 years sooner than do natural stands. A sensitivity analysis using transect data collected outside the South Fork Coos Watershed supports this observation (see Table CWD-3).

Spies *et al*. (1988) in their paper on CWD offered an explanation why the transact data show more CWD in the young managed stands that had been logged 29 to 35-years before than either Spies *et al*. (1988) or Spies and Franklin (1991) found in old-growth stands or young natural stands: Wild stands do not necessarily regenerate immediately after a stand replacement fire. Regeneration lags of 20-years to more than 100-years are not unusual. This means under natural conditions, CWD volumes recruited by a stand replacing fire are subject to losses due to decay, weathering, and possibly reburns for 20 to 100 years before a replacement stand is established. This becomes evident when one compares published volumes for CWD in young natural stands to CWD volumes in old-growth stands. This comparison will show a volume wood, which is somewhat larger than the total standing green volume of an old-growth stand, is lost between the time a stand replacement fire kills an old-growth stand and when the replacement natural stand reaches 40 to 80 years old (Spies *et al*.1988; Spies and Franklin 1991).

We speculate the reason 3 of the 4 candidate units for commercial thinning/ density management have decay class 2 volumes in the range typical for natural stands, which are older by 45 to 165-years, is a function of the relative size of the recent individual tree mortality. PCTed stands, contain larger diameter trees in the intermediate and suppressed crown position than do natural stands, of similar age and on similar sites. Although the PCTed stands, which have fewer trees/ acre, produce fewer dead trees through suppression mortality, those dead trees are larger than the mortality in more densely stocked natural stands. Therefore, on average, each dead tree in the PCTed stand contains more volume. Also, given the relative volume to surface area for a log increases with increased piece size, these larger dead trees progress through the decay class stages at a slower rate.

Table CWD-1: Down Woody Debris Volumes in Natural Young, Mature, and Old-Growth Douglas-fir Forests in Oregon and Washington from Spies; Franklin (1991)

	young stands: 40 to 80-years old	mature stands: 80 to 195-years old	old-growth stands: >195-years old
Decay class 2: average cubic meters/ hectare	2.0	8.3	16
Decay class 2: 95% confidence limits of the mean expressed in cubic meters/ hectare	0.9 to 4.5	3.9 to 17.8	9.6 to 26.9
Decay class 2: average cubic feet/ acre	28.6	118.7	228.8
Decay class 2: 95% confidence limits of the mean expressed in cubic feet/ acre	12.9 to 64.4	55.8 to 254.5	137.3 to 384.7
Log volume: average cubic meters/ hectare	223	124	266
Log volume: 95% confidence limits of the mean expressed in cubic meters/ hectare	163 to 305	93 to 165	219 to 324
Log volume: average cubic feet/ acre	3188.9	1773.2	3803.8
Log volume: 95% confidence limits of the mean expressed in cubic feet/ acre	2330.9 to 4361.5	1329.9 to 2359.5	3131.7 to 4633.2

Notes: The volumes include all woody debris 4 inches in diameter and larger as measured on the large end.
Conversion factor: 1cubic meter/ hectare = 35.3 cubic feet /2.471 acres or 14.3 cubic feet / acre

Table CWD-2: Coarse Woody Debris Amounts Measured in Four Candidate Thinning/ Density Management Units in the Tioga Subwatershed

Unit	CWD length in ft.	tons/ ac (calc. oven dry weight) conifer sp. 5 in. dia.+							cubic ft/ ac conifer sp. 5 in dia.+					
		DC.1	DC.2	DC.3	DC.4	DC.5	% DC 4&5*	all DC.	DC.1	DC.2	DC.3	DC.4	DC.5	all DC
sec. 15 & 22, T.27S., R.9W.: Beyer's Way, 35-yrs old (44 transects for a total length of 4,400 ft)	8 - 15			0.7	20.1	3.6		24			36	1851	348	2235
	16 +		0.3	7.4	46.7	.2		55		21	667	4605	25	5318
	all: 8+	0	0.3	8.1	66.8	3.8	89%	79	0	21	703	6456	373	7553
sect. 23, T.27S., R.9W.: Burnt Mtn., 29-yrs old (3 transects for a total length of 300 ft)	8 - 15				37.0	1.7		39				3722	179	3901
	16 +		1.0		53.7			55		70		4448		4518
	all: 8+	0	1	0	90.7	1.7	99%	93.4	0	70	0	8170	179	8419
sect. 23, T.27S., R.9W.: Upper Dead Horse, 30-yr old (11 transects for a total length of 1100 ft)	8 - 15				29.1	2.7		32				2673	293	2966
	16 +		1.1		35.9	1.3		38		71		3236	164	3471
	all: 8+	0	1.1	0	65	4	98%	70.1	0	71	0	5909	457	6437
sect. 10, T.27S.,R.9W.: North Tioga, 32-yrs old (10 transects for a total length of 1000 ft)	8 - 15		.3	0.6	29.0	6.1		36		23	49	3055	658	3785
	16 +		1.1	0.1	29.7			30.9		77	13	3032		3122
	all: 8+	0	1.4	0.7	58.7	6.1	97%	66.9	0	100	62	6087	658	6907

Table CWD-3: Coarse Woody Debris Amounts Measured in Candidate Thinning/ Density Management Units outside the South Fork Coos Watershed (conifer only)

Unit	CWD length in feet	tons/ ac (calc. oven dry weight) conifer sp. 5in. dia.+							cubic ft/ ac conifer sp. 5in dia.+					
		DC.1	DC.2	DC.3	DC.4	DC.5	% DC 4&5	all DC.	DC.1	DC.2	DC.3	DC.4	DC.5	all DC
sect. 23, T.22S., R.9W.: Sidewinder, 72-yrs old post thinning survey (18 transects for a total length of 18,000 ft)	8 - 15	0.1	1.9	1.5	0.2	0.0		3.7	4	155	155	21	0	335
	16 +	7.3	6.9	5.1	2.1	.5		21.9	414	601	412	185	53	1665
	all: 8+	7.4	8.8	6.6	2.3	0.5	11%	25.6	418	756	567	206	53	2000
sect. 16, T.23S., R.9W.: N. Fk. Soup, 44-yrs old (41 transects for a total length of 4,100 ft)	8 - 15	0.0	0.0	0.0	3.0	.8		3.8	0	0	0	304	87	391
	16 +	1.4	0.9	8.6	34.5	2.3		47.7	104	69	818	3963	261	5215
	all: 8+	1.4	0.9	8.6	37.5	3.1	79%	51.5	104	69	818	4267	348	5606
sect. 23, T.21S., R.8W.: W pt. of sect., 36-yrs old (29 transects for a total length of 2,900 ft.)	8 - 15	0.0	0.0	0.0	3.2	1.1		4.3	0	0	0	324	116	440
	16 +	0.4	0.3	0.7	19.3	0.1		20.8	32	25	72	2380	13	2522
	all: 8+	0.4	0.3	0.7	22.5	1.2	94%	25.1	32	25	72	2704	129	2962
sect. 23, T.21S., R.8W.: SE pt. of sect., 34-yrs old (34 transects for a total length of 3,400 ft.)	8 - 15	0.0	0.0	0.0	4.6	0.1		4.7	0	0	0	447	19	466
	16 +	0.2	3.0	8.3	15.8	0.0		27.3	12	226	1040	1836	0	3114
	all: 8+	0.2	3	8.3	20.4	0.1	64%	32	12	226	1040	2283	19	3580

Table CWD-4 and CWD-5 show how the CWD conditions observed in the four Tioga Creek stands, and four other stands used in the sensitivity analysis, compare to the CWD benchmarks published by Spies and Franklin (1991) and Spies et al. (1988).

Table CWD-4: CWD Conditions in Tioga Ck. Managed Stands, Regenerated Following Logging, Compared to Unmanaged Stands of Natural Origin

Note: All managed stands included in this table are less than 40-yrs old and therefore are younger than the benchmark "young stand."

	Managed stands compared with 40 to 80-yr old natural young stands	Managed stands compared with 80 to 195-yr old natural mature stands	Managed stands compared with 200-yr old stands
Total volume of CWD Bench mark volumes from Spies & Franklin (1991)	Four of the 4 stands are outside the benchmark range exceeding the high end for total CWD volumes observed in unmanaged young stands.	Four of the 4 stands are outside the benchmark range exceeding the high end for volumes observed in unmanaged mature stands.	Four of the 4 stands are outside the benchmark range exceeding the high end for volumes observed in old-growth stands.
Volume of decay class 2 CWD Bench mark volumes from Spies & Franklin (1991)	One of the 4 stands is within the benchmark range for decay class 2 CWD volumes for young stands. The other 3 stands have decay class 2 CWD volumes exceeding the upper end of the benchmark range for un managed young stands.	Three of the 4 stands are within the benchmark range for CWD volumes in mature stands.	Four of the 4 stands are outside and below the low end of the benchmark range of CWD volumes in old-growth stands.
% CWD in decay classes 4 & 5 Bench mark % biomass from Spies *et al.* (1988)	The biomass of decay class 4 & 5 in Tioga stands ranged from 89% to 99% compared with the 59% benchmark for young stands of fire origin.	The biomass of decay class 4 & 5 in Tioga stands ranged from 89% to 99% compared with the 37% benchmark for mature stands of fire origin.	The biomass of decay class 4 & 5 in Tioga stands ranged from 89% to 99% compared with the 27% benchmark for old-growth stands of fire origin.

Table CWD-5: CWD Conditions in Managed Stands Outside the South Fork Coos Watershed Compared to Unmanaged Stands. These Data Are Included as a Sensitivity Analysis.

Note: Two of the managed stands are younger than the benchmark natural young stand (40 to 80-years) and two managed stands are within the age range used for the bench mark young stands.

	Managed stands compared with 40 to 80-yr old natural young stands	Managed stands compared with 80 to 195-yr old natural mature stands	Managed stands compared with 200-yr old stands
Total volume of CWD Bench mark volumes from Spies & Franklin (1991)	Two of the 4 stands are within the benchmark range for total CWD volumes for unmanaged young stands. One of the 4 stands is outside the range exceeding the high end of the total CWD volume benchmark for unmanaged young stands. The commercial thinned 72-yr old stand has a total CWD volume below the lower extent of the benchmark range for an unmanaged young stands. With respect to this and other CWD benchmarks, the commercial thinned stand has more in common with the older unmanaged stand types than with "young" Unmanaged stands.	Three of the 4 stands are outside the benchmark range exceeding the high end for volumes observed in unmanaged mature stands. The commercial thinned 72-yr old stand has a total CWD volume within the benchmark range for natural unmanaged mature stands. The prescription for this thinning included leaving the tops and branches in the unit, and meeting the standards and guides for down wood on Matrix land. These S&Gs are retain existing CWD and retain 120 lineal feet of decay class 1 & 2 logs. Even assuming all the decay class 1 CWD was recruited either because of post thinning mortality or through active management, the stand has sufficient CWD volume in decay class 2 through 5 logs to be within the benchmark range for a mature stand.	Of the 4 stands, 1 is within the benchmark range for total CWD in old-growth. One stand has CWD volumes exceeding the upper end of the bench mark range for old-growth. Two stands fall below the lower end of the benchmark range for old-growth.
Volume of decay class 2 CWD Bench mark volumes from Spies & Franklin (1991)	One of the 4 stands is within the benchmark range for an unmanaged young stand. Three of the 4 stands have volumes of decay class 2 CWD that exceed the upper end of the benchmark range for a young stand.	Two of the 4 stands have decay class 2 CWD volumes exceeding the upper end of the bench mark range for a mature stand. One of the 4 stands is within the benchmark range for a mature stand. One of the 4 stands has a volume of decay class 2 CWD below the lower benchmark for a mature stand, but within the range for a young stand.	One of the 4 stands has decay class 2 CWD volumes within the bench mark range for old-growth. The commercial thinned stand has decay class2 CWD volumes that are more than 3 times the average used as the bench mark for old-growth.
% CWD in decay classes 4 & 5 Bench mark % biomass from Spies *et al.* (1988)	The biomasses of decay class 4 & 5 in the stands used in the sensitivity analysis are 11%, 64%, 79% and 94% compared with the 59% bench mark for young stands of fire origin.	The biomasses of decay class 4 & 5 in the stands used in the sensitivity analysis are 11%, 64%, 79% and 94% compared with the 37% benchmark for mature stands of fire origin.	The biomasses of decay class 4 & 5 in the stands used in the sensitivity analysis are 11%, 64%, 79% and 94% compared with the 27% benchmark for old-growth stands of fire origin. The 11% level was observed in the 72-yr old commercial thinned stand.

Pretreatment and post treatment down log surveys using a 100% sample

Prior to June 1999, we conducted 1 post treatment and 4 pretreatment CWD surveys inside South Fork Coos Watershed following the Down Log Monitoring Plan protocol (Coos Bay District, 1998). These surveys are a 100% sample (cull piles excluded) where all decay class 1 and 2 logs $\geq$16 inches diameter and $\geq$16 feet long, with intact bark, are measured and tallied. The focus on the larger decay class 1 and 2 logs is based on the management direction, for Matrix land, to retain 120 linear feet of logs per acre, with intact bark, in cutting areas (USDI 1995 pg. 22). Since the smaller material and decay classes logs 3, 4 and 5 were not considered, these surveys are unable to suggest whether the total CWD amounts on these sites are within the range observed by Spies and Franklin (1991) for natural unmanaged stands.

The data for this analysis were taken from the field forms. Lineal feet by decay were summed. Cubic foot volumes were calculated using the following formula, which is published in the Cubic Scaling Handbook (USDA 1991):

$$volume\ in\ cubic\ feet = 0.002727 * (D^2 + d^2) * length$$

where D = diameter at the large end of the log, and d = diameter at the small end

Table CWD-6: Amounts of Decay Class 1 & 2 CWD Found Using the Down Log Monitoring Protocol

location	survey type	decay class	lineal ft/ acre	cubic ft vol./ acre
Bateman & Robin sect. 6, T.25S., R.8W (This unit is just outside the watershed)	100% sample, abbreviated post treatment survey in a regeneration unit	1(with bark)	53.0	128.6
		2 (with bark)	132.5	360.6
		total 1 + 2 (with bark)	**185.5**	**489.2**
		2 (without bark)	81.5	152.6
		total 1 + 2 with & without bark	267.0	1,131.0
Green Cedar Unit 1	100% sample, abbreviated pretreatment survey in a proposed regeneration unit	1(with bark)	38.7	96.1
		2 (with bark)	203.7	471.8
		total 1 + 2 (with bark)	**242.4**	**567.9**
Green Cedar Unit 4	100% sample, abbreviated pretreatment survey in a proposed regeneration unit	1(with bark)	7.6	15.9
		2 (with bark)	529.6	935.6
		total 1 + 2 (with bark)	**537.2**	**951.5**
Bear Gulch Unit 4	100% sample, abbreviated pretreatment survey in a proposed regeneration unit	1(with bark)	0.0	0.0
		2 (with bark)	199.0	430.1
		total 1 + 2 (with bark)	**199.0**	**430.1**
Dead Horse sect. 23 & 24, T.27S., R.9W.	100% sample, abbreviated pretreatment survey in proposed CT unit	1(with bark)	0.0	0.0
		2 (with bark)	7.9	30.0
		total 1 + 2 (with bark)	**7.9**	**30.0**

The 185.5 lineal feet/ acre of decay class 1 and 2 logs ($\geq$16 inches in diameter/ $\geq$16 feet long with bark), found in the Bateman & Robin unit, comply with the RMP objective for 120 lineal feet/ acre of CWD following cutting on Matrix land. The 360.6 cubic feet of decay class 2 CWD (total both with and without intact bark) is within the range observed by Spies and Franklin (1991) in old-growth Coast Range stands (range 137.3 to 384.7 cubic feet with an average of 228.8 cubic feet). The 360.6 cubic feet of decay class 2 CWD exceeds the amounts of decay class 2 CWD observed by Spies and Franklin (1991) in either natural young stands or natural mature stands. The total amount of decay class 1 and 2, including those logs without bark, in the Bateman and Robin unit is 1,131 cubic feet in material that is $\geq$16 inches in diameter and $\geq$16 feet long. This approaches the lower end of the range of total CWD observed by Spies and Franklin (1991) in natural mature stands. That range is 1,329.9 to 2,359.5 cubic feet of decay classes 1 though 5, which is $\geq$ 4 inches in diameter. Given this unit is a sample size of one, we caution the reader not to treat this data as anything more than a description of conditions on a single site.

The pretreatment monitoring showed we can meet the RMP/ROD requirement to retain a minimum of 120 lineal feet of decay class 1 and 2 logs, after logging in the 3 proposed regeneration harvest units without resorting to recruiting from standing merchantable trees. This is provided we also meet the RMP/ROD standard to retain the CWD already on the ground and protect it to the greatest extent possible from disturbance during treatment(s) that might otherwise destroy the integrity of that material (USDI 1995 pg. 22). All 3 sites have levels of decay class 2 CWD that exceed the range observed by Spies and Franklin (1991) in old-growth stands.

The 30.0 cubic feet of decay class 2 CWD observed in the proposed Dead Horse commercial thinning are consistent with observations in other candidate units for thinning where the BLM Handbook stand exam protocol was used. This level of decay class 2 CWD is also consistent with levels observed by Spies and Franklin (1991) in 40 to 80-year old Coast Range stands of natural origin.

Coarse Wood Debris Data and Analysis Since to June 1999:

Table CWD-7: Summary of Coarse Woody Debris Transects for Candidate Density Management Units in the Late Successional Reserve Portion of the Tioga Subwatershed That Are Less Than 40-Years Old

Notes: CWD ≥5- inch diameter, and ≥8-feet long was measured in transects. Ursitti (1990) measured all CWD ≥4-inch diameter and >1-meter long. Spies and Franklin (1991) measured all CWD ≥4-inches in diameter. Consequently, transect data underestimates CWD volumes relative to the data collection standards used to document natural conditions. Ages in the table are age at breast height (4.5 ft. above the ground).

location OI # / Unit # (notes on hdwd CWD)	length class (ft)	volume/ ac conifer CWD by decay class (DC) (cubic feet/ ac.)				Ave. age	Observed DC 2 volume within or greater than natural range for DC 2 observed by Spies & Franklin			Observed total CWD volume within or greater than natural range for CWD observed by Spies			DC 1&2 ≥16 in. Dia and ≥16 ft long**		Observed CWD volume relative to CWD recommendations in LSR		
		DC 1	DC 2	DC 3, 4 & 5	total cubic ft/ac		Young Stands (40 to 80-yrs old)	Mature Stands (80 to 195-yrs old)	old-growth (>195-yrs old)	Young Stands (40 to 80-yrs old)	Mature Stands (80 to 195-yrs old)	old-growth (>195-yrs old)	pieces / ac.	lineal ft./ ac.	1,600-2,300 cubic ft/ac by age 80-yrs	3,600-9,400 cubic ft/ac within 1-site potential tree of perennial streams by age 80-yrs.	Notes
Sec. 24, T.26S.,R10W. Hatcher OI: 240382 (no hdwd CWD)	8 - 15	0	0	1064	1064												
	16+	68	45	3389	3502								1.3	101			
	all ≥ 8	68	45	4453	4566	33	within	below	below	exceed	exceed	within			exceed	within	
Sec. 19, T.26S.,R9W. Hatcher OI: 240086 (no hdwd CWD)	8 - 15	0	0	767	767												
	16+	0	0	2841	2841								0	0			
	all ≥ 8	0	0	3608	3608	23	below	below	below	within	exceed	within			exceed	within	
Sec. 24, T.26S.,R10W. Hog-Water OI: 240377 (no hdwd CWD)	8 - 15	0	0	1057	1057												
	16+	0	0	4425	4425								0	0			
	all ≥ 8	0	0	5482	5482	20	below	below	below	exceed	exceed	exceed			exceed	within	
Sec. 21, T.26S.,R9W. Shotgun OI: 240106 (no hdwd CWD)	8 - 15	0	0	219	219												
	16+	0	20	1568	1588								0	0			
	all ≥ 8	0	20	1787	1807	29	within	below	below	below	within	below			within	below	

location OI # / Unit # (notes on hdwd CWD)	length class (ft)	volume/ ac conifer CWD by decay class (DC) (cubic feet/ ac.)				Ave. age	Observed DC 2 volume within or greater than natural range for DC 2 observed by Spies & Franklin			Observed total CWD volume within or greater than natural range for CWD observed by Spies			DC 1&2 ≥16 in. Dia and ≥16 ft long**		Observed CWD volume relative to CWD recommendations in LSR		
		DC 1	DC 2	DC 3, 4 & 5	total cubic ft/ac		Young Stands (40 to 80-yrs old)	Mature Stands (80 to 195-yrs old)	old-growth (>195-yrs old)	Young Stands (40 to 80-yrs old)	Mature Stands (80 to 195-yrs old)	old-growth (>195-yrs old)	pieces / ac.	lineal ft./ ac.	1,600-2,300 cubic ft/ac by age 80-yrs	3,600-9,400 cubic ft/ac within 1-site potential tree of perennial streams by age 80-yrs.	Notes
Sec.25 , T.26S.,R10W. Middle Tioga OI: 243129 (hdwd CDW = 0.5 tons/ac - 50 cubic ft)	8 - 15	0	0	491	491												99 ac unit. Alder conversion on 19 ac.
	16+	43	23	1912	1978								0.6	34.2			
	all ≥ 8	43	23	2,403	2,469	36	within	below	below	within	exceed	below			exceed	below	
Sec. 35, T.26S.,R10W. Middle Tioga OI: 240413 (no hdwd CWD)	8 - 15	0	0	1212	1212												alder conversion areas in unit
	16+	0	47	1329	1376								0	0			
	all ≥ 8	0	47	2541	2588	30	within	below	below	within	exceed	below			exceed	below	
Sec.35 , T.26S.,R10W. Middle Tioga OI: 240494 (no hdwd CWD)	8 - 15	0	15	749	764												possible alder conversion areas in unit
	16+	0	0	2159	2159								0	0			
	all ≥ 8	0	15	2908	2923	24	within	below	below	within	exceed	below			exceed	below	
Sec.35 , T.2S6.,R10W. Middle Tioga OI: 240499 (mixed stand - hdwd CDW = 0.4 tons/ac - 43 cubic ft)	8 - 15	0	0	230	230												alder conversion areas in unit
	16+	0	22	564	586								0	0			
	all ≥ 8	0	22	794	816	35	within	below	below	below	below	below			below	below	
Sec.33 , T.26S.,R9W. Burnt Ck. OI: 240143 (no hdwd CWD)	8 - 15	0	0	2627	2627												
	16+	57	0	1498	1555								1.2	48.9			
	all ≥ 8	57	0	4125	4182	24	below	below	below	within	above	within			exceed	within	

location OI # / Unit # (notes on hdwd CWD)	length class (ft)	volume/ ac conifer CWD by decay class (DC) (cubic feet/ ac.)				Ave. age	Observed DC 2 volume within or greater than natural range for DC 2 observed by Spies & Franklin			Observed total CWD volume within or greater than natural range for CWD observed by Spies			DC 1&2 ≥16 in. Dia and ≥16 ft long**		Observed CWD volume relative to CWD recommendations in LSR		
		DC 1	DC 2	DC 3, 4 & 5	total cubic ft/ac		Young Stands (40 to 80-yrs old)	Mature Stands (80 to 195-yrs old)	old-growth (>195-yrs old)	Young Stands (40 to 80-yrs old)	Mature Stands (80 to 195-yrs old)	old-growth (>195-yrs old)	pieces / ac.	lineal ft./ ac.	1,600-2,300 cubic ft/ac by age 80-yrs	3,600-9,400 cubic ft/ac within 1-site potential tree of perennial streams by age 80-yrs.	Notes
Sec. 33, T.26S.,R9W. Burnt Ck. OI: 240145 (no hdwd CWD)	8 - 15	0	0	919	919												alder conversion areas in unit
	16+	61	114	2,826	3001								0.7	42.8			
	all ≥ 8	61	114	3745	3920	38	exceed	within	below	within	above	within			exceed	within	
Sec. 4, T.27S.,R9W. Burnt Ck. OI: 240535 (no hdwd CWD)	8 - 15	0	8	942	950												
	16+	36	51	2887	2974								0.4	26.3			
	all ≥ 8	36	59	3829	3924	37	within	within	below	within	above	within			exceed	within	
Sec.4 , T.27S.,R9W. Burnt Ck. OI: 240531 (hdwd CDW = 0.4 tons/ac - 30 cubic ft)	8 - 15	0	0	902	902												alder conversion areas in unit
	16+	23	73	793	889								0	0			
	all ≥ 8	23	73	1695	1791	25	exceed	within	below	below	within	below			within	below	
Sec.9 , T.27S.,R9W. Burnt Ck. OI: 240556 (no hdwd CWD)	8 - 15	0	0	642	642												
	16+	20	15	3120	3155								0	0			
	all ≥ 8	20	15	3762	3797	39	within	below	below	within	exceed	within			exceed	within	
Sec.9 , T.27S.,R9W. Burnt Ck. OI: 240555 (no hdwd CWD)	8 - 15	0	0	423	423												stand configuration such that it may be better to thin the alder than convert it
	16+	0	55	3237	3292								0	0			
	all ≥ 8	0	55	3660	3715	34	within	below	below	within	exceed	within			exceed	within	
Sec.9 , T.27S.,R9W. Upper Tioga OI: 240560 (no hdwd CWD)	8 - 15	0	0	1518	1518												
	16+	0	0	2625	2625								0	0			
	all ≥ 8	0	0	4143	4143	26	below	below	below	within	exceed	within			exceed	within	

location OI # / Unit # (notes on hdwd CWD)	length class (ft)	volume/ ac conifer CWD by decay class (DC) (cubic feet/ ac.)				Ave. age	Observed DC 2 volume within or greater than natural range for DC 2 observed by Spies & Franklin			Observed total CWD volume within or greater than natural range for CWD observed by Spies			DC 1&2 ≥16 in. Dia and ≥16 ft long**		Observed CWD volume relative to CWD recommendations in LSR		
		DC 1	DC 2	DC 3, 4 & 5	total cubic ft/ac		Young Stands (40 to 80-yrs old)	Mature Stands (80 to 195-yrs old)	old-growth (>195-yrs old)	Young Stands (40 to 80-yrs old)	Mature Stands (80 to 195-yrs old)	old-growth (>195-yrs old)	pieces / ac.	lineal ft./ ac.	1,600-2,300 cubic ft/ac by age 80-yrs	3,600-9,400 cubic ft/ac within 1-site potential tree of perennial streams by age 80-yrs.	Notes
Sec.17 , T.27S.,R9W. Upper Tioga OI: 240607 / unit: 22A (no hdwd CWD)	8 - 15	0	0	1323	1323												
	16+	0	0	3008	3008								0	0			
	all ≥ 8	0	0	4331	4331	30	below	below	below	within	exceed	within			exceed	within	
Sec. 21, T.27S.,R9W. Upper Tioga OI: 240632 (no hdwd CWD)	8 - 15	0	0	293	293												
	16+	36	111	5521	5668								0	0			
	all ≥ 8	36	111	5814	5961	33	exceed	within	below	exceed	exceed	exceed			exceed	within	
Sec. 21, T.27S.,R9W. Upper Tioga OI: 240633 (no hdwd CWD)	8 - 15	0	0	98	98												
	16+	0	0	7,368	7,368								0	0			
	all ≥ 8	0	0	7466	7466	32	below	below	below	exceed	exceed	exceed			exceed	within	
Average for all stands < 40-years old and assessment of CWD relative to published benchmarks	8 - 15	0	1	860	861		3 units exceed	0 units exceed	0 units exceed	4 units exceed	15 units exceed	3 units exceed			15 units exceed	0 units exceed	
	16+	19	32	2,837	2,888		9 units within	5 units within	0 units within	11 units within	2 units within	9 units below	0.2	14.0	2 units within	12 units within	
	all ≥ 8	19	33	3,697	3,749	30	6 units below	13 units below	18 units below	3 units below	1 unit below	6 units below			1 unit below	6 units below	

** This reference to the Matrix standards and guidelines for CWD is for comparison purposes only. These standards do not apply to LSR lands.

Table CWD-8: Summary of Coarse Woody Debris Transects for Candidate Density Management Units in the Late Successional Reserve Portion of the Tioga Subwatershed That Are 40-Years Old and Older

Notes: CWD ≥5-inch diameter, and ≥8-feet long was measured in transects. Ursitti (1990) measured all CWD ≥4-inch diameter and >1-meter long. Spies and Franklin (1991) measured all CWD ≥4-inches in diameter. Consequently, transect data underestimates CWD volumes relative to the data collection standards used to document natural conditions. Ages in the table are age at breast height (4.5 ft. above the ground).

location OI # / Unit # (notes on hdwd CWD)	length class (ft)	volume/ ac conifer CWD by decay class (DC) (cubic feet/ ac.)				Ave. age	Observed DC 2 volume within or greater than natural range for DC 2 observed by Spies & Franklin			Observed total CWD volume within or greater than natural range for CWD observed by Spies			DC 1&2 ≥16 in. Dia and ≥16 ft long**		Observed CWD volume relative to CWD recommendations in LSR		
		DC 1	DC 2	DC 3, 4 & 5	total cubic ft/ac		Young Stands (40 to 80-yrs old)	Mature Stands (80 to 195-yrs old)	old-growth (>195-yrs old)	Young Stands (40 to 80-yrs old)	Mature Stands (80 to 195-yrs old)	old-growth (>195-yrs old)	pieces / ac.	lineal ft./ ac.	1,600-2,300 cubic ft/ac by age 80-yrs	3,600-9,400 cubic ft/ac within 1-site potential tree of perennial streams by age 80-yrs.	Notes
Sec. 17, T.26S.,R.9W. Shotgun OI: 240070 (no hdwd CWD)	8 - 15	0	0	563	563												natural origin
	16+	0	3836	3847	7683								7	684			
	all ≥ 8	0	3836	4410	8246	57	exceed	exceed	exceed	exceed	exceed	exceed			exceed	within	
Sec. 18, T.26S.,R9W. Hatcher OI: 240089 (no hdwd CWD)	8 - 15	0	13	1500	1513												
	16+	54	156	3389	3599								0.7	54.7			
	all ≥ 8	54	169	4889	5112	41	exceed	within	within	exceed	exceed	exceed			exceed	within	
Sec. 35, T.26S.,R10W. Middle Tioga OI: 240502 (no hdwd CWD)	8 - 15	0	0	384	384												natural origin
	16+	0	0	1587	1587								0	0			
	all ≥ 8	0	0	1971	1971	58	below	below	below	below	within	below			within	below	
Sec.32 , T.26S.,R9W. Lower Tioga OI: 241278 (no hdwd CWD)	8 - 15	0	0	940	940												natural origin
	16+	0	0	1268	1268								0	0			
	all ≥ 8	0	0	2208	2208	61	below	below	below	below	within	below			within	below	
Sec. 31, T.26S.,R9W. OI: pt 240133 W. of Coos R. Mainline (hdwd CDW = 0.9 tons/ac - 71 cubic ft)	8 - 15	0	0	1064	1064												
	16+	0	0	1959	1959								0	0			
	all ≥ 8	0	0	3023	3023	50	below	below	below	within	above	below			exceed	below	

location OI # / Unit # (notes on hdwd CWD)	length class (ft)	volume/ ac conifer CWD by decay class (DC) (cubic feet/ ac.)				Ave. age	Observed DC 2 volume within or greater than natural range for DC 2 observed by Spies & Franklin			Observed total CWD volume within or greater than natural range for CWD observed by Spies			DC 1&2 ≥16 in. Dia and ≥16 ft long**		Observed CWD volume relative to CWD recommendations in LSR		
		DC 1	DC 2	DC 3, 4 & 5	total cubic ft/ac		Young Stands (40 to 80-yrs old)	Mature Stands (80 to 195-yrs old)	old-growth (>195-yrs old)	Young Stands (40 to 80-yrs old)	Mature Stands (80 to 195-yrs old)	old-growth (>195-yrs old)	pieces / ac.	lineal ft./ ac.	1,600-2,300 cubic ft/ac by age 80-yrs	3,600-9,400 cubic ft/ac within 1-site potential tree of perennial streams by age 80-yrs.	Notes
Sec. 31, T.26S.,R9W. OI: pt 240133 E. of Coos R. Mainline (no hdwd CWD)	8 - 15	0	0	117	117												
	16+	29	0	1141	1170								0	0			
	all ≥ 8	29	0	1258	1287	50	below	below	below	below	below	below			below	below	
Sec. 13, T.27S.,R10W. Middle Tioga OI: 240863 (hdwd CDW = 0.1 tons/ac - 11 cubic ft)	8 - 15	0	0	340	340												natural origin
	16+	25	82	784	891								0.6	44.1			
	all ≥ 8	25	82	1124	1231	67	exceed	within	below	below	below	below			below	below	
Sec.13 , T.27S.,R10W. Middle Tioga OI: 240863 (no hdwd CWD)	8 - 15	0	0	48	48												natural origin
	16+	0	272	3003	3275								2.7	137			
	all ≥ 8	0	272	3051	3323	67	exceed	exceed	within	within	above	within			exceed	below	
Sec. 18, T.27S.,R9W. Middle Tioga OI: 241317 (no hdwd CWD)	8 - 15	0	24	490	514												natural origin
	16+	0	44	1213	1257								0	0			
	all ≥ 8	0	68	1703	1771	64	exceed	within	below	below	within	below			within	below	
Sec. 17, T.27S.,R9W. Middle Tioga OI: 240604 (no hdwd CWD)	8 - 15	0	14	951	965												natural origin
	16+	0	20	1709	1729								0	0			
	all ≥ 8	0	34	2660	2694	62	within	below	below	within	exceed	below			exceed	below	
Sec. 5, T.27S.,R9W. OI: 241278 (hdwd CDW = 0.2 tons/ac - 13 cubic ft)	8 - 15	0	0	312	312												natural origin
	16+	0	87	1189	1276								0	0			
	all ≥ 8	0	87	1501	1588	68	exceed	within	below	below	within	below			below	below	

location OI # / Unit # (notes on hdwd CWD)	length class (ft)	volume/ ac conifer CWD by decay class (DC) (cubic feet/ ac.)				Ave. age	Observed DC 2 volume within or greater than natural range for DC 2 observed by Spies & Franklin			Observed total CWD volume within or greater than natural range for CWD observed by Spies			DC 1&2 ≥16 in. Dia and ≥16 ft long**		Observed CWD volume relative to CWD recommendations in LSR		
		DC 1	DC 2	DC 3, 4 & 5	total cubic ft/ac		Young Stands (40 to 80-yrs old)	Mature Stands (80 to 195-yrs old)	old-growth (>195-yrs old)	Young Stands (40 to 80-yrs old)	Mature Stands (80 to 195-yrs old)	old-growth (>195-yrs old)	pieces / ac.	lineal ft./ ac.	1,600-2,300 cubic ft/ac by age 80-yrs	3,600-9,400 cubic ft/ac within 1-site potential tree of perennial streams by age 80-yrs.	Notes
Sec. 5, T.27S.,R9W. OI: 240545 (hdwd CDW = 0.3 tons/ac - 39 cubic ft)	8 - 15	0	0	787	787												natural origin
	16+	6	117	1311	1434								1	40.2			
	all ≥ 8	6	117	2098	2221	53	exceed	within	below	below	within	below			within	below	
Sec.1 , T.27S.,R10W. Middle Tioga OI: 240760 (Includes hdwd conv. areas. No hdwd CWD in plots)	8 - 15	0	0	134	134												natural origin
	16+	0	121	139	260								1.7	171			
	all ≥ 8	0	121	273	394	56	exceed	within	below	below	below	below			below	below	
Sec.1 , T.27S.,R10W. Middle Tioga OI: 240760 (hdwd CDW = 0.4 tons/ac - 35 cubic ft)	8 - 15	0	0	662	662												alder conversion
	16+	0	46	1218	1264								0.8	62.2			
	all ≥ 8	0	46	1880	1926	40	within	below	below	below	within	below			within	below	
Average for all stands 40-years old and older with assessment of CWD relative to published benchmarks	8 - 15	0	4	592	596		8units exceed	2 units exceed	1 unit exceeds	2 units exceed	5 units exceed	2 units exceed			5 units exceed	0 units exceed	natural origin
	16+	8	342	1,697	2,047		2 units within	6units within	2 units within	3 units within	6 units within	1 unit within	1.0	85.2	5 units within	2 units within	
	all ≥ 8	8	345	2,289	2,643	57	4 units below	6 units below	11 units below	9 units below	3 units below	11 units below			4 units below	12 units below	

** This reference to the Matrix standards and guidelines for CWD is for comparison purposes only. These standards do not apply to LSR lands.

The reader is reminded that the observed levels of CWD in the Tioga Creek Subwatershed are based on measuring larger pieces of CWD than were measured for the published studies. Consequently, the Tioga Creek data under reports CWD amounts compared to what would have been measured if the smaller piece size standard used for research purposes had been used for operational assessment purposes.

CWD transects were done on 18 stands that are less than 40-years old. All 18 regenerated following logging. Twelve had decay class II CWD amounts that are within or exceed the range documented for 40 to 80-year old natural stands by Spies and Franklin (1991). Fifteen stands had total CWD amounts that are within or exceed the range documented for 40 to 80-year old natural stands.

Ten of the 14 stands that are older than 40-years are of natural origin. Two of the 4 stands that regenerated following logging have total CWD levels that within or exceed the range of CWD observed by Spies and Franklin in natural stands. Ten out of 14 units surveyed for CWD, which were 40-years old or older, had decay class II levels that were within or exceeded the natural range documented by Spies and Franklin for 40 to 80-year old natural stands. Five out of 14 units surveyed had total CWD amounts that were within or exceeded the natural range documented by Spies and Franklin.

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WL Appendix - D: Snag Management on Matrix Land

Introduction:
This analysis is concerned only with how to meet the District ROD/RMP management direction to provide snag habitat on the Matrix land. This section will not examine the role of snag habitat, nor will it cover how to maximize or optimize snag habitat. Readers interested in those areas should consult the snag chapter in Brown (1985) for a general survey on snags a habitat, Huff and Raley (1991) on optimizing snag habitat, Peet and Christensen (1987) on tree mortality/ snag recruitment, and Hutto (1995)on snag patches as landscape features.

The Management Direction:
The Forest Plan (USDA; USDI 1994 page C-42) standards and guidelines for managing snag habitat on Matrix Land are:

> *As a minimum, snags are to be retained within the harvest unit at levels sufficient to support species of cavity-nesting birds at 40 percent of potential population levels based on published guidelines and models. The objective is to meet the 40 percent minimum standard throughout the matrix, with per-acre requirements met on average areas no larger than 40 acres. To the extent possible, snag management within harvest units should occur within the areas of green tree retention. The needs of bats should also be considered in these standards and guidelines as those needs become better known. Snag recruitment trees left to meet an identified, near-term (less than 3 decades) snag deficit do not count toward green-tree retention requirements.*

The District ROD/RMP (USDI 1995 pages 22, 27, 28, 53 and 54) contains the following management actions and direction for providing snag habitat on Matrix land:

> *Retain snags within a timber harvest unit at levels sufficient to support species of cavity nesting birds at 40 percent of potential population levels. Meet the 40 percent minimum throughout the Matrix with per acre requirements met on average areas no larger than 40 acres.*
>
> *In addition to the green tree retention management action/ direction, retain green trees for snag recruitment in timber harvest units where there is an identified, near-term (less than 3 decades) snag deficit. These trees do not count toward green-tree retention requirements.*

Snag Habitat Quantity and Quality needed to Support 40% of Potential Population Levels:
Table Snag-1 shows the snag nesting habitat minimum requirements for the species of primary excavator birds found in the South Fork Coos Watershed:

Table Snag-1: Snag Requirements for Nesting and Roosting for the Primary Excavators Found in the South Fork Coos River Watershed

Bird Species	Minimun Snag DBH (with bark) usable by the species	Snag Decay Class usable by the bird species for nesting habitat	
		Hard Snags (decay classes 2-3)	Soft Snags (decay classes 4-5)
Downy woodpecker	11+	X	X
Red-breasted sapsucker	15+	X	
Hairy woodpecker	15+	X	
Northern flicker	17+	X	X
Red-breasted nutchatch	17+	X	
Pileated woodpecker	25+	X	

The data in Table Snag-2 are output from Marcot model and show the number of snags by size and decay class to meet the 40%, 60% and 100% nesting habitat needs for the primary excavator species in the South Fork Coos Watershed.

Table Snag-2: The Number of Snags Needed to Support 100%, 60%, and 40% Population Levels of Primary Excavators in a Forested Habitat in the South Fork Coos Watershed (from the Marcot snag model)

	Snag outside bark DBH class (inches)	Number of Snags/ 100 acres by decay class		Total snags/ 100 acres	Total snags/ 40 acres	Total snags/ 1 acre
		Hard snags (decay classes 2-3)	Soft snags (decay classes 4-5)			
Number of snags needed to support a 100% population	11+	8	8	16	6.4	0.16
	15+	237	0	237	94.8	2.37
	17+	100	24	124	49.6	1.24
	25+	6	0	6	2.4	0.06
	Totals:	**351**	**32**	**383**	**153.2**	**3.83**
Number of snags needed to support a 60% population	11+	5	5	10	4.0	0.10
	15+	142	0	142	56.8	1.42
	17+	60	15	75	30.0	0.75
	25+	4	0	4	1.6	0.04
	Totals:	**211**	**20**	**231**	**92.4**	**2.31**
Number of snags needed to support a 40% population	11+	3	3	6	2.4	0.06
	15+	95	0	95	38.0	0.95
	17+	40	10	50	20.0	0.50
	25+	2	0	2	0.8	0.02
	Totals:	**140**	**13**	**153**	**61.2**	**1.53**

Hard Snag Longevity and Providing Snag Habitat in the Near Term (defined as 3 decades):
As shown in the preceding two tables, the primary excavator birds have minimum snag diameter and state of decay requirements that must be meet in addition to numbers of snags on the landscape. For example, retaining 3 or 4 or more snags per acre following a timber harvest would not meet the 40% population objective if all those snags were decay class 4 or 5. A snag's decay class is not a static condition. As shown in the next two tables below, leaving 1.5 hard snags/ acre, without making provisions for additional snag recruitment, will not necessarily meet the ROD/RMP management actions and direction to provide the prescribed levels of snag habitat for the "near-term (less than 3 decades)." This is because the hard snags smaller than 18.8-inches dbh will transition to soft snags before the new stand can produce replacement snags meeting the minimum size required by most of the primary excavator species (see Tables Snag-3 and Snag-4).

Table Snag-3: Estimated Age When Douglas-fir Snags Reach a Deterioration State
(Adapted from Brown 1985 pg. 136, which in turn was adapted from Cline et al. 1980.)

snag size	decay class1	decay class2	decay class 3	decay class 4	decay class 5
3.6-7.2 inch dbh	0-4	5-8	9-16	17	fallen
7.6-18.8 inch dbh	0-5	6-13	14-29	30-60	>60
>18.8 inch dbh	0-6	7-18	19-50	51-125	>125

Table Snag-4: The Expected Time that Hard Snags Retained on a Regeneration Harvest Unit Will Provide Hard Snag Habitat

snag size and decay class when regeneration unit is cut	number of years snag will be a hard snag	Replacement snag needed to meet the RMP short term (30-yr) objective	Discussion
3.6-7.2 inch dbh - decay class1	12 to 16	N/A	Too small to provide nesting habitat
3.6-7.2 inch dbh - decay class2	8 to 11	N/A	Too small to provide nesting habitat
3.6-7.2 inch dbh - decay class 3	1 to 7	N/A	Too small to provide nesting habitat
7.6-18.8 inch dbh - decay class1	24 to 29	no, if original snag is 11-inches yes, if the needs of the excavator species that can use 11-inch hard snags are already met.	New stand potentially can provide 11-inch dbh snags to replace the old snags that transition to decay class 4. New stand will not likely provide either the 15inch + or 17 inch + replacement snags.
7.6-18.8 inch dbh - decay class2	16 to 23	yes	Snag recruitment needed 15 to 20 years after the regeneration cut is completed to meet the RMP direction to provide snag habitat in the near term (30-yr).
7.6-18.8 inch dbh - decay class 3	1 to 15	yes	Replacement snag needed within first 15-years after regeneration cut.
>18.8 inch dbh - decay class1	46 to 50	no	
>18.8 inch dbh - decay class2	32 to 44	no	
>18.8 inch dbh - decay class 3	1 to 31	yes	Unless the decay class 3 snags left after the regeneration cut had just transitioned from decay class 2, replacement snags will be needed to meet the RMP direction to provide snag habitat in the near term (30-yr).

Most large (≥18.8-inch) decay class 3 snags will transition to a decay class 4 before the new stand can produce replacement small snags. If we are to meet the ROD/RMP management actions/ direction, then we do one of the following:

- Meet the hard snag component of 1.5 snag/ acre requirement with decay class 1 and 2 snags that are more than 18.8-inches in diameter.
- Or retain additional green trees to be turned into new snags to replace those hard snags that are between 15 and 18.8-inches dbh,and to replace the large decay class 3 snags when they transition to soft snags.
- Or the adjacent stands in the ROD/RMP prescribed 40-acre Matrix land neighborhood must consistently provide a minimum of 56 hard snags and 5.2 soft snags (61.2 total) during the 3 decades following the timber harvest.

The limited time a snag provides hard snag habitat for primary excavators means that many smaller hard snags, and several large decay class 3 snags, left on timber sale units in the early 1980's, are now or soon will be soft snags. Table Snag-5 shows the stand age when the average new mortality meets or exceeds the minimum snag diameter used by a range of primary excavator species for a range of sites and management conditions(adapted from Table DM-1):

Table Snag-5: Stand Age When the Average New Mortality Meets or Exceeds the Minimum Snag Diameter Used by a Range of Primary Excavator Species

Snag dbh	SI 115, 291 trees/ ac at age 32			SI 127, 259 trees/ac at age 31		
	unthinned stand	Stand thinned to 120 trees/ ac at age 40-yrs	Stand thinned to 60 trees/ ac at age 40-yrs	unthinned stand	Stand thinned to 120 trees/ ac at age 40-yrs	Stand thinned to 60 trees/ ac at age 40-yrs
11-inches +	60-yr old	50-yr old	50-yr old	40-yr old	40-yr old	40-yr old
15-inches +	100-yr old	60-yr old	50-yr old	70-yr old	50-yr old	50-yr old
17-inches +	120-yr old	70-yr old	50-yr old	80-yr old	50-yr old	50-yr old
25-inches +	>200-yr old	>200-yr old	not determined	200-yr old	170-yr old	90-yr old

Meeting the 40 % Minimum Throughout the Matrix with the per Acre Requirements Met on Average Areas No Larger than 40 Acres:

The language concerning snag management on Matrix land, contained in the ROD/RMP, suggests that the 40% level/ 40 acre neighborhood applies to Matrix land with no provision to count snags in the LSR or Riparian Reserve toward meeting the Matrix snag actions direction. This is emphasized by the language in the Forest Plan to meet the 40 % minimum standard throughout the Matrix, with per-acre requirements met on average areas no larger than 40 acres.

The Matrix land in the South Fork Coos Watershed contains 2,237 acres of GFMA and 903 acres of Connectivity (Table ACS-1). Of this, 616 acres in the GFMA support stands that are 60-years old or older. These stands, excluding those areas taken out of the timber based due to a nonsuitable classification in TPCC, are available for regeneration harvest pending the results of surveys for survey and manage species and marbled murrelets.

The data in Table Snag-5 suggests that 50-year old and younger second growth stands will not reliably provide hard snags except on the better sites and in thinned stands[1]. The hard snags in these young stands will only provide suitable nesting habitat for the smaller excavator species. This further suggests that the BLM may have to retain or recruit large hard snags in addition to the minimum 1.5 snags/ acre, on those regeneration units next to second growth stands, to meet the 40% minimum snag levels throughout the Matrix. The numbers of additional snags that need to be retained or created are shown in Table Snag-6.

Table Snag-6: Snag Retention Levels Needed to Meet the 40% Snag Levels in the 40-acre Neighborhood Management Objective

Regeneration unit size	Area outside the regeneration unit but inside the 40-acre neighborhood	Total number of snags needed to meet the 40% snag level in the 40-acre neighborhood	Snags/ acre needed on the regeneration unit, following harvest, if there are no suitable snags in the 40-acre neighborhood outside the regeneration unit.
40-acres	0	61.2	1.53
30-acres	10-acres	61.2	2.04
20-acres	20-acres	61.2	3.06
16-acres	24-acres	61.2	3.8
<16-acres	>24-acres	Increasing snag densities to greater than 3.8 snags/ acre inside the regeneration unit boundary may not result in greater primary cavity excavator bird numbers. This is because territory size or other factors may become more limiting than snag numbers. Therefore, when the regeneration unit is less than 16-acres, ID teams should establish snag retention levels based on an estimate of the number of primary excavator birds that can occupy the 40-acre neighborhood.	

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[1] As of 1999, the only thinned Matrix stands in this Watershed on BLM are on Blue Ridge.

WL Appendix - E: Vertebrate Wildlife Species List For the South Fork Coos Watershed

The following species list was compiled by wildlife biologists for the Coos Bay District BLM. It is intended to be a comprehensive list of all vertebrate wildlife species known or suspected to utilize the District, and will continue to be updated as new information becomes available. The determination of species presence within the South Fork Coos Watershed was made using a combination of documented sightings, professional knowledge of and review of distribution information found in field guides and the Oregon Natural Heritage Database. The codes used for Presence, Federal and State Status are given below.

[1] Present in South Fork Coos Watershed

- N - Not thought to be present within the watershed at any time.
- S - Suspected to be present within the watershed, but the species has not been documented and local biologists have no direct evidence of presence.
- K - Known to be present within the watershed through observations by trained biologists, most sightings documented in Resource Area files.
- D - Species which have been documented present within the watershed.

[2] Status Federal

- FE - Federally Endangered Species
- FT - Federally Threatened Species
- FC - Federal Candidate Species
- BS - Bureau Sensitive Species
- BT - Bureau Tracking Species
- BA - Bureau Assessment Species

[3] Status State

- SE - State Endangered Species
- ST - State Threatened Species
- SSC - State Sensitive- Critical Species
- SSV - State Sensitive- Vulnerable Species
- SSP - State Sensitive- Peripheral or Naturally Rare Species
- SSU - State Sensitive- Undetermined Status Species

[4] Represents some type of change from the published version of Table C-3 of the Coos Bay District Record of Decision and Resource Management Plan (May 1995). Changes are due to administrative and legal changes in species status by federal and state agencies, changes to lists maintained by the Oregon Natural Heritage Program and correction of errors in the published version of Table C-3. Some species gained special status, others no longer have special status, for others it was the level of status that changed and some were Special Status Species at the time Table C-3 was published but were mistakenly omitted from it.

[5] Represents change to a common or scientific name for a Special Status Species from the name provided in the published version of Table C-3 of the Coos Bay District Record of Decision and Resource Management Plan (May 1995).

COMMON NAME	LATIN NAME	PRESENT IN SOUTH FORK COOS WATERSHED[1]	STATUS FEDERAL[2]	STATUS STATE[3]
AMPHIBIANS				
NORTHWESTERN SALAMANDER	AMBYSTOMA GRACILE	S		
LONG-TOED SALAMANDER	AMBYSTOMA MACRODACTYLUM	S		
PACIFIC GIANT SALAMANDER	DICAMPTODON TENEBROSUS	S		
SOUTHERN TORRENT SALAMANDER	RHYACOTRITON VARIEGATUS	K	BT	SSC[4]
CLOUDED SALAMANDER	ANEIDES FERREUS	S	BT	SSU
CALIFORNIA SLENDER SALAMANDER	BATRACHOSEPS ATTENUATUS	N	BA	SSP
ENSATINA	ENSATINA ESCHSCHOLTZII	S		
DUNN'S SALAMANDER	PLETHODON DUNNI	S		
DEL NORTE SALAMANDER	PLETHODON ELOGATUS	N	BS[4]	SSV
SISKIYOU MOUNTAINS SALAMANDER	PLETHODON STORMI	N	BS[4]	SSV
WESTERN RED-BACKED SALAMANDER	PLETHODON VEHICULUM	K		
ROUGH-SKINNED NEWT	TARICHA GRANULOSA	K		
WESTERN TOAD	BUFO BOREAS	S	BT	SSV
PACIFIC TREEFROG	PSEUDACRIS REGILLA	K		
TAILED FROG	ASCAPHUS TRUEI	S	BA[4]	SSV
RED-LEGGED FROG	RANA AURORA	K	BS[4]	SSU
FOOTHILL YELLOW LEGGED FROG	RANA BOYLII	S	BS[4]	SSV
BULLFROG	RANA CATESBEIANA	S		
SPOTTED FROG	RANA PRETIOSA	N	FC	SSC
REPTILES				
PAINTED TURTLE	CHRYSEMYS PICTA	N	BA[4]	SSC
NORTHWESTERN POND TURTLE[5]	CLEMMYS MARMORATA MARMORATA	S	BS[4]	SSC
LOGGERHEAD SEA TURTLE	CARETTA CARETTA	N	FT[4]	ST
GREEN SEA TURTLE	CHELONIA MYDAS	N	FE	SE
LEATHERBACK SEA TURTLE	DERMOCHELYS CORIACEA	N	FE	SE
PACIFIC RIDLEY SEA TURTLE	LEPIDOCHELYS OLIVACEA	N	FT	ST
NORTHERN ALLIGATOR LIZARD	ELGARIA COERULEA	S		
SOUTHERN ALLIGATOR LIZARD	ELGARIA MULTICARINATA	S		
SAGEBRUSH LIZARD	SCELOPORUS GRACIOSUS	N		
WESTERN FENCE LIZARD	SCELOPORUS OCCIDENTALIS	S		
WESTERN SKINK	EUMECES SKILTONIANUS	S		
RUBBER BOA	CHARINA BOTTAE	S		
RACER	COLUBER CONSTRICTOR	S		

COMMON NAME	LATIN NAME	PRESENT IN SOUTH FORK COOS WATERSHED[1]	STATUS FEDERAL[2]	STATUS STATE[3]
SHARPTAIL SNAKE	CONTIA TENUIS	S	BA[4]	SSV
RINGNECK SNAKE	DIADOPHIS PUNCTATUS	S		
COMMON KINGSNAKE	LAMPROPELTIS GETULUS	N	BA[4]	SV[4]
CALIFORNIA MOUNTAIN KINGSNAKE	LAMPROPELTIS ZONATA	N	BA[4]	SSV[4]
GOPHER SNAKE	PITUOPHIS CATENIFER	S		
WESTERN AQUATIC GARTER SNAKE	THAMNOPHIS COUCHI	S		
WESTERN TERRESTRIAL GARTER SNAKE	THAMNOPHIS ELEGANS	S		
NORTHWESTERN GARTER SNAKE	THAMNOPHIS ORDINOIDES	S		
COMMON GARTER SNAKE	THAMNOPHIS SIRTALIS	S		
WESTERN RATTLESNAKE	CROTALUS VIRIDIS	S		
BIRDS				
PACIFIC LOON	GAVIA PACIFICA	N		
COMMON LOON	GAVIA IMMER	N	BA	
YELLOW-BILLED LOON	GAVIA ADAMSII	N		
RED-THROATED LOON	GAVIA STELLATA	N		
PIED-BILLED GREBE	PODILYMBUS PODICEPS	S		
HORNED GREBE	PODICEPS AURITUS	N	[4]	[4]
RED-NECKED GREBE	PODICEPS GRISEGENA	N	[4]	[4]
EARED GREBE	PODICEPS NIGRICOLLIS	N		
WESTERN GREBE	AECHMOPHORUS OCCIDENTALIS	N		
CLARK'S GREBE	AECHMOPHORUS CLARKII	N		
FORK-TAILED STORM PETREL	OCEANODROMA FURCATA	N	BA	SSV
BROWN PELICAN	PELECANUS OCCIDENTALIS	N	FE	SE
DOUBLE-CRESTED CORMORANT	PHALACROCORAX AURITUS	N		
BRANDT'S CORMORANT	PHALACROCORAX PENICILLATUS	N		
PELAGIC CORMORANT	PHALACROCORAX PELAGICUS	N		
AMERICAN BITTERN	BOTAURUS LENTIGINOSUS	N		
GREAT EGRET	ARDEA ALBA	N	BT	[4]
SNOWY EGRET	EGRETTA THULA	N	[4]	[4]
CATTLE EGRET	BUBULCUS IBIS	N		
GREAT BLUE HERON	ARDEA HERODIAS	S		
GREEN HERON	BUTORIDES VIRESCENS	S		
BLACK-CROWNED NIGHT HERON	NYCTICORAX NYCTICORAX	N		
TUNDRA SWAN	CYGNUS COLUMBIANUS	N		
GREATER WHITE-FRONTED GOOSE	ANSER ALBIFRONS	N		

COMMON NAME	LATIN NAME	PRESENT IN SOUTH FORK COOS WATERSHED[1]	STATUS FEDERAL[2]	STATUS STATE[3]
SNOW GOOSE	CHEN CAERULESCENS	N		
BRANDT	BRANTA BERNICLA	N		
CANADA GOOSE	BRANTA CANADENSIS	N		
ALEUTIAN CANADA GOOSE	BRANTA CANADENSIS LEUCOPAREIA	N	FT	SE
CACKLING CANADA GOOSE	BRANTA CANADENSIS MINIMA	N	[4]	
DUSKY CANADA GOOSE	BRANTA CANADENSIS OCCIDENTALIS	N	BA[4]	
WOOD DUCK	AIX SPONSA	S		
GREEN-WINGED TEAL	ANAS CRECCA	S		
MALLARD	ANAS PLATYRHYNCHOS	S		
NORTHERN PINTAIL	ANAS ACUTA	S		
BLUE-WINGED TEAL	ANAS DISCORS	S		
CINNAMON TEAL	ANAS CYANOPTERA	S		
NORTHERN SHOVELER	ANAS CLYPEATA	N		
GADWALL	ANAS STREPERA	N		
EURASIAN WIGEON	ANAS PENELOPE	N		
AMERICAN WIGEON	ANAS AMERICANA	N		
CANVASBACK	AYTHYA VALISINERIA	N		
REDHEAD	AYTHYA AMERICANA	N		
RING-NECKED DUCK	AYTHYA COLLARIS	N	[4]	
GREATER SCAUP	AYTHYA MARILA	N		
LESSER SCAUP	AYTHYA AFFINIS	N	[4]	
COMMON GOLDENEYE	BUCEPHALA CLANGULA	S		
BARROW'S GOLDENEYE	BUCEPHALA ISLANDICA	N		
BUFFLEHEAD	BUCEPHALA ALBEOLA	N	[4]	[4]
HOODED MERGANSER	LOPHODYTES CUCULLATUS	S		
COMMON MERGANSER	MERGUS MERGANSER	S		
RED-BREASTED MERGANSER	MERGUS SERRATOR	S		
RUDDY DUCK	OXYURA JAMAICENSIS	N		
HARLEQUIN DUCK	HISTRIONICUS HISTRIONICUS	N	BS[4]	
OLDSQUAW	CLANGULA HYEMALIS	N		
BLACK SCOTER	MELANITTA NIGRA	N		
SURF SCOTER	MELANITTA PERSPICILLATA	N		
WHITE-WINGED SCOTER	MELANITTA FUSCA	N		
TURKEY VULTURE	CATHARTES AURA	K		
OSPREY	PANDION HALIAETUS	S		
WHITE-TAILED KITE	ELANUS LEUCURUS	S	BT	

COMMON NAME	LATIN NAME	PRESENT IN SOUTH FORK COOS WATERSHED[1]	STATUS FEDERAL[2]	STATUS STATE[3]
BALD EAGLE	HALIAEETUS LEUCOCEPHALUS	D	FT	ST
GOLDEN EAGLE	AQUILA CHRYSAETOS	S		
NORTHERN HARRIER	CIRCUS CYANEUS	N		
SHARP-SHINNED HAWK	ACCIPITER STRIATUS	S		
COOPER'S HAWK	ACCIPITER COOPERII	D		
NORTHERN GOSHAWK	ACCIPITER GENTILIS	S	BS[4]	SSC
RED-SHOULDERED HAWK	BUTEO LINEATUS	N		
RED-TAILED HAWK	BUTEO JAMAICENSIS	K		
ROUGH-LEGGED HAWK	BUTEO LAGOPUS	N		
AMERICAN KESTREL	FALCO SPARVERIUS	S		
MERLIN	FALCO COLUMBARIUS	S	BA	
AMERICAN PEREGRINE FALCON[5]	FALCO PEREGRINUS ANATUM[5]	S	FE	SE
GYRFALCON	FALCO RUSTICOLUS	N		
RING-NECKED PHEASANT	PHASIANUS COLCHICUS	S		
BLUE GROUSE	DENDRAGAPUS OBSCURUS	S		
RUFFED GROUSE	BONASA UMBELLUS	S		
WILD TURKEY	MELEAGRIS GALLOPAVO	S		
CALIFORNIA QUAIL	CALLIPEPLA CALIFORNICA	S		
MOUNTAIN QUAIL	OREORTYX PICTUS	S	[4]	
VIRGINIA RAIL	RALLUS LIMICOLA	N		
SORA	PORZANA CAROLINA	N		
AMERICAN COOT	FULICA AMERICANA	S		
BLACK-BELLIED PLOVER	PLUVIALIS SQUATAROLA	N		
AMERICAN GOLDEN PLOVER	PLUVIALIS DOMINICA	N		
PACIFIC GOLDEN PLOVER	PLUVIALIS FULVA	N		
WESTERN SNOWY PLOVER	CHARADRIUS ALEXANDRINUS NIVOSUS	N	FT	ST
SEMIPALMATED PLOVER	CHARADRIUS SEMIPALMATUS	N		
KILLDEER	CHARADRIUS VOCIFERUS	S		
BLACK OYSTERCATCHER	HAEMATOPUS BACHMANI	N		
GREATER YELLOWLEGS	TRINGA MELANOLEUCA	N	BA	
LESSER YELLOWLEGS	TRINGA FLAVIPES	N		
WILLET	CATOPTROPHORUS SEMIPALMATUS	N		
WANDERING TATTLER	HETEROSCELUS INCANUS	N		
WHIMBREL	NUMENIUS PHAEOPUS	N		
LONG-BILLED CURLEW	NUMENIUS AMERICANUS	N	[4]	
BAR-TAILED GODWIT	LIMOSA LAPPONICA	N		

COMMON NAME	LATIN NAME	PRESENT IN SOUTH FORK COOS WATERSHED[1]	STATUS FEDERAL[2]	STATUS STATE[3]
MARBLED GODWIT	LIMOSA FEDOA	N		
RUDDY TURNSTONE	ARENARIA INTERPRES	N		
BLACK TURNSTONE	ARENARIA MELANOCEPHALA	N		
SURFBIRD	APHRIZA VIRGATA	N		
RED KNOT	CALIDRIS CANUTUS	N		
SANDERLING	CALIDRIS ALBA	N		
SOLITARY SANDPIPER	TRINGA SOLITARIA	N	BT[4]	
SPOTTED SANDPIPER	ACTITIS MACULARIA	S		
SEMIPALMATED SANDPIPER	CALIDRIS PUSILLA	N		
WESTERN SANDPIPER	CALIDRIS MAURI	N		
LEAST SANDPIPER	CALIDRIS MINUTILLA	N		
BAIRD'S SANDPIPER	CALIDRIS BAIRDII	N		
PECTORAL SANDPIPER	CALIDRIS MELANOTOS	N		
SHARP-TAILED SANDPIPER	CALIDRIS ACUMINATA	N		
ROCK SANDPIPER	CALIDRIS PTILOCNEMIS	N		
STILT SANDPIPER	CALIDRIS HIMANTOPUS	N		
BUFF-BREASTED SANDPIPER	TRYNGITES SUBRUFICOLLIS	N		
DUNLIN	CALIDRIS ALPINA	N		
RUFF	PHILOMACHUS PUGNAX	N		
SHORT-BILLED DOWITCHER	LIMNODROMUS GRISEUS	N		
LONG-BILLED DOWITCHER	LIMNODROMUS SCOLOPACEUS	N		
COMMON SNIPE	GALLINAGO GALLINAGO	S		
WILSON'S PHALAROPE	PHALAROPUS TRICOLOR	N		
RED-NECKED PHALAROPE	PHALAROPUS LOBATUS	N		
RED PHALAROPE	PHALAROPUS FULICARIA	N		
BONAPARTE'S GULL	LARUS PHILADELPHIA	N		
HEERMANN'S GULL	LARUS HEERMANNI	N		
MEW GULL	LARUS CANUS	N		
RING-BILLED GULL	LARUS DELAWARENSIS	S		
CALIFORNIA GULL	LARUS CALIFORNICUS	N		
HERRING GULL	LARUS ARGENTATUS	N		
THAYER'S GULL	LARUS THAYERI	N		
WESTERN GULL	LARUS OCCIDENTALIS	N		
GLAUCOUS-WINGED GULL	LARUS GLAUCESCENS	N		
GLAUCOUS GULL	LARUS HYPERBOREUS	N		
SABINE'S GULL	XEMA SABINI	N		

COMMON NAME	LATIN NAME	PRESENT IN SOUTH FORK COOS WATERSHED[1]	STATUS FEDERAL[2]	STATUS STATE[3]
BLACK-LEGGED KITTIWAKE	RISSA TRIDACTYLA	N		
CASPIAN TERN	STERNA CASPIA	S	BT	
COMMON TERN	STERNA HIRUNDO	N		
ARCTIC TERN	STERNA PARADISAEA	N		
ELEGANT TERN	STERNA ELEGANS	N		
COMMON MURRE	URIA AALGE	N		
PIGEON GUILLEMOT	CEPPHUS COLUMBA	N		
MARBLED MURRELET	BRACHYRAMPHUS MARMORATUS MARMORATUS		D	FTST[4]
ANCIENT MURRELET	SYNTHLIBORAMPHUS CRAVERI	N		
CASSIN'S AUKLET	PTYCHORAMPHUS ALEUTICUS	N		
RHINOCEROS AUKLET	CERORHINCA MONOCERATA	N		
TUFTED PUFFIN	FRATERCULA CIRRHATA	N		
BAND-TAILED PIGEON	COLUMBA FASCIATA	S		
ROCK DOVE	COLUMBA LIVIA	S		
MOURNING DOVE	ZENAIDA MACROURA	S		
BARN OWL	TYTO ALBA	S		
WESTERN SCREECH-OWL	OTUS KENNICOTTII	S		
GREAT HORNED OWL	BUBO VIRGINIANUS	S		
SNOWY OWL	NYCTEA SCANDIACA	N		
NORTHERN PYGMY-OWL	GLAUCIDIUM GNOMA	K	BT	SSU
BURROWING OWL	ATHENE CUNICULARIA	N	BS	SSC
NORTHERN SPOTTED OWL	STRIX OCCIDENTALIS CAURINA	D	FT	ST
BARRED OWL	STRIX VARIA	S		
SHORT-EARED OWL	ASIO FLAMMEUS	N		
NORTHERN SAW-WHET OWL	AEGOLIUS ACADICUS	S	BA[4]	
COMMON NIGHTHAWK	CHORDEILES MINOR	S		
BLACK SWIFT	CYPSELOIDES NIGER	S		
VAUX'S SWIFT	CHAETURA VAUXI	S		
ANNA'S HUMMINGBIRD	CALYPTE ANNA	S		
RUFOUS HUMMINGBIRD	SELASPHORUS RUFUS	S		
ALLEN'S HUMMINGBIRD	SELASPHORUS SASIN	S	BT[4]	
BELTED KINGFISHER	CERYLE ALCYON	K		
LEWIS' WOODPECKER	MELANERPES LEWIS	N	BA[4]	SSC
ACORN WOODPECKER	MELANERPES FORMICIVORUS	N	BT	[4]
RED-BREASTED SAPSUCKER	SPHYRAPICUS RUBER	S		
DOWNY WOODPECKER	PICOIDES PUBESCENS	K		

COMMON NAME	LATIN NAME	PRESENT IN SOUTH FORK COOS WATERSHED[1]	STATUS FEDERAL[2]	STATUS STATE[3]
HAIRY WOODPECKER	PICOIDES VILLOSUS	K		
BLACK-BACKED WOODPECKER	PICOIDES ARCTICUS	N	BA[4]	SSC
NORTHERN FLICKER	COLAPTES AURATUS	K		
PILEATED WOODPECKER	DRYOCOPUS PILEATUS	K	BA[4]	SSV[4]
OLIVE-SIDED FLYCATCHER	CONTOPUS BOREALIS	K		
WESTERN WOOD-PEWEE	CONTOPUS SORDIDULUS	S		
WILLOW FLYCATCHER	EMPIDONAX TRAILLII	K		
HAMMOND'S FLYCATCHER	EMPIDONAX HAMMONDII	K		
DUSKY FLYCATCHER	EMPIDONAX OBERHOLSERI	S		
PACIFIC SLOPE FLYCATCHER	EMPIDONAX DIFFICILIS	K		
BLACK PHOEBE	SAYORNIS NIGRICANS	N	BT	
TROPICAL KINGBIRD	TYRANNUS VOCIFERANS	N		
WESTERN KINGBIRD	TYRANNUS VERTICALIS	S		
HORNED LARK	EREMOPHILA ALPESTRIS	N		
PURPLE MARTIN	PROGNE SUBIS	S	BA[4]	SSC
TREE SWALLOW	TACHYCINETA BICOLOR	S		
VIOLET-GREEN SWALLOW	TACHYCINETA THALASSINA	S		
NORTHERN ROUGH-WINGED SWALLOW	STELGIDOPTERYX SERRIPENNIS	S		
BANK SWALLOW	RIPARIA RIPARIA	N	BT[4]	SSU[4]
CLIFF SWALLOW	HIRUNDO PYRRHONOTA	S		
BARN SWALLOW	HIRUNDO RUSTICA	S		
GRAY JAY	PERISOREUS CANADENSIS	S		
STELLER'S JAY	CYANOCITTA STELLERI	K		
SCRUB JAY	APHELOCOMA CALIFORNICA	S		
AMERICAN CROW	CORVUS BRACHYRHYNCHOS	K		
COMMON RAVEN	CORVUS CORAX	K		
BLACK-CAPPED CHICKADEE	PARUS ATRICAPILLUS	K		
MOUNTAIN CHICKADEE	PARUS GAMBELI	K		
CHESTNUT-BACKED CHICKADEE	PARUS RUFESCENS	K		
BUSHTIT	PSALTRIPARUS MINIMUS	K		
RED-BREASTED NUTHATCH	SITTA CANADENSIS	K		
WHITE-BREASTED NUTHATCH	SITTA CAROLINENSIS	K		
BROWN CREEPER	CERTHIA AMERICANA	K		
BEWICK'S WREN	THRYOMANES BEWICKII	S		
HOUSE WREN	TROGLODYTES AEDON	S		
WINTER WREN	TROGLODYTES TROGLODYTES	K		

COMMON NAME	LATIN NAME	PRESENT IN SOUTH FORK COOS WATERSHED[1]	STATUS FEDERAL[2]	STATUS STATE[3]
MARSH WREN	CISTOTHORUS PALUSTRIS	S		
AMERICAN DIPPER	CINCLUS MEXICANUS	S		
GOLDEN-CROWNED KINGLET	REGULUS SATRAPA	K		
RUBY-CROWNED KINGLET	REGULUS CALENDULA	K		
WESTERN BLUEBIRD	SIALIA MEXICANA	S	BA[4]	SSV
TOWNSEND'S SOLITAIRE	MYADESTES TOWNSENDI	S		
AMERICAN ROBIN	TURDUS MIGRATORIUS	K		
SWAINSON'S THRUSH	CATHARUS USTULATUS	K		
HERMIT THRUSH	CATHARUS GUTTATUS	K		
VARIED THRUSH	IXOREUS NAEVIUS	K		
WRENTIT	CHAMAEA FASCIATA	K		
MOCKINGBIRD	MIMUS POLYGLOTTOS	N		
AMERICAN PIPIT	ANTHUS SPINOLETTA	S		
CEDAR WAXWING	BOMBYCILLA CEDRORUM	S		
NORTHERN SHRIKE	LANIUS EXCUBITOR	S		
LOGGERHEAD SHRIKE	LANIUS LUDOVICIANUS	S	BT[4]	[4]
EUROPEAN STARLING	STURNUS VULGARIS	S		
SOLITARY VIREO	VIREO SOLITARIUS	S		
HUTTON'S VIREO	VIREO HUTTONI	K		
WARBLING VIREO	VIREO GILVUS	K		
ORANGE-CROWNED WARBLER	VERMIVORA CELATA	K		
NASHVILLE WARBLER	VERMIVORA RUFICAPILLA	S		
YELLOW WARBLER	DENDROICA PETECHIA	S		
YELLOW-RUMPED WARBLER	DENDROICA CORONATA	S		
BLACK-THROATED GRAY WARBLER	DENDROICA NIGRESCENS	K		
TOWNSEND'S WARBLER	DENDROICA TOWNSENDI	S		
HERMIT WARBLER	DENDROICA OCCIDENTALIS	K		
PALM WARBLER	DENDROICA PALMARUM	N		
BLACK-AND-WHITE WARBLER	MNIOTILTA VARIA	N		
MACGILLIVRAY'S WARBLER	OPORORNIS TOLMIEI	K		
COMMON YELLOWTHROAT	GEOTHLYPIS TRICHAS	S		
WILSON'S WARBLER	WILSONIA PUSILLA	S		
YELLOW-BREASTED CHAT	ICTERIA VIRENS	S		
WESTERN TANAGER	PIRANGA LUDOVICIANA	K		
BLACK-HEADED GROSBEAK	PHEUCTICUS MELANOCEPHALUS	K		
LAZULI BUNTING	PASSERINA AMOENA	S		

COMMON NAME	LATIN NAME	PRESENT IN SOUTH FORK COOS WATERSHED[1]	STATUS FEDERAL[2]	STATUS STATE[3]
RUFOUS-SIDED TOWHEE	PIPILO ERYTHROPHTHALMUS	K		
CHIPPING SPARROW	SPIZELLA PASSERINA	K		
VESPER SPARROW	POOECETES GRAMINEUS	N	BT[4]	SSC[4]
SAVANNAH SPARROW	PASSERCULUS SANDWICHENSIS	S		
FOX SPARROW	PASSERELLA ILIACA	K		
SONG SPARROW	MELOSPIZA MELODIA	K		
LINCOLN'S SPARROW	MELOSPIZA LINCOLNII	S		
GOLDEN-CROWNED SPARROW	ZONOTRICHIA ATRICAPILLA	S		
WHITE-CROWNED SPARROW	ZONOTRICHIA LEUCOPHRYS	K		
HARRIS' SPARROW	ZONOTRICHIA QUERULA	N		
DARK-EYED JUNCO	JUNCO HYEMALIS	K		
LAPLAND LONGSPUR	CALCARIUS LAPPONICUS	N		
SNOW BUNTING	PLECTROPHENAX NIVALIS	N		
WESTERN MEADOWLARK	STURNELLA NEGLECTA	S	BA[4]	
RED-WINGED BLACKBIRD	AGELAIUS PHOENICEUS	S		
YELLOW-HEADED BLACKBIRD	XANTHOCEPHALUS XANTHOCEPHALUS	N		
BREWER'S BLACKBIRD	EUPHAGUS CYANOCEPHALUS	S		
BROWN-HEADED COWBIRD	MOLOTHRUS ATER	S		
BULLOCK'S ORIOLE	ICTERUS BULLOCKII	S		
PURPLE FINCH	CARPODACUS PURPUREUS	K		
HOUSE FINCH	CARPODACUS MEXICANUS	S		
PINE SISKIN	CARDUELIS PINUS	S		
LESSER GOLDFINCH	CARDUELIS PSALTRIA	S		
AMERICAN GOLDFINCH	CARDUELIS TRISTIS	K		
RED CROSSBILL	LOXIA CURVIROSTRA	S		
EVENING GROSBEAK	COCCOTHRAUSTES VESPERTINUS	K		
HOUSE SPARROW	PASSER DOMESTICUS	S		
MAMMALS				
VIRGINIA OPOSSUM	DIDELPHIS VIRGINIANA	S		
PACIFIC WATER SHREW	SOREX BENDIRII	S		
PACIFIC SHREW	SOREX PACIFICUS	S		
TROWBRIDGE'S SHREW	SOREX TROWBRIDGII	S		
VAGRANT SHREW	SOREX VAGRANS	S		
SHREW-MOLE	NEUROTRICHUS GIBBSII	S		
PACIFIC MOLE	SCAPANUS ORARIUS	S		

COMMON NAME	LATIN NAME	PRESENT IN SOUTH FORK COOS WATERSHED[1]	STATUS FEDERAL[2]	STATUS STATE[3]
TOWNSEND'S MOLE	SCAPANUS TOWNSENDII	S		
BIG BROWN BAT	EPTESICUS FUSCUS	S		
SILVER-HAIRED BAT	LASIONYCTERIS NOCTIVAGANS	S	BT[4]	SSU[4]
HOARY BAT	LASIURUS CINEREUS	S		
CALIFORNIA MYOTIS	MYOTIS CALIFORNICUS	S		
LONG-EARED MYOTIS	MYOTIS EVOTIS	S	BT[4]	SSU[4]
LITTLE BROWN MYOTIS	MYOTIS LUCIFUGUS	S		
FRINGED MYOTIS	MYOTIS THYSANODES	S	BS	SSV
LONG-LEGGED MYOTIS	MYOTIS VOLANS	S	BT[4]	SSU[4]
YUMA MYOTIS	MYOTIS YUMANENSIS	S	BT[4]	SSU[4]
PACIFIC WESTERN BIG-EARED BAT	CORYNORHINUS TOWNSENDII TOWNSENDII[5]		S	BS[4]SSC
COYOTE	CANIS LATRANS	S		
GRAY FOX	UROCYON CINEREOARGENTEUS	S		
RED FOX	VULPES VULPES	N		
BLACK BEAR	URSUS AMERICANUS	K		
RINGTAIL	BASSARISCUS ASTUTUS	S	BT	SSU
RACCOON	PROCYON LOTOR	K		
SOUTHERN SEA OTTER	ENHYDRA LUTRIS NEVERS	N	FT	ST
RIVER OTTER	LUTRA CANADENSIS	K		
AMERICAN MARTEN	MARTES AMERICANA	S	BA[4]	SSV[4]
FISHER	MARTES PENNANTI	S	BS[4]	SSC
STRIPED SKUNK	MEPHITIS MEPHITIS	S		
WESTERN SPOTTED SKUNK	SPILOGALE GRACILIS	S		
SHORT-TAILED WEASEL	MUSTELA ERMINEA	S		
LONG-TAILED WEASEL	MUSTELA FRENATA	S		
MINK	MUSTELA VISON	K		
MOUNTAIN LION	FELIS CONCOLOR	S		
BOBCAT	FELIS RUFUS	K		
STELLAR SEA LION	EUMETOPIAS JUBATUS	N	FT	SSV[4]
CALIFORNIA SEA LION	ZALOPHUS CALIFORNIANUS	N		
NORTHERN ELEPHANT SEAL	MIROUNGA ANGUSTIROSTRIS	N		
HARBOR SEAL	PHOCA VITULINA	N		
ROOSEVELT ELK	CERVUS ELAPHUS	K		
BLACK-TAILED & MULE DEER	ODOCOILEUS HEMIONUS	K		
MOUNTAIN BEAVER	APLODONTIA RUFA	K		
NORTHERN FLYING SQUIRREL	GLAUCOMYS SABRINUS	S		

WESTERN GRAY SQUIRREL	SCIURUS GRISEUS	S	BT[4]	SSU[4]
CALIFORNIA GROUND SQUIRREL	SPERMOPHILUS BEECHEYI	S		
TOWNSEND'S CHIPMUNK	TAMIAS TOWNSENDII	S		
DOUGLAS' SQUIRREL	TAMIASCIURUS DOUGLASII	S		
WESTERN POCKET GOPHER	THOMOMYS MAZAMA	N		
GOLD BEACH POCKET GOPHER	THOMOMYS MAZAMA HELLERI	N	BS[4]	
PISTOL RIVER POCKET GOPHER	THOMOMYS UMBRINUS DETUMIDUS	N	BS[4]	
BEAVER	CASTOR CANADENSIS	K		
NUTRIA	MYOCASTOR COYPUS	N		
DEER MOUSE	PEROMYSCUS MANICULATUS	S		
WESTERN HARVEST MOUSE	REITHRODONTOMYS MEGALOTIS	N		
HOUSE MOUSE	MUS MUSCULUS	S		
WHITE-FOOTED VOLE	ARBORIMUS ALBIPES	S	BS[4]	SSU
RED TREE VOLE	ARBORIMUS LONGICAUDUS	S		
WESTERN RED-BACKED VOLE	CLETHRIONOMYS CALIFORNICUS	S		
LONG-TAILED VOLE	MICROTUS LONGICAUDUS	S		
CREEPING VOLE	MICROTUS OREGONI	S		
TOWNSEND'S VOLE	MICROTUS TOWNSENDII	S		
PACIFIC JUMPING MOUSE	ZAPUS TRINOTATUS	S		
BUSHY-TAILED WOODRAT	NEOTOMA CINEREA	S		
DUSKY-FOOTED WOODRAT	NEOTOMA FUSCIPES	N		
NORWAY RAT	RATTUS NORVEGICUS	S		
BLACK RAT	RATTUS RATTUS	S		
MUSKRAT	ONDATRA ZIBETHICA	S		
PORCUPINE	ERETHIZON DORSATUM	K		
BRUSH RABBIT	SYLVILAGUS BACHMANI	S		
RIGHT WHALE	EUBALAENA GLACIALIS	N	FE	SE
GRAY WHALE	ESCHRICHTIUS ROBUSTUS	N	FE	SE
BLUE WHALE	BALAENOPTERA MUSCULUS	N	FE	SE
FINBACK WHALE	BALAENOPTERA PHYSALUS	N	FE	SE
SEI WHALE	BALAENOPTERA BOREALIS	N	FE	SE
HUMPBACKED WHALE	MEGAPTERA NOVAEANGLIAE	N	FE	SE
SPERM WHALE	PHYSETER CATODON	N	FE	SE