BIODIVERSITY

Goal: Maintain healthy forest ecosystems; maintain a mix of habitats at different spatial scales capable of supporting the full range of naturally occurring flora, fauna, and ecological processes native to Southeast Alaska.

Objective: Maintain a Forest-wide system of old-growth forest habitat to sustain old-growth-associated species and resources. Ensure that the system meets the minimum size, spacing, and composition criteria described in Appendix K of the 1997 Tongass Land and Resource Management Plan. Provide sufficient habitat to preclude the need for listing species under the Endangered Species Act due to habitat conditions on National Forest System lands.

Background: During the development of the 1997 Tongass Land and Resource Management Plan (Forest Plan), an Interagency Viable Population Committee (VPOP) developed a landscape conservation strategy to provide old-growth habitat to support well-distributed, viable populations of old-growth associated wildlife species across the Tongass National Forest (Suring et al. 1993). Because of the comprehensive nature of the VPOP approach and supportive technical reviews of the strategy (Marcot 1992; Kiester and Eckhardt 1994), the system of the VPOP large, medium, and small old-growth habitat reserves was integrated into the Forest Plan as the cornerstone of the old-growth habitat reserve strategy (Appendix K). The planning record for the Forest Plan provides an evaluation of how well the Tongass old-growth reserve system meets VPOP recommendations (Iverson 1997). The record found that the Forest Plan reserves exceeded the minimum amount recommended by the VPOP strategy by over 100%. Of particular interest were the five biological provinces identified by VPOP as having a higher risk of not maintaining viable populations of wildlife (Table B-1).

Table B-1. Percentage that Higher Risk Biological Provinces Exceed the Minimum VPOP Productive Old Growth Recommendations

Higher Risk Biological Provinces (higher risk relative to maintaining viable populations)	Percent Exceed Minimum VPOP Recommendations
North Prince of Wales	51
Kupreanof/Mitkof Island	33
Etolin Island and Vicinity	43
Eastern Chichagof Island	73
Revilla Island/Cleveland Peninsula	108

These higher risk provinces exceed the minimum VPOP productive old-growth (POG) recommendations by 33 % to 108%. These and other analyses at the time concluded that the strategy was sufficient. The Interagency Monitoring and Evaluation Group (IMEG) has recommended additional analyses.

The responses to the biodiversity questions are based on the results of continued analysis of the system of large, medium, and small old-growth habitat reserves (OGRs) as outlined in Appendix K of the Forest Plan.

Biodiversity Question 1: Are contiguous blocks of old-growth habitat being maintained in a Forest-wide system of old-growth reserves to support viable and well-distributed populations of old-growth-associated species and subspecies?

The effects of management activities on the Tongass old-growth conservation strategy were determined by reviewing project-level environmental documents and Forest Plan amendments for their effects on the spatial distribution, size, and composition of old-growth habitat reserves. This is consistent with the Biodiversity Evaluation Criteria and Sampling Methods listed in the Forest Plan.

The 2001 monitoring report recommended that a detailed analysis be done of the old-growth reserves with special emphasis on the composition and spacing of the OGRs. The Forest-wide system of old-growth habitat consists of the Old-growth Habitat land use designation (LUD) areas and the other non-development LUDs. Table B-2 shows how the Forest Plan land use designations are divided into non-development and development areas.

Table B-2. Land Use Designations(1) From the 1997 Forest Plan

Non-development LUDs (13,428,299 acres)		**Development LUDs (3,866,036)**	
Wilderness & National Monument (5,885,387 acres)	**Mostly Natural (7,542,912 acres)**	**Moderate Development (1,119,000 acres)**	**Intensive Development (2,747,036 acres)**
Wilderness National Monument Wilderness National Monument	LUD II, Old-growth Habitat (Reserve) Research Natural Area Remote Recreation Semi-Remote Recreation Municipal Watershed Special Interest Area Wild River Scenic River Recreational River Experimental Forests	Scenic Viewshed Modified Landscape	Timber Production Minerals Transportation & Utility Systems

In Table B-2, the total area within each LUD is included. However, in some cases, more than one Land Use Designation can be appointed to the same area (such as Special Interest Area within Wilderness). Therefore, totaling the acres of the LUDs will exceed the total Tongass acreage. No acreage has been calculated for the Transportation and Utility Systems LUD.

Old growth reserves are only part of the old-growth habitat. The OGR guideline for the Tongass is 57,754 acres in old-growth habitat reserves; there are currently 90,788 acres of OGRs. Old growth habitat also includes beach, estuary, and riparian corridors which can be part of the development LUDs. They were established to supplement the other old-growth habitat. Mostly natural areas can have some development but development is very limited.

The 2001 monitoring report also recommended that old-growth habitat be tied in with the ecological subsections (Nowacki et al, 2001) and coarse canopy forest (Caouette et al, 2000). For old-growth habitat in the ecological subsections see Table B-3.

Table B-3 is based on the 1997 Forest Plan. The productive forest in 11 ecological subsections is 100% old-growth habitat. Most of these ecological subsections contain over half old-growth habitat. Only 17 subsections are over half development land use designations (LUDs). The Tongass is well represented in old-growth habitat. The spacing of old-growth habitat has not been analyzed but a look at the 1997 Forest Plan ROD Tongass map shows no large continuous development LUDs.

Photo 1: *Ligusticum caldera*, Photo by Ashley Atkinson

Table B-3. 1997 Land Use Designation Percentages for 73 Ecological Subsections

	Percent Of Acres by LUD							Productive Forest		
SUBSECTION	Wilderness & National Monument	Mostly natural setting	Moderate development	Intensive development	Private	% Non productive forests	% Non forest	%	Acres	% harvested
Affleck Canal Till Lowlands	37	62	0	0	0	49	2	49	27,108	0.14
Alvin Bay Sediments	53	24	14	9	0	26	2	72	58,364	1.84
Behm Canal Complex	65	18	2	14	1	41	19	40	93,756	4.18
Bell Island Granitics	14	65	9	11	0	39	18	43	142,121	2.49
Boca De Quadra Complex	100	0	0	0	0	53	2	45	57,369	0.00
Boundary Ranges Icefields	32	62	2	3	0	9	84	7	634,925	1.67
Cape Fanshaw Complex	0	30	28	38	4	27	5	67	45,530	0.79
Central Baranof Metasediments	20	65	2	10	2	20	35	15	53,713	10.67
Central POW Till Lowlands	0	45	19	28	7	29	11	60	146,225	23.15
Central POW Volcanics	8	21	21	34	15	30	16	54	268,219	26.41
Chilkat Complex	0	96	0	0	4	31	47	22	139,231	*
Chilkat Peninsula Carbonates	26	52	13	7	2	18	54	28	151,009	5.48
Clarence Strait Volcanics	15	34	5	7	40	24	41	34	87,289	1.42
Dall-Outside Complex	0	59	9	3	29	21	33	47	135,112	0.97
Duke Island Till Lowlands	0	73	0	0	27	54	34	13	8,300	2.96
Duncan Canal Till Lowlands	6	35	13	46	1	52	13	36	87,819	7.74
Eastern Passage Complex	23	32	30	14	2	29	23	47	114,523	1.59
Elevenmile Till Lowlands	0	52	0	39	8	48	19	32	15,318	0.26
Etolin Granitics	37	19	26	19	0	44	19	38	33,710	5.44
Foggy Bay Till Lowlands	100	0	0	0	0	59	5	37	20,697	0.00
Freshwater Bay Carbonates	0	30	3	55	12	17	25	58	151,447	14.55
Gulf of Esquibel Till Lowlands	12	88	0	0	0	66	2	32	14,497	0.14
Hetta Inlet Metasediments	1	23	8	32	35	21	31	47	106,716	13.72

	Percent Of Acres by LUD							Productive Forest		
SUBSECTION	Wilderness & National Monument	Mostly natural setting	Moderate development	Intensive development	Private	% Non productive forests	% Non forest	%	Acres	% harvested
Holkham Bay Complex	32	26	12	30	0	21	22	57	290,378	0.09
Hood-Gambier Bay Carbonates	98	0	0	1	0	23	9	68	148,901	0.00
Kake Volcanics	0	23	5	34	39	34	28	37	49,382	15.42
Kasaan Peninsula Volcanics	0	28	11	0	61	17	63	20	7,128	0.85
Ketchikan Mafics/Ultramafics	0	51	10	21	18	30	36	34	23,449	6.06
Klawock Inlet Till Lowlands	0	4	0	0	96	2	86	13	1,950	62.00
Kook Lake Carbonates	0	39	6	55	0	19	15	66	67,364	17.38
Kuiu-POW Granitics	19	58	3	20	0	25	15	59	86,947	5.75
Misty Fiords Granitics	96	2	0	1	0	34	38	27	581,088	0.35
Mitchell-Hasselborg Till Lowlands	95	4	0	1	0	23	7	71	66,270	0.00
Moira Sound Complex	24	34	0	41	2	39	13	49	5,554	0.17
Mount Edgecumbe Volcanics	0	75	21	3	0	39	22	38	27,736	13.51
Necker Bay Granitics	83	16	0	0	0	35	42	22	40,710	0.34
North Admiralty Complex	84	7	2	6	0	22	31	48	150,357	0.00
North Baranof Complex	0	36	4	60	0	30	18	52	66,799	15.26
North Chichagof Granitics	19	51	2	28	1	27	47	25	100,374	2.97
North POW Complex	0	46	16	37	0	32	5	63	51,011	14.13
North POW-Kuiu Carbonates	0	28	7	56	10	11	8	81	203,532	40.84
Outer Coast Wave-cut Terraces	77	19	0	0	4	51	17	32	36,934	0.00
Outer Islands Complex	100	0	0	0	0	25	7	68	22,282	0.00
Peril Strait Granitics	0	40	9	51	0	29	23	49	114,046	9.80
Point Adolphus Carbonates	0	32	0	67	1	20	23	57	66,873	3.71
Princess Bay Volcanics	62	10	8	20	0	37	6	57	31,670	12.95
Puget Peninsula Metasediments	100	0	0	0	0	4	83	12	11,996	0.00

	Percent Of Acres by LUD							Productive Forest		
SUBSECTION	Wilderness & National Monument	Mostly natural setting	Moderate development	Intensive development	Private	% Non productive forests	% Non forest	%	Acres	% harvested
Rowan Sediments	27	27	0	46	1	11	2	86	112,078	13.62
Sitka Sound Complex	0	68	9	15	7	36	15	49	91,053	9.15
Skowl Arm Till Lowlands	0	28	2	47	22	46	23	31	27,264	14.28
Soda Bay Till Lowlands	0	44	5	25	25	38	31	31	46,004	4.17
South Admiralty Volcanics	100	0	0	0	0	29	15	56	104,934	0.00
South Baranof Sediments	31	69	0	0	0	26	53	21	35,454	0.00
South POW Granitics	39	48	0	12	1	56	8	35	48,574	0.08
Stephens Passage Glaciomarine Terraces	36	39	11	8	7	32	8	61	172,630	0.08
Stephens Passage Volcanics	58	28	0	13	2	26	12	62	58,767	0.03
Stikine River Delta	77	5	15	0	3	13	30	57	24,034	15.87
Stikine Strait Complex	0	42	29	29	0	44	5	52	33,245	8.35
Stikine-Taku River Valleys	44	53	0	3	0	15	39	46	244,134	0.00
Sumner Strait Volcanics	0	32	7	61	0	48	4	48	172,326	6.45
Thayer Lake Granitics	100	0	0	0	0	25	10	65	46,677	0.00
Thomas Bay Outwash Plains	0	27	61	0	12	34	21	45	13,835	30.96
Thorne Arm Granitics	19	38	12	31	1	48	4	48	30,277	8.86
Traitors Cove Metasediments	0	36	21	32	11	31	14	55	176,470	13.63
Ushk-Patterson Bay Granitics	18	49	4	29	0	40	20	40	45,946	4.72
Vixen Inlet Till Lowlands	0	41	6	54	0	52	9	39	10,718	0.00
West Chichagof Complex	93	6	0	1	0	40	37	22	29,318	0.00
Wrangell Narrows Metasediments	11	19	34	26	11	32	14	54	169,149	13.54
Yakutat-Lituya Forelands	9	71	11	6	2	17	34	49	577,166	*
Zimovia Strait Complex	5	24	34	30	7	40	9	51	112,978	9.26

* Only partially in the Tongass

Monitoring Results

As directed in the Forest Plan, small OGRs are being systematically reviewed as part of individual timber sale plans. Since the signing of the Forest Plan ROD in May 1997, some project-level plans have changed the size or composition of old growth reserves. These changes are summarized in Table B-4. None of these changes significantly changed the spacing of the reserves. To date, four other environmental documents, Indian River Timber Sale(s), Skipping Cow Timber Sale, Crane and Rowan Mountain, and Emerald Bay, did not amend OGR boundaries and are not included in Table B-4. These OGRs met Forest Plan requirements.

Amendments to the Forest Plan have resulted in an increase of 14,239 acres, including 5,737 acres of productive old growth (POG) within the Old-growth Habitat LUD. Old-growth habitat reserves modified in these project level plans meet or exceed size and productive old-growth minimums (Appendix K, Forest Plan).

In the resolution of an appeal of the Crystal Creek FEIS (#99-10-00-0006-A15), the Forest Service agreed to display the effects of OGR modifications on the suitable available timber in the biodiversity section of this annual Monitoring and Evaluation Report. These changes are displayed in the Table B-4. Forest-wide, these modifications of OGRs have reduced the net suitable acres for timber harvest by 672 acres.

One small OGR was reviewed in 2005/2006, the Couverden Timber Sale (VCU 1190).

The Couverden Timber Sale was reviewed by an interagency group of biologists from the Forest Service, the US Fish & Wildlife Service and the Alaska Department of Fish & Game. The existing small OGR did not meet Forest Plan guidelines for size. The OGR boundaries of the reserve were adjusted to add an additional 790 acres to the reserve, all of which were productive old growth.

Evaluation of Results

Since May 1997, project level decisions have generally increased the size and improved composition of Old-growth Reserves. This is the case for FY2006 as well.

Action Plan

- Continue detailed descriptions of changes in OGRs and associated rationale in project-level National Environmental Policy Act (NEPA) documents.
- Develop procedures within the GIS to make it easier to track changes in OGRs.
- Track all non-development LUDs within the boundary of the OGR.
- In the GIS database, attach the correct size code to each OGR (large, medium, and small).
- Include the size and composition of the OGRs before and after the changes in the NEPA documents.

Table B-4. Summary of Acreage Changes in the Old-growth LUDs Documented in Project-level NEPA RODs from FY 1998- 2004.

Project FY ROD Signed	VCU	OGR Acres (POG) on	Minimum Forest Plan OGR Acres (POG)[1]	Modified OGR Acres (POG)	Net Change OGR Acres (POG)	Net Change Suitable Acres [4]	Comments
Canal Hoya 1998	5200	2,090 (1,630)	2,901 (1,450)	9,210 (2,740)	7,120 (1,110)	-151	1) Expanded to meet required size
Chasina 1998	6800	1,525 (537) 2	637 (318)	2,202 (842)	677 (305)	-78	1) Too small due to private lands 2) Expanded to meet required size
Cholmondeley 2003 – small OGR	614 615 616	14,396 (5,079)	7,411 (3,841)	12,889 (5,416)	1507 (-337)	-5,979	
Cholmondeley 2003 – medium OGR[1]	617 675 676	17,412	10,000	18,050	+638	-55	
Control Lake 1998	5972 5971	5,073 (2,418) 2	3,404 (1,702)	4,596 (2,359) 2	-477 (-59)	304	1) Remove 2nd growth 2) Improve connectivity 3) Includes small part of 5980
Couverden 2005	1190	1,469	2,259	2,259	+790	-617	1) Meet size requirement
Crystal Cr. (Delta Cr.) 1998	487	2,800 (1,680)	3,195 (1,598)	4,100 (2,340)	1,300 (660)	6	1) Include goat range 2) Maintain Paterson R. corridor 3) Reduce 2nd growth
Crystal Cr. (Pt Agassiz) 1998	489	2,350 (1,260)	Part of Brown Cove	2,270 (1,400)	-80 (140)	-306	1) Reduce beach and riparian buffers 2) Add high volume stands
Crystal Cr. (Brown Cove) 1998	489	4,650 (2,550)	6,444 (3,222)	4,840 (2,640)	190 (90)	-372	1) Add goat range 2) Improve connectivity 3) Brown Cove in same VCU
Doughnut T.S. 2000	476 477	2,001 (1,560)	3,090 (1,540)	3,090 (1,620)	1,089 (60)	-19	1) Meet size requirement
Finger Mountain 2003	231 232	2,588 1,717	3,028 1,801	3,064 1,834	+476 +117	-593	1) Meet POG requirements
Fire Cove Salvage 2002	739	3,650 (2,194)	4,688 (2,344)	3,853 (2,692)	203 (498)	-447	1) Meet POG requirements
Kensington Mine	160 190 200	802 1,299 2,098	1,375 1,441 1,750	1,454 1,462 2,556	+ 652 + 163 + 458	-1,204	
Kuakan T.S. 2000	525	1,141 (931)	1,526 (763)	1,564 (999)	423 (68)	-126	1) Meet size requirement 2) Improve location

[1] Numbers combined for VCUs 675, 676, and 617 for the medium OGR.

Project FY ROD Signed	VCU	OGR Acres (POG) on	Minimum Forest Plan OGR Acres (POG)[1]	Modified OGR Acres (POG)	Net Change OGR Acres (POG)	Net Change Suitable Acres [4]	Comments
Luck Lake 2000	581 582 583	5,984 (2,884)	5,874 (3,015)	6,156 (3,841)	172 (957)	-537	1) Meet size requirement 2) Improve location
Madan 2003	502 504	1,402 1,791	4594 2685	5,085 2,696	+3,683 + 905	-2343	
Nemo Loop Thoms Lake 1998	479	12,203 (7,157)	10,000 (5,000)	12,430 (7,917)	227 (760)	-755	1) Fixed mapping error to allow road corridor 2) Improve connectivity
Niblack EA 1998	6830	583 (344)	1,414 (707)	1,499 (828)	916 (484)	252	1) Meet POG requirements
Polk Small Sales 2000	620	3,788 (1,963)	3,759 (1,879)	3,808 (2,057)	20 (94)	-153	1) Better placement
Salty EA 2000	747	2,576 (1,821)	2,546 (1,273)	2,603 (1,871)	27 (50)	-27	1) Meet size requirement 2) Improve connectivity
Sea Level 1999	756	1,160 (800)	1,308 (654)	1,395 (716)	235 (-84)	-315	1) Meet size requirement 2) Improve connectivity
Threemile TS, 2004	419	2,721	3,098	3,396	+ 675	- 368	
Todahl Backline 1998	443	1,557 (687)	2,106 (1,598)	2,159 (1,090)	602 (403)	-361	1) Meet POG requirements
Woodpecker 2003	448 452	4,920 (3,880)	9,064 (4,532)	4,530 (3,850)	-390 (-30)	50	1) Meet size requirement 2) Improve location
Total	N/A	105,696 (39,375)	101,398 (35,436)	122,354 (47,914)	14,551 (5,169)	-14,194	

1) Required acreage (Appendix K, Forest Plan 1997).

2) Numbers not found in environmental document. It was determined by subsequent GIS analysis for this report.

3) All numbers are in acres; POG = volume strata High, Medium, and Low; OGR = Old-growth reserve.

4) Suitable acres are those that are suitable for timber harvest.

5) VCU 489 has two small OGRs (Pt Agassiz and Brown Cove), when combined they exceed guideline acres for VCU 489.

6) Required to be reported here as part of the resolution of an appeal on the Crystal Creek FEIS (#99-10-00-0006-A15),

7) Decision remanded on appeal, the new decision was made in FY 03.

Biodiversity Question 2: Are the effects on biodiversity consistent with those estimated in the Forest Plan?

Monitoring Results

The biodiversity/viability analyses in the Forest Plan assumed that the maximum level of timber harvest allowed by the Forest Plan would be harvested and that the amount and

intensity of timber harvest is an index of potential effects on biodiversity (Table B-5). This is a “coarse filter” approach, not a “fine filter” analysis designed to address single species issues (Hunter 1990). Therefore, for this analysis, if the actual amount or the intensity of harvest were less than assumed in the Forest Plan FEIS, the potential effects on biodiversity would be favorable. In actuality, less than half the ASQ was harvested from 1997 through 2002. These harvest units were placed into GIS and summarized by province and volume strata. During these years, 16,472 acres of productive old growth (POG) were treated by some type of timber harvest method (clearcut, clearcut with reserves, or partial cutting). Of these acres, 7,926 acres were in the "high" volume stratum (Julin and Caouette 1997). These data are summarized by ecological subsection in Table B-6.

To date, the high volume stratum has been harvested disproportionately to its abundance. The Forest Plan ROD stated that about 42 percent of the forest is in the high volume stratum. Since 1997, about 48 percent of the harvest has been in the high volume stratum.

About 13 percent of the harvest has been a type of partial harvest resulting in uneven-aged or two-aged stands, thereby retaining higher levels of biological legacy within units (Table B-5). The majority of harvest reported to date was planned under the 1979 Tongass Land Management Plan (TLMP). As timber sales planned under the 1997 Forest Plan are harvested, the amount of clearcut harvest is expected to decline. Partial harvest methods, depending on how they are designed, can allow for higher habitat value levels than even-aged management (Kirchhoff and Thomson 1998; Price et al. 1998; Zenner 2000; Deal 2001; Deal and Tappeiner 2001; Kramer et al. 2001).

Table B-5. Description of Timber Harvest (1998-2002) by Silvicultural System

Silvicultural system	% of Acres
Even-aged	87.0
Uneven-aged	12.3
Two-aged	0.5
Intermediate	0.2
Total	16,472 acres

Figures are rounded to achieve 100%.

Evaluation of Results

Biodiversity analyses within the Forest Plan assume the maximum level of harvest. The Forest Plan allows for an ASQ harvest of 267 million board feet of timber (MMBF). An ASQ of 267 MMBF equates to an annual harvest of about 8,529 acres of POG for the first decade of the Forest Plan. Less than half of the annual allowed harvest has occurred during the first 7 years of Forest Plan implementation (Tables B-5 and B-6). Therefore, the magnitude of timber harvest and the potential impacts on biodiversity have been less than those forecast in the Forest Plan. It appears that this trend will continue for the foreseeable future. In fiscal year 2005, only 24% of the ASQ was harvested. Even less was harvested in 2006.

Table B-6. Productive Old Growth Harvested in 1998 through 2003[1] by Ecological Subsection

		High volume			Medium volume			Low vol.	Other
TIMTYP VOL CLASS		**6 & 7**	**5**	**5**	**5**	**4**	**4**	**4**	
Subsection[2]	**Total acres Harvested[3]**	**Acres**	**N aspect**	**S aspect**	**Hydric Acres**	**N aspect**	**S aspect**	**Hydric Acres**	**Acres**
Behm Canal Complex	126	80	0	40	0	0	0	2	4
Bell Island Granitics	862	20	160	261	160	60	120	40	40
Central POW Till Lowlands	889	280	20	40	105	0	80	265	100
Central POW Volcanics	3000	412	229	606	322	209	521	415	286
Duncan Canal Till Lowlands	925	29	120	278	60	80	179	160	20
Elevenmile Till Lowlands	161	0	20	0	20	20	60	20	20
Etolin Granitics	40	0	0	40	0	0	0	0	0
Hetta Inlet Metasediments	980	200	120	220	0	100	220	40	80
Kake Volcanics	120	0	0	20	0	0	40	20	40
Kuiu-POW Granitics	199	0	40	159	0	0	0	0	0
North Baranof Complex	501	0	40	40	40	120	140	100	20
North POW Complex	22	0	0	0	0	1	0	7	14
North POW-Kuiu Carbonates	1127	660	60	325	1	0	60	0	21
Peril Strait Granitics	140	0	60	20	20	40	0	0	0
Rowan Sediments	480	140	80	200	20	0	0	40	0
Skowl Arm Till Lowlands	841	60	0	0	120	20	140	320	180
Stikine Strait Complex	238	20	58	104	5	1	20	0	30
Sumner Strait Volcanics	1369	77	249	456	24	99	293	52	118
Traitors Cove Metasediments	1509	200	180	285	180	20	301	301	41
Wrangell Narrows Metasediments	1643	201	321	440	0	281	280	60	60
Zimovia Strait Complex	2029	8	220	407	60	240	710	217	167
Tongass Total [1]	**17202**	**2387**	**1977**	**3941**	**1137**	**1291**	**3164**	**2059**	**1241**

[1] Forest Database was queried for all timber harvest from 1998 through 2002. The ROD was signed in mid-1997 so some timber harvested in the fall of 1997 was not reflected here.

[2] Caouette J.P. and E. DeGayner 2003. A Forest Mapping and Classification Tool Developed by Modeling Tree Sizes and Densities in the Commercial Forests of Southeast Alaska; in Press.

[3] Some columns or rows don't add up to total 100%; this is due to rounding errors.

ACTION PLANS

Continue to monitor the amount and intensity of timber harvest as a "coarse filter" index for the effects of management on biodiversity.

Support efforts to construct better existing vegetation maps for the Tongass National Forest, particularly in mapping disturbance regimes and coarse canopy forest.

Biodiversity Question 3: Are management practices consistent with current knowledge regarding sensitive species conservation?

In the Forest Plan's Monitoring Plan (page 6-5), "sensitive species" are defined as federally (U. S. Fish and Wildlife Service [USFWS] and National Marine Fisheries Service [NMFS]) listed threatened or endangered species, Alaska Region (Forest Service) sensitive species, and state (Alaska Department of Fish and Game [ADF&G]) species of concern. The Forest Plan separates this monitoring question into four types of information.

Monitoring Results

The sampling methods are separated into four parts.

1) "Annually review (USFS) files and recent information regarding sensitive species taxa on the Tongass National Forest" (Forest Plan page 6-5).

Alaska Department of Fish and Game (ADFG) continued analysis of nesting habitat, productivity, and telemetry data for Queen Charlotte goshawk to understand their distribution and habitat in Southeast Alaska. The Yakutat Ranger District conducted surveys of trumpeter swans. A revision of the Regional Forester's Sensitive Wildlife Species list began in July, and continued through the 2006 fiscal year.

Besides the BEs listed below, several publications discuss plants that are designated as sensitive in the Alaska Region. Several unpublished reports discuss the genetics, distribution, and abundance of *Botrychium tunux* and *Botrychium yaaxudakeit* as well as other *Botrychium*. There has been correspondence concerning the abundance and distribution of *Poa laxiflora* and *Glyceria leptostachya*, the taxonomy of *Carex lenticularis* var. *dolia*, and the name change of *Senecio moresbiensis*. Due to these reports, discussions, recent publications, field work, and laboratory work concerning botany, a revision of the Regional Foresters Sensitive Plant Species list is currently underway, with an expected completion date of spring 2007.

2) "Consult with other agencies regarding (management practices for) these species and whether additional species should be considered for addition to the Region 10 sensitive species list" (Forest Plan page 6-5). Summarize the "…results of any consultations with ADF&G, USFWS or NMFS under the MOU with those agencies" (Forest Plan page 6-5).

Correspondence also occurred regarding the Sensitive Wildlife Species List with USFWS Endangered Species Branch, USFWS Juneau Field Office, Kenai National Wildlife Refuge, National Park Service Alaska Regional Office, Kenai Fjords National Park, Glacier Bay National Park and Preserve, and ADFG Non-game Program. Joe Cook (University of New Mexico) and Steve MacDonald (University of Alaska - Fairbanks) submitted letters concerning the sensitive species list revision (M. Goldstein pers. comm.)

Correspondence occurred regarding revision of the Regional Forester's Sensitive Plant Species List with several agencies and organizations, including US Fish and Wildlife Service (USFWS), University of Alaska – Fairbanks, and Alaska Natural Heritage Program (M. Stensvold, pers. comm.). Correspondence also occurred regarding the Sensitive Wildlife Species List with USFWS Endangered Species Branch, USFWS Juneau Field Office, Kenai National Wildlife Refuge, National Park Service Alaska Regional Office, Kenai Fjords National Park, Glacier Bay National Park and Preserve, and ADFG Nongame Program.

3) "Evaluate data collected in studies to determine the need for changes in the Standards and Guidelines of the Tongass Land Management Plan" (Forest Plan page 6-5).

No project-level effectiveness monitoring was performed during the 2006 fiscal year. Broad-scale monitoring continued for the Queen Charlotte goshawk. Selected monitoring occurred for trumpeter swans on the Yakutat Ranger District.

No project-level effectiveness monitoring for sensitive plants was performed during the 2006 fiscal year.

4) "Summarize results of Biological Evaluations (BEs) and associated effectiveness monitoring conducted at the project level" (Forest Plan page 6-5).

R10 Sensitive Species: Biological Evaluations for Wildlife

Forest Service wildlife biologists and biological technicians completed 51 Biological Evaluations during the 2006 fiscal year for R10 sensitive wildlife species. Most of the analyses reported a "no impact" determination, while a few reported a "may impact individuals but not likely to adversely affect population viability" for others.

Fifty-nine BEs were reported in 2006 by Ranger Districts comprising the Tongass National Forest. The following report by districts details the BEs and BAs.

Admiralty National Monument had no BEs completed for 2006.

Craig Ranger District completed eleven wildlife BEs. "No impact" determinations were reported for sixteen of the seventeen BEs completed. These included Hyak Mine Corp. Road, Weed Eradication, Soda Nick Timber Sale, Ladrones Micro Sale, Blanket Island Micro Sale, Polk Inlet Micro Sale, Free Use, Wrong Arm Salvage, Niblack Mine and Craig Warehouse. The Scratchings Timber Sale had a finding of May Impact Individuals for the Northern Goshawk under all alternatives.

Hoonah Ranger District had no BEs completed for 2006.

Juneau Ranger District completed four BEs. All four had no effects determinations. The four BEs reported are West Lynn Canal Stone Site, ORCAS Water Sampling, Green's Creek Exploratory Drilling,* McBride Water System.*

Ketchikan/Misty Ranger District reported two BEs. The Traitors Cove EIS and the Salvage Trail Wildlife Restoration Thinning. Traitors Cove had a finding of not likely to adversely affect Stellar Sea Lions and Humpbacked Whales for alternatives 2-5. No effects were reported for these species under alternative 1. No effect was reported for alternatives 1-5 on Leatherback Sea Turtles. No impact was reported for alternatives 1-5 for the Osprey.

No impact was reported for alternative 1-5 for the Trumpeter Swan. A finding of May Impact Individuals was reported for alternatives 2-5 for the Northern goshawk. Under alternative 1, a report of no impact was given for the Northern goshawk.

For the Salvage Trail Wildlife Restoration Thinning (all alternatives), a finding of no effect was given for all threatened, endangered, and candidate species. A finding of no impact for all sensitive species was given for the same project (Salvage Trail Wildlife Restoration Thinning).

Petersburg Ranger District completed twenty-three BEs; six reported "no impact" determinations for R10 sensitive wildlife species from the following projects: Mineral Materials, Special Uses, Petersburg Creek Special Use, Kadake Tributary Restoration, Recreational Suction Dredging and West Point Cabin. A determination of May impact individuals but is not likely to cause a listing or a loss of viability was reported from the Big John's Thinning project. A determination of May impact individuals but not likely to cause a trend to federal listing or a loss of viability was reported from the Kuiu project. A finding of No Effect/Not likely to adversely affect was reported from the following six projects; Petersburg Mountain Trail, Thomas Bay Rock Pit Extension, Three Lakes Trail and Shelter, Kutlaku Lake, Mitkof Road, Portage Bay Reseeding. A finding of No Effect/May adversely impact individuals, but not likely to result in a loss of viability on the planning area, nor cause a trend to federal listing or a loss of species viability range wide on northern goshawks and have No impact on osprey, or trumpeter swans was reported on Falls Creek Rock Pit, the Woodpecker Road project and the Blind Slough LTF. A finding of May adversely impact individuals, but not likely to result in a loss of viability on the planning area, nor cause a trend to federal listing or a loss of species viability range wide on northern goshawks was reported for the Woewodski Island Mineral Exploration Addendum.

Sitka Ranger District completed five BEs, all reporting "no impact" determinations for R10 sensitive wildlife species from the following projects; North Zone TSI, Cross Trail Extension, Sandy Cove Salvage, Port Alexander dam and water line SUP renewal and the False Island Lodge Waterline.

Thorne Bay Ranger District completed six BEs all reporting no impact determinations. The following projects are reported; Yatuk Creek Private Road, Micro Sale #120, Chuck Creek, East Edna Bay MAF, Thorne Bay Small Tracks Act Project and the Sand and Gravel project.

***Wrangell Ranger District** completed seven BEs, all but one of which had "no effect"/"no impact" determinations for R10 sensitive wildlife species. The following are the projects listed; Continue Special Use Authorization for 16 Isolated, Research, and Pre-Anilca Cabins; Sunrise Lake Field Reconnaissance and Survey Work; Surface Exploration and Subsurface Drilling 2006 Plan of Operations Zarembo Minerals; Backline Timber Sale; Precommerical Thinning 5 Year Plan; Twin Lakes Cabin Relocation and Cabin Removal at Dry Island. The Backline Timber Sale had one finding on the Northern Goshawk reported as "May Impact Individuals".

Yakutat Ranger District completed one BE reporting "no impact" and "no effect" determinations for R10 sensitive wildlife species. The project is listed as the Nine-mile Campground and Boat Launch project.

R10 Sensitive Species: Biological Evaluations for Plants

Tongass National Forest botanists and ecologists completed BEs for sensitive plants for 64 projects on the Forest during FY2006. For 46 projects, the determination was "no impact" to sensitive plants (Table B-7). In the 18 of the BEs the "may impact individuals but not likely to result in a trend to federal listing or loss of viability" determination was made for one or more of the following sensitive plants: *Carex lenticularis* var. *dolia, Cirsium edule, Glyceria leptostachya, Hymenophyllum wrightii, Isoetes truncata, Ligusticum calderi, Papaver alboroseum, Platanthera gracilis, Poa laxiflora, Puccinellia kamtschatica, Romanzoffia unalaschcensis,* and *Senecio moresbiensis.* Four BEs reported a determination of "may have beneficial impacts" for *Glyceria leptostachya.*

Table B-7. Summary of biological evaluation determinations for Region 10 Sensitive Plant Species by ranger district on the Tongass National Forest, FY 2006.

District	No Impact	Beneficial Impact*	May Impact Individuals*	Likely to Impact Population
Admiralty NM	1	0	0	0
Craig RD	9	0	2 (6)	0
Hoonah RD	0	0	0	0
Juneau RD	7	0	0	0
Ketchikan-Misty Fiords RD	1	0	1 (5)	0
Petersburg RD	13	4 (1)	12 (7)	0
Sitka RD	7	0	0	0
Thorne Bay RD	5	0	1 (6)	0
Wrangell RD	1	0	2 (4)	0
Yakutat RD	2	0	0	0
Total	46	4	18	0

* Numbers in parentheses indicate the number of species that were given the listed BE designation within a district.

Admiralty National Monument completed one BE for sensitive plants, which reported a "no impact" determination.

Craig Ranger District completed eleven BEs for R10 sensitive plants. Nine BEs reported a "no impact" determination for sensitive plants. Determinations of "may impact individuals but not likely to impact population viability" for sensitive plant species were made for the Niblack Mine (*Carex lenticularis* var. *dolia*, *Hymenophyllum wrightii, Ligusticum calderi, Papaver alboroseum, Senecio moresbiensis*) and Scratchings Timber Sale (*Hymenophyllum wrightii, Poa laxiflora*).

Hoonah Ranger District completed no BEs for sensitive plants during Fiscal Year 2006.

Juneau Ranger District completed seven BEs, all of which reported a "no impact" determination for sensitive plants.

Ketchikan-Misty Fiords Ranger District completed two BEs for sensitive plants. The Salvage Trail Wildlife Restoration Thinning reported a "no impact" determination for

sensitive plants. The Traitors Cove BE reported a "may impact individuals but not likely to impact population viability" determination for *Cirsium edule, Glyceria leptostachya, Hymenophyllum wrightii, Isoetes truncata,* and *Poa laxiflora.*

Petersburg Ranger District completed 25 BEs for sensitive plants. Thirteen of the projects had the "no impact" determination to sensitive plant species. Determinations of "may impact individuals but not likely to impact population viability" for sensitive plant species were made for the following 12 projects: Blind Slough LTF & Twin Cr. Road SUP (*Hymenophyllum wrightii, Poa laxiflora, Puccinellia kamtschatica*); Kadake Tributary Channel Restoration (*Glyceria leptostachya*); Kake Deferred Road Maintenance (*Glyceria leptostachya*); Kuiu Island Road Maintenance (*Glyceria leptostachya, Poa laxiflora*); Kutlaku Tent Platform and Fish Weir (*Cirsium edule, Poa laxiflora*); Mitkof Road Maintenance (*Glyceria leptostachya*); NOAA Tidal Survey (*Hymenophyllum wrightii, Platanthera gracilis, Puccinellia kamtschatica, Romanzoffia unalaschcensis*); Petersburg Creek Cabin Special Use Permit (*Hymenophyllum wrightii, Poa laxiflora, Romanzoffia unalaschcensis*); Portage Bay Landslide Seeding (*Poa laxiflora, Puccinellia kamtschatica*); Recreational Suction Dredging (*Glyceria leptostachya, Poa laxiflora, Romanzoffia unalaschcensis*); Special Use Permit Reissues & Commercial Road Permits (*Hymenophyllum wrightii, Poa laxiflora, Puccinellia kamtschatica, Romanzoffia unalaschcensis*); and Towers Lake Cabin Decommission (*Hymenophyllum wrightii*). Four of the BEs listed above (Kutlaku Tent Platform and Fish Weir, Petersburg Creek Cabin Special Use Permit, Special Use Permit Reissues & Commercial Road Permits, Towers Lake Cabin Decommission) reported a "beneficial impact" determination for *Glyceria leptostachya.*

Sitka Ranger District reported seven BEs for sensitive plants, all of which reported a "no impact" determination for sensitive plants.

Thorne Bay Ranger District completed six BEs for sensitive plants. All except one reported a "no impact" determination for sensitive plants. The Micro Sale #120 BE reported a "may impact individuals but not likely to impact population viability" determination for *Glyceria leptostachya, Hymenophyllum wrightii, Ligusticum calderi, Papaver alboroseum, Poa laxiflora,* and *Senecio moresbiensis.*

Wrangell Ranger District completed three BEs for sensitive plants. The Mining Exploration Activities (Drilling) on Zarembo Island– Frenchy Creek BE reported "no impact" determination for sensitive plants. Determinations of "may impact individuals but not likely to impact population viability" for sensitive plant species were made for the Pre-Commercial Thinning 5-Year Plan (*Cirsium edule, Poa laxiflora, Hymenophyllum wrightii*) and Volunteer Trail Extension (*Glyceria leptostachya*).

Yakutat Ranger District completed two BEs for sensitive plant species, both of which reported a "no impact" determination for sensitive plants.

Evaluation of Monitoring Results for Sensitive Plant Species

Sixty-four Biological Evaluations were completed for sensitive plant species. Forty-six had a determination of "no impact" to all sensitive species. Eighteen plant BEs had a determination of "may impact individuals but not likely to adversely affect population viability" for 12

sensitive plant species (Table B-8). For a list of impacted plant species by district and project, please refer to the R10 Sensitive Species: Biological Evaluations for Plants section above.

Table B-8. Summary of biological evaluations reporting determinations of "may impact individuals but not likely to impact population viability" for Region 10 Sensitive Plant Species by species and ranger district, Tongass National Forest FY 2006.

Species	ANM	CRD	HRD	JRD	KMRD	PRD	SRD	TBRD	WRD	YRD	Total
Carex lenticularis dolia		1									1
Cirsium edule					1	1			1		3
Glyceria leptostachya					1	4		1	1		7
Hymenophyllum wrightii		2			1	5		1	1		10
Isoetes truncata					1						1
Ligusticum calderi		1						1			2
Papaver alboroseum		1						1			2
Platanthera gracilis						1					1
Poa laxiflora		1			1	7			1		10
Puccinellia kamtschatica						4					4
Romanzoffia											
unalaschcensis						4					4
Senecio moresbiensis		1						1			2

ANM = Admiralty National Monument, CRD = Craig Ranger District, HRD = Hoonah Ranger District, JRD = Juneau Ranger District, KMRD = Ketchikan-Misty Fiords Ranger District, PRD = Petersburg Ranger District, SRD = Sitka Ranger District, TBRD = Thorne Bay Ranger District, WRD = Wrangell Ranger District, YRD = Yakutat Ranger District

Reviewers of biological evaluations must qualify as professional (journey-level) biologists and botanists. Wildlife biologists review BEs for terrestrial and aquatic wildlife, fish biologists review BEs for fish, and botanists or plant ecologists review BEs for plants. If the documents are written as one for both plants and animals, a qualified botanist and wildlife biologist is required to review and sign the document.

The BA/BE determination language must adhere to Forest Service Manual (2672.43) direction, which is specific to the particular listing status of the species. The trail of logic leading to the determination must be clearly stated. Analysis is to be based on the type of project and magnitude of the proposed actions. The analysis also includes a summary of any site-specific species surveys conducted in the project area, and/or other local information, such as previously existing surveys found in rare plant databases, scientific literature and/or previous analyses. If no surveys were conducted within known sensitive species habitat within the project area, then risk assessments should be performed for the sensitive species or their affected habitats.

A revision of the current Regional Forester's sensitive plant list is currently underway, with an expected completion date of spring 2007. This revision is in response to recent reports and publications, discussions, field work, and laboratory analysis concerning the current list of sensitive and rare plants in the Alaska Region.

A review of projects and their associated BEs conducted on the Forest during fiscal year 2006 indicates that implementation monitoring is occurring by avoiding or minimizing the impacts to sensitive plant populations and their known habitats. This is shown through the determinations of the Biological Evaluations, which include "no impact" and "may adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward federal listing". A summary of the determinations found in BEs conducted in FY06 are shown under Monitoring Results.

Sensitive species effectiveness monitoring should include the assessment of our management affects (disturbances) to viable plant populations or their habitats. Prior to analyzing whether our Forest-wide standards are guidelines are effective in maintaining viable plant populations that are well distributed (USDA 1997), the Forest must have a more robust understanding of the distribution of the species on the sensitive list. Extensive unbiased surveys for sensitive plants have not been conducted across the Forest. The reason for this is because sensitive plant surveys are financed on a project-by-project basis. The need for the surveys arises because of the requirement for a BE as part of the NEPA document. Therefore, surveys are only conducted on small landscapes (project areas) which are selected based on project proposals and not on stratification of habitat characteristics. Therefore, the range of natural conditions or habitat preferences for sensitive plant species or their tolerance to a range of disturbances is not yet fully understood. Forest-wide surveys have traditionally not been financed, but are currently on the Inventory and Monitoring Program Planning system (IMPP) for out-year planning.

Moving toward the goal of understanding the distribution of sensitive plant species necessitates additional survey efforts across the Tongass. Currently we are developing a random, stratified sampling scheme to help focus survey efforts. An analysis of the habitat characteristics from known populations of sensitive species is currently underway. This analysis will aid in the selection of high probability habitats for each sensitive species and can thus be applied to the sampling scheme needed for understanding the distribution of the species listed.

Effectiveness monitoring of each species can proceed once we have an understanding of the distribution of the sensitive species across the Forest, and further, across their respective ranges (outside Forest boundaries). In essence, once we know where the species occur and

their relationship to specific habitat characteristics, we can then model sensitive plant occurrences and then determine the relative risk of our management activities affecting the viability and distribution of sensitive plant populations on the Forest.

Biodiversity Question 4: Are destructive insect and disease organisms increasing to potentially damaging levels following management activities?

Goal: Part 219 of the National Forest System Land and Resource Management Planning regulations (36 CFR section 219.12) requires the monitoring of forest health and determining if destructive insect and disease organisms have increased following vegetation management. Areas are identified where there is an increase to damaging levels. Monitor forest health and determine if there is an increase following vegetation management as required by the above referenced regulations.

Objective: Identify areas where destructive insect and disease organisms increase following management. Evaluate the results and modify vegetation management practices if they increase to damaging levels.

Background: A key premise of ecosystem management is that native species have adapted to, and in part, evolved with natural disturbance events. Climate can alter natural disturbances, stimulate native insects and diseases, and influence the vigor of trees and understory plants. Along with wind, avalanche, and other disturbance agents, insects and diseases are important factors in the Tongass National Forest. Most occurrences of insects and disease are natural and considered a part of, and contributing factor to, ecosystem diversity. Endemic levels of insect and disease activity are usually allowed to run their course. Heart rot decays are a key agent causing small-scale disturbance in the Forest, which results in bole breakage in older trees. Average defect in late seral stands is approximately 1/3 of gross volume. The incidence of decay is significantly related to tree age. Research by Kimmey (1956) also indicates that volume losses are small in young trees. Hemlock and spruce less than about 100 years of age are generally sound. Older hemlock deteriorates at a faster rate than Sitka spruce. Based on research by James Kimmey, for trees in age class 151 to 200, defect in Sitka spruce was 5 percent, while in hemlock it was 16 percent (Farr, 1976). At 300 to 400 years of age, spruce was relatively rot-free, whereas decay in hemlock averaged 30 to 40 percent on a board-foot basis (Farr, 1976). Hemlock dwarf mistletoe is an important disease of western hemlock throughout the Forest, except that it is not found in the Yakutat Ranger District. This is another disease whose levels do not change significantly from year to year. Dwarf mistletoe is largely eliminated with clearcut harvesting and young-growth stand development. The disease is present following partial harvest at levels based on the number, size, and infection levels of residual hemlocks. Generally, the disease can be managed predictably to any desirable level given these factors.

As for forest insects, trends in population are generally linked to weather conditions as opposed to forest management practices. For example, the spruce needle aphid occurred on 44,400, 29,500, 20,200, and 9,286 acres in 1998, 2000, 2001, and 2003, respectively. The cold temperatures in March, 2006 killed many emerging spruce aphids. Only 3,182 acres were mapped in 2006. Defoliation occurred in small pockets along the beach fringe from Lincoln Island in the Lynn Canal, across from Berners Bay, to the north end of Kupreanof

Island and along the mainland from Juneau to Thomas Bay. In the southwest area of the panhandle, small spots were mapped between Edna Bay, Kosciusko Island, and Naukati, Prince of Wales Island and on Long and Dall Islands. Defoliation also occurred around the towns of Craig, Juneau, Ketchikan, and Sitka.

Hemlock sawfly and black-headed budworm, also defoliating insects, have caused growth loss, top kill, and some mortality in late-seral forests. Outbreaks can affect western hemlock and to a lesser extent Sitka spruce throughout the Tongass, as did the outbreak in the early 1950s, which resulted in top kill and mortality on only a fraction of the acres affected. In 2000, 2001, and 2002 only 5,200, 1,300, and 382 acres, respectively, of hemlock sawfly defoliation were recorded. In 2003, 152 and 500 acres of light and moderate hemlock sawfly and black-headed budworm defoliation, respectively, were observed. In 2006, no hemlock sawfly defoliation was mapped. Black-headed budworm was mapped on 287 acres on the north side of the Taku River, near the Canadian border, on 449 acres on the Snettisham Peninsula, and on 171 acres on the north end of Duncan Canal, Kupreanof Island.

Spruce beetle has been a rather minor problem on the Tongass compared to other lands in Alaska but outbreaks such as the one brought on by the extensive windthrow that occurred in the winter of 1990-1991 resulted in the buildup of a population of beetles that killed many acres of high value Sitka spruce throughout Southeast Alaska. These spruce beetle outbreaks are usually short. The annual pest survey will help to identify where mortality has most recently occurred so that trees can be harvested before they decay. Spruce beetle activity was detected on only 1,201 acres in 2006, more than any year since 2000. Mortality occurred from the south end of Yakutat Bay to Wrangell Island, but most of it on the mainland side of Lynn Canal.

In the Skagway area, 87 acres of western-balsam-bark-beetle (subalpine fir beetle) mortality were detected. It occurred on a hill-slope east of town.

A considerable amount of porcupine caused mortality occurred in scattered areas of the Tongass National Forest, mostly on Mitkof, Wrangell, Etolin, and Revillagigedo Islands. Flooding was responsible for 323 acres of mortality.

Yellow-cedar decline continues as a natural, chronic, site-specific mortality problem in southeast Alaska. Recent research indicates that trees may be dying from freezing injury in areas that have inadequate snowpack in late winter and early spring. This association of the lack of snow and yellow-cedar mortality is seen at several spatial scales. Snags of yellow-cedar accumulate on affected sites and forest composition is substantially altered as yellow-cedar trees die, often giving way to other tree species. Western and mountain hemlock, and in some portions of the Tongass N.F., western redcedar, are favored in stands with dead yellow-cedar overstory. Approximately 500,000 acres of yellow-cedar decline have been mapped across an extensive portion of southeast Alaska. Most of the yellow-cedar in these stands is dead and is represented by mixtures of dead standing trees that died recently or up to 100 years ago. The amount of old and newer mortality suggests that yellow-cedar began at the end of the Little Ice Age, but accelerated in the second half of the 1900s. Thus, the onset of yellow-cedar decline was probably the result of a natural climatic cycle, but it is conceivable that the concentrated mortality since 1950 may indicate a response to human-induced climate warming. Observations during the forest health aerial detection survey showed that active tree death occurred in many forests with yellow-cedar decline in 2006. New tree death

represents an intensification of the problem in stands that also have trees that died recently and decades ago. In recent years, active tree death was found in particular areas of southeast Alaska; this year, it was more evenly scattered within the bounds of where yellow-cedar decline is known to occur.

As part of the Invasive Species Program, there has been an Early Detection and Rapid Response program in place since 2001. Though insects have been the focus of reporting, plants and plant diseases will become part of this effort. This is much like the Gypsy Moth, Nun Moth, Rosy Gypsy Moth, and Pine Moth trapping that have been going on for some time with the exception that traps collections are made every one or two weeks. Through insect trapping, we have determined that our trapping techniques have worked well but we have not discovered any new or potentially destructive insects. Early detection may have limited the impact of more the recently introduced insects into North America (e.g. Asian Longhorn Borer, Emerald Ash Borer, and Sirex Borer).

The gypsy moth (North America) has been an important pest of hardwoods in the Northeastern United States since its introduction in 1869. Nun moth (Eurasia) larvae feed on and kill primarily conifers (spruce, pine, fir, and larch species) but can also defoliate deciduous trees and shrubs (beech, hornbeam, birch, and oak species). Rosy Gypsy Moth (Asia) attacks many species of birch, chestnut, walnut, apple, oak, willow, basswood, elm and other deciduous trees. Pine Moth (Europe) is one of the most harmful insect pests of Scots pine. It has also been known attack other pines, e.g. the black pine, eastern white pine, and mountain pine.

Monitoring Question: Are destructive insect and disease organisms increasing to potentially damaging levels following management activities?

The State and Private Forestry, Forest Health Group, branch of the Forest Service flies annual aerial detection surveys over Southeast Alaska. The location of insect and disease activity is mapped and entered in a geographic information system (GIS) database. In addition to the aerial survey work, on-the-ground site visits are also conducted. In general, current management reduces the incidence and severity of insect and disease occurrence by removing infected trees through timber harvest. Even-aged vegetation management (clearcutting, seed tree or shelterwood regeneration methods) removes defective trees with fungal infections or those with mistletoe. The Forest Plan estimated that approximately 80 percent of future harvests would use the even-aged system. Past management has been above this level. The young growth that results after an even-aged harvest is vigorous and usually decay-free.

Currently the Forest Service is exploring alternatives to clearcutting where portions of the stand, as either single trees or groups of trees, are left as legacy (residual) trees. Questions have been raised as to whether increased blowdown and increased insect and disease damage will occur due to bole wounding of residual trees and/or retention of mistletoe and other infestations within the stand. These questions will be studied in a series of three research installations across the Tongass National Forest. Results on logging damage and blowdown from two of these sites will be made available in early 2007.

Monitoring Results

The most important diseases and natural declines on the Tongass National Forest since approval of the Revised Forest Plan in 1997 as well as in 2006 were wood decay of live trees,

hemlock dwarf mistletoe, and yellow-cedar decline. Heart and butt rot fungi cause substantial decay in late seral spruce-hemlock forests. No serious insect or disease organisms in young-growth stands were detected through monitoring efforts. Dwarf mistletoe is present in some stands following partial harvests, but at disease levels less than occurred before harvest.

Within their limited distribution in southeast Alaska, porcupines are the most damaging biological agent to the health and productivity of young growth trees. Ground and aerial observations of areas with intense feeding will be made in 2007 in order to help produce thinning guidelines in young-growth stands with porcupines.

Evaluation of Results

Although yellow-cedar decline is not a management-induced problem, recent research indicates good recovery rates of wood from snags. In addition, wood from dead cedar retains all strength properties, even 80 years after death. Given the large acreage of decline and the value of the wood, there is interest in salvage recovery. Plant succession favoring other tree species will probably proceed whether salvage occurs or not. Planting or favoring yellow-cedar during thinning on non-decline sites can help offset the losses of the species elsewhere. Appropriate sites to plant and manage yellow-cedar include those with good drainage, higher elevation, or in the northeast portion of the Tongass National Forest.

The monitoring work conducted annually by the State and Private Forestry branch of the Forest Service, Forest Health Group and the Forest Silvicultural staff is adequate.

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