



**Department of the Army**  
Joint Base Lewis-McChord, Washington

---

## **APPENDICES**

# **Environmental Assessment – Northwest Aviation Operations 160<sup>th</sup> Special Operations Aviation Regiment Joint Base Lewis-McChord, Washington**

April 2012





## **Appendix A**

# **Endangered Species Act Consultation and Special Status Species Lists**





**TABLE A-1**  
**Special Status Plant Species in the Project Area**

Common Name	Scientific Name	Federal Status	Counties
<b>Threatened, Endangered, Proposed, and Candidate Species</b>			
Bradshaw’s desertparsley	<i>Lomatium bradshawii</i>	E	OR: Benton, Lane, Linn, Marion, Multnomah, Polk WA: Clark
Field sagewort	<i>Artemisia campestris</i> ssp. <i>borealis</i> var. <i>womskioldii</i>	C	OR: Multnomah, Wasco WA: Klickitat
Golden Indian paintbrush	<i>Castilleja levisecta</i>	T	OR: Benton, Linn, Marion, Polk WA: Clark, Pierce, Thurston
Kincaid’s lupine <sup>1</sup>	<i>Lupinus oregonus</i> ssp. <i>kincaidii</i>	T	OR: Benton, Lane, Linn, Marion, Multnomah, Polk, Washington, Yamhill WA: Lewis
Marsh sandwort	<i>Arenaria paludicola</i>	E	WA: Pierce
Nelson’s checkerbloom	<i>Sidalcea nelsoniana</i>	T	OR: Benton, Clackamas, Clatsop, Columbia, Linn, Marion, Multnomah, Polk, Tillamook, Washington, Yamhill, WA: Cowlitz, Lewis
Ute lady’s tresses	<i>Spiranthes diluvialis</i>	T	WA: Klickitat, Yakima
Water howellia	<i>Howellia aquatilis</i>	T	OR: Benton, Columbia, Marion, Multnomah, Polk, Yamhill WA: Clark, Pierce, Thurston
Willamette fleabane <sup>1</sup>	<i>Erigeron decumbens</i> var. <i>decumbens</i>	E	OR: Benton, Clackamas, Lane, Linn, Marion, Multnomah, Polk, Yamhill
<b>Species of Concern</b>			
Barrett’s beardtongue	<i>Penstemon barrettiae</i>	SC	OR: Hood River, Multnomah, Wasco WA: Klickitat, Skamania
Basalt daisy	<i>Erigeron basalticus</i>	SC	WA: Yakima
Bog anemone	<i>Anemone oregana</i> var. <i>felix</i>	SC	OR: Linn, Lincoln, Polk, Tillamook, Yamhill
Bristlystem checkerbloom	<i>Sidalcea hirtipes</i>	SC	OR: Clatsop, Lincoln, Tillamook
Chamber’s paintbrush	<i>Castilleja chambersii</i>	SC	OR: Clatsop
Cliff Indian paintbrush	<i>Castilleja rupicola</i>	SC	OR: Clackamas, Deschutes, Hood River, Lane, Linn, Multnomah
Clustered lady’s slipper	<i>Cypripedium fasciculatum</i>	SC	WA: Pierce, Skamania, Klickitat, Yakima
Coast Range fawnlily	<i>Erythronium elegans</i>	SC	OR: Lincoln, Polk, Tillamook, Yamhill
Coldwater fumewort	<i>Corydalis caseana</i> ssp. <i>aquae-gelidae</i>	SC	OR: Clackamas, Lane, Linn, Marion, Multnomah WA: Clark, Skamania
Columbia milk-vetch	<i>Astragalus columbianus</i>	SC	WA: Yakima
Columbian whitetop aster	<i>Sericocarpus rigidus</i>	SC	OR: Clackamas, Lane, Linn, Marion, Multnomah WA: Grays Harbor, Pierce, Thurston



## APPENDIX A – ESA CONSULTATION AND SPECIES LISTS

Common Name	Scientific Name	Federal Status	Counties
Columbian yellowcress	<i>Rorippa columbiae</i>	SC	WA: Skamania, Klickitat
Cotton's milkvetch	<i>Astragalus australis</i> var. <i>olympicus</i>	SC	WA: Clallam
Cusick's buckwheat	<i>Eriogonum cusickii</i>	SC	OR: Deschutes
Disappearing monkeyflower	<i>Mimulus evanescens</i>	SC	OR: Deschutes, Jefferson, Wasco
Dwarf checkerbloom	<i>Sidalcea malviflora</i> ssp. <i>virgata</i>	SC	WA: Thurston
Dwarf suncup	<i>Camissonia pygmaea</i>	SC	OR: Wasco
Eared rock-cress	<i>Arabis hastatula</i>	SC	OR: Linn
Footsteps of spring	<i>Sanicula arctopoides</i>	SC	WA: Grays Harbor, Pacific
Frye's limbella moss	<i>Limbella fryei</i>	SC	OR: Benton, Clatsop, Lane, Lincoln, Polk, Tillamook
Gorge fleabane	<i>Erigeron oreganus</i>	SC	OR: Hood River, Multnomah, Wasco WA: Skamania, Wahkiakum
Gray cryptantha	<i>Cryptantha leucophaea</i>	SC	WA: Yakima
Henderson's bentgrass	<i>Agrostis hendersonii</i>	SC	OR: Wasco
Henderson's checkerbloom	<i>Sidalcea hendersonii</i>	SC	OR: Clackamas, Lane, Tillamook
Henderson's needlegrass	<i>Acnatherum hendersonii</i>	SC	OR: Wasco
Hitchcock's blue-eyed grass	<i>Sisyrinchium hitchcockii</i>	SC	OR: Benton, Lane,
Hoover's desert-parsley	<i>Lomatium tuberosum</i>	SC	WA: Yakima
Hoover's tauschia	<i>Tauschia hooveri</i>	SC	WA: Yakima
Howell's bentgrass	<i>Agrostis howellii</i>	SC	OR: Hood River, Linn, Multnomah
Howell's fleabane	<i>Erigeron howellii</i>	SC	OR: Clackamas, Hood River, Multnomah WA: Skamania
Howell's thelypody	<i>Thelypodium howellii</i> ssp. <i>howellii</i>	SC	OR: Deschutes
Liverwort monkeyflower	<i>Mimulus jungermannioides</i>	SC	WA: Klickitat
Longbeard mariposa lily	<i>Calochortus longebarbatus</i> var. <i>longebarbatus</i>	SC	WA: Klickitat, Yakima
Manyleaf gilia	<i>Gilia millefoliata</i>	SC	OR: Lincoln
Mountain blue-eyed grass	<i>Sisyrinchium sarmentosum</i>	SC	OR: Clackamas, Marion WA: Klickitat, Skamania, Yakima
Mountain moonwort	<i>Botrychium montanum</i>	SC	OR: Hood River, Linn, Marion, Wasco



Common Name	Scientific Name	Federal Status	Counties
Obscure buttercup	<i>Ranunculus tritermatus</i>	SC	OR: Wasco WA: Klickitat
Obscure Indian paintbrush	<i>Castilleja cryptantha</i>	SC	WA: Pierce, Yakima
Oregon coolwort	<i>Sullivantia oregona</i>	SC	OR: Clackamas, Columbia, Hood River, Multnomah WA: Skamania
Peacock larkspur	<i>Delphinium</i> <i>×pavonaceum</i>	SC	OR: Benton, Clackamas, Lane, Linn, Marion, Multnomah, Polk, Washington, Yamhill
Peck's beardtongue	<i>Penstemon peckii</i>	SC	OR: Deschutes, Jefferson
Pink sand verbena	<i>Abronia umbellata</i> ssp. <i>breviflora</i>	SC	OR: Lane, Linn, Clatsop, Tillamook WA: Pacific
Pt. Reyes bird's-beak	<i>Cordylanthus maritimus</i> ssp. <i>palustris</i>	SC	OR: Lincoln, Tillamook
Queen of the forest	<i>Filipendula occidentalis</i>	SC	OR: Clatsop, Lincoln, Polk, Tillamook WA: Pacific
Saddle Mountain bittercress	<i>Cardamine pattersonii</i>	SC	OR: Clatsop, Tillamook
Saddle Mountain saxifrage	<i>Saxifraga hitchcockiana</i>	SC	OR: Clatsop, Tillamook
San Francisco bluegrass	<i>Poa unilateralis</i>	SC	OR: Lincoln, Tillamook
Scalloped moonwort	<i>Botrychium crenulatum</i>	SC	OR: Lane
Seabluff catchfly	<i>Silene douglasii</i> var. <i>oraria</i>	SC	OR: Tillamook
Sierra horkelia	<i>Horkelia congesta</i> ssp. <i>congesta</i>	SC	OR: Benton, Lane, Linn, Marion, Polk, Washington
Suksdorf's deserparsley	<i>Lomatium suksdorfii</i>	SC	OR: Hood River, Wasco WA: Klickitat
Suksdorf's milkvetch	<i>Astragalus pulsiferae</i> var. <i>suksdorfii</i>	SC	WA: Klickitat
Tall bugbane	<i>Actaea elata</i>	SC	WA: Clallam, Clark, Cowlitz, Grays Harbor, Lewis, Pierce, Skamania, Thurston
Thinleaf pea	<i>Lathyrus holochlorus</i>	SC	OR: Benton, Clackamas, Lane, Linn, Marion, Polk, Washington, Yamhill
Torrey's pea	<i>Lathyrus torreyi</i>	SC	WA: Clark, Pierce
Trianglelobe moonwort	<i>Botrychium ascendens</i>	SC	WA: Mason, Pierce
Tundra shootingstar	<i>Dodecatheon austrofrigidum</i>	SC	OR: Clatsop, Tillamook WA: Grays Harbor, Pacific
Upland larkspur	<i>Delphinium nuttallii</i> ssp. <i>nuttallii</i>	SC	OR: Clackamas, Lane, Linn, Marion, Polk, Yamhill



Common Name	Scientific Name	Federal Status	Counties
Upland larkspur	<i>Delphinium nuttallii</i> <i>ssp. ochroleucum</i>	SC	OR: Clackamas, Marion, Multnomah, Washington, Yamhill WA: Lewis
Vernal pool mousetail	<i>Myosurus sessilis</i>	SC	OR: Jefferson
Wayside aster	<i>Eucephalus vialis</i>	SC	OR: Lane, Linn
White fairypoppy	<i>Meconella oregana</i>	SC	OR: Hood River, Wasco WA: Klickitat, Lewis
White sagebrush	<i>Artemisia ludoviciana</i> <i>ssp. estesii</i>	SC	OR: Deschutes, Jefferson
Whitebark pine	<i>Pinus albicaulis</i>	SC	WA: Klickitat, Yakima
Woven spore lichen	<i>Texosporium sancti- jacobi</i>	SC	OR: Jefferson WA: Klickitat
<p><sup>1</sup>Critical habitat for this species has been designated in the project area.                      Key: E = endangered, T = threatened, C = candidate, P = proposed, and SC = species of concern.                      Sources: USFWS 2010 a, b, c.                      Note: For consistency, all names follow the terminology and taxonomy presented in the National Resource Conservation Service (NRCS) PLANTS database (U.S. Department of Agriculture [USDA] NRCS 2008). These names may differ from USFWS names.</p>			



**TABLE A-2**  
**Special Status Fish Species in the Project Area**

Common Name	Scientific Name	Federal Status	Counties
<b>Threatened, Endangered, and Proposed Species</b>			
Bocaccio	<i>Sebastes paucispinis</i>	E	WA: Jefferson, Mason, Pierce, Thurston
Bull trout <sup>1</sup>	<i>Salvelinus confluentus</i>	T	OR: Clackamas, Deschutes, Hood River, Jefferson, Lane, Linn, Multnomah, Wasco WA: Clallam, Clark, Cowlitz, Grays Harbor, Jefferson, Klickitat, Mason, Pacific, Pierce, Skamania, Thurston, Wahkiakum, Yakima
Canary rockfish	<i>Sebastes pinniger</i>	T	WA: Jefferson, Mason, Pierce, Thurston
Chinook salmon <sup>1</sup>	<i>Oncorhynchus tshawytscha</i>	T	OR: Benton, Clackamas, Clatsop, Columbia, Hood River, Lane, Linn, Marion, Multnomah, Polk, Tillamook, Wasco, Washington, Yamhill WA: Clallam, Clark, Cowlitz, Jefferson, Klickitat, Lewis, Mason, Pacific, Skamania, Thurston, Wahkiakum
		E	OR: Columbia, Hood River, Multnomah, Wasco WA: Clark, Cowlitz, Klickitat, Pacific, Skamania, Wahkiakum, Yakima
Chum salmon <sup>1</sup>	<i>Oncorhynchus keta</i>	T	OR: Clackamas, Clatsop, Columbia, Hood River, Multnomah, Washington WA: Clallam, Jefferson, Mason
Coho salmon <sup>1</sup>	<i>Oncorhynchus kisutch</i>	T	OR: Clatsop, Columbia, Hood River, Marion, Multnomah, Wasco WA: Clark, Cowlitz, Klickitat, Pacific, Skamania, Wahkiakum
Dolly Varden	<i>Salvelinus malma</i>	P	WA: Clallam, Jefferson
Eulachon (Columbia River smelt) <sup>1</sup>	<i>Taleichthys pacificus</i>	T	OR: Benton, Clackamas, Clatsop, Columbia, Hood River, Lane, Lincoln, Multnomah, Polk, Tillamook, Wasco, Washington, Yamhill WA: Clallam, Clark, Cowlitz, Grays Harbor, Jefferson, Klickitat, Lewis, Mason, Pacific, Pierce, Skamania, Thurston, Wahkiakum
North American green sturgeon (Southern DPS)	<i>Acipenser medirostris</i>	T	OR: Clatsop, Columbia, Lane, Lincoln, Multnomah, Tillamook
Oregon chub <sup>1</sup>	<i>Oregonichthys cramerii</i>	E	OR: Benton Clackamas, Lane, Linn, Marion, Polk
Sockeye salmon <sup>1</sup>	<i>Oncorhynchus nerka</i>	T	WA: Clallam
		E	OR: Clatsop, Columbia, Hood River, Multnomah, Wasco WA: Clark, Cowlitz, Klickitat, Pacific, Skamania, Wahkiakum



APPENDIX A – ESA CONSULTATION AND SPECIES LISTS

Common Name	Scientific Name	Federal Status	Counties
Steelhead <sup>1</sup>	<i>Oncorhynchus mykiss</i>	T	OR: Benton, Clackamas, Clatsop, Columbia, Hood River, Lane, Linn, Marion, Jefferson, Multnomah, Polk, Tillamook, Wasco, Washington, Yamhill WA: Clark, Cowlitz, Klickitat, Lewis, Pacific, Skamania, Wahkiakum, Yakima
		E	OR: Clatsop, Columbia, Hood River, Multnomah, Wasco WA: Clark, Cowlitz, Klickitat, Skamania, Wahkiakum, Yakima
Yelloweye rockfish	<i>Sebastes ruberimus</i>	T	WA: Jefferson, Mason, Pierce, Thurston
<b>Species of Concern</b>			
Coastal cutthroat trout	<i>Oncorhynchus clarki clarki</i>	SC	OR: Benton, Clackamas, Clatsop, Columbia, Hood River, Lane, Lincoln, Linn, Marion, Multnomah, Polk, Tillamook, Wasco, Washington, Yamhill WA: Clark, Cowlitz, Grays Harbor, Jefferson, Lewis, Mason, Pacific, Skamania, Thurston, Wahkiakum
Interior redband trout	<i>Oncorhynchus mykiss</i> ssp.	SC	OR: Deschutes, Jefferson, Wasco WA: Klickitat, Yakima
Malheur mottled sculpin	<i>Cottus bairdi</i> ssp.	SC	OR: Lane, Linn, Columbia, Washington
Pacific lamprey	<i>Lampetra tridentata</i>	SC	OR: Benton, Clackamas, Clatsop, Columbia, Deschutes, Hood River, Jefferson, Lane, Lincoln, Linn, Marion, Multnomah, Polk, Tillamook, Wasco, Washington, Yamhill WA: Clallam, Clark, Cowlitz, Grays Harbor, Jefferson, Klickitat, Lewis, Mason, Pacific, Pierce, Skamania, Thurston, Wahkiakum, Yakima
River lamprey	<i>Lampetra ayresi</i>	SC	OR: Clatsop, Columbia, Lane, Lincoln, Multnomah, Tillamook WA: Clallam, Clark, Cowlitz, Grays Harbor, Jefferson, Klickitat, Lewis, Mason, Pacific, Pierce, Skamania, Thurston, Wahkiakum, Yakima
Western brook lamprey	<i>Lampetra richardsoni</i>	SC	WA: Klickitat, Yakima
Westslope cutthroat trout	<i>Oncorhynchus clarki lewisi</i>	SC	WA: Klickitat, Yakima
<sup>1</sup> Critical habitat for this species has been designated in the project area. Key: E = endangered, T = threatened, C = candidate, P = proposed, and SC = species of concern. Sources: NMFS 2010a, USFWSa, b, c.			



**TABLE A-3**  
**Special Status Wildlife Species in the Project Area**

Common Name	Scientific Name	Federal Status	Counties
<b>Threatened, Endangered, Proposed, and Candidate Species</b>			
<b>INVERTEBRATES</b>			
Fender’s blue butterfly <sup>1</sup>	<i>Icaricia icarioides fenderi</i>	E	OR: Benton, Lane, Linn, Polk, Yamhill
Mardon skipper	<i>Polites mardon</i>	C	WA: Klickitat, Pierce, Skamania, Thurston, Yakima
Oregon silverspot butterfly <sup>1</sup>	<i>Speyeria zerene hippolyta</i>	T	OR: Clatsop, Lane, Lincoln, Tillamook, Yamhill WA: Grays Harbor, Pacific
Taylor’s checkerspot	<i>Euphydryas editha taylori</i>	C	OR: Benton WA: Clallam, Pierce, Thurston
<b>REPTILES AND AMPHIBIANS</b>			
Columbia spotted frog	<i>Rana luteiventris</i>	C	OR: Jefferson
Green sea turtle	<i>Chelonia mydas</i>	T	OR: Clatsop, Lane, Lincoln, Tillamook
Leatherback sea turtle <sup>1</sup>	<i>Dermochelys coriacea</i>	E	OR: Clatsop, Lane, Lincoln, Tillamook
Loggerhead sea turtle	<i>Caretta caretta</i>	T	OR: Clatsop, Lane, Lincoln, Tillamook
Olive (=Pacific) ridley sea turtle	<i>Lepidochelys olivacea</i>	T	OR: Clatsop, Lane, Lincoln, Tillamook
Oregon spotted frog	<i>Rana pretiosa</i>	C	OR: Deschutes, Jefferson, Lane, Wasco WA: Clark, Klickitat, Pierce, Skamania, Thurston
<b>BIRDS</b>			
Greater sage-grouse (Columbia Basin)	<i>Centrocercus urophasianus</i>	C	OR: Deschutes WA: Yakima
Marbled murrelet <sup>1</sup>	<i>Brachyramphus marmoratus</i>	T	OR: Benton, Clatsop, Lane, Lincoln, Polk, Tillamook, Washington, Yamhill WA: Clallam, Cowlitz, Grays Harbor, Jefferson, Lewis, Mason, Pacific, Pierce, Thurston, Wahkiakum, Yakima
Northern spotted owl <sup>1</sup>	<i>Strix occidentalis caurina</i>	T	OR: Benton, Clackamas, Clatsop, Columbia, Deschutes, Hood River, Jefferson, Lane, Lincoln, Linn, Marion, Multnomah, Polk, Tillamook, Wasco, Washington, Yamhill WA: Clallam, Clark, Cowlitz, Grays Harbor, Jefferson, Klickitat, Lewis, Mason, Pacific, Pierce, Skamania, Thurston, Wahkiakum, Yakima
Short-tailed albatross	<i>Phoebastria (=Diomedea) albatrus</i>	E	OR: Clatsop, Lane, Lincoln, Tillamook WA: Clallam, Grays Harbor, Jefferson, Pacific



APPENDIX A – ESA CONSULTATION AND SPECIES LISTS

Common Name	Scientific Name	Federal Status	Counties
Streaked horned lark	<i>Eremophila alpestris strigata</i>	C	OR: Benton, Clackamas, Clatsop, Columbia, Lane, Linn, Marion, Multnomah, Polk, Washington, Yamhill WA: Grays Harbor, Mason, Pacific, Pierce, Thurston, Wahkiakum
Western snowy plover (coastal population) <sup>1</sup>	<i>Charadrius alexandrinus nivosus</i>	T	OR: Clatsop, Lane, Lincoln, Tillamook WA: Grays Harbor, Pacific
Yellow-billed cuckoo	<i>Coccyzus americanus</i>	C	OR: Deschutes, WA: Grays Harbor, Klickitat, Pierce, Yakima
<b>TERRESTRIAL MAMMALS</b>			
Canada lynx	<i>Lynx canadensis</i>	T	WA: Lewis, Pierce, Skamania
Columbian white-tailed deer	<i>Odocoileus virginianus leucurus</i>	E	OR: Clatsop, Multnomah, Columbia WA: Cowlitz, Wahkiakum
Gray wolf	<i>Canis lupus</i>	E	WA: Clark, Klickitat, Lewis, Pierce, Skamania, Yakima
Grizzly bear	<i>Ursus arctos (=U. a. horribilis)</i>	T	WA: Lewis, Pierce, Skamania, Yakima
Mazama pocket gopher	<i>Thomomys mazama</i>	C	WA: Clallam, Clark, Mason, Pierce, Thurston, Wahkiakum
Pacific fisher	<i>Martes pennanti pacifica</i>	C	WA: Clallam, Grays Harbor, Jefferson, Klickitat, Lewis, Mason, Pierce, Skamania, Thurston, Yakima
<b>MARINE MAMMALS</b>			
Blue whale	<i>Balaenoptera musculus</i>	E	N/A
Finback whale	<i>Balaenoptera physalus</i>	E	N/A
Humpback whale	<i>Megaptera novaeangliae</i>	E	N/A
Southern Resident killer whale	<i>Orcinus orca</i>	E	N/A
Sei whale	<i>Balaenoptera borealis</i>	E	N/A
Sperm whale	<i>Physeter macrocephalus</i>	E	N/A
Steller (=northern) sea lion	<i>Eumetopias jubatus</i>	T	N/A
<b>Species of Concern</b>			
<b>BIRDS</b>			
Acorn woodpecker	<i>Melanerpes formicivorus</i>	SC	OR: Benton, Clackamas, Lane, Linn, Marion, Polk, Wasco, Washington, Yamhill
Aleutian Canada goose	<i>Branta canadensis leucopareia</i>	SC	OR: Benton, Columbia, Marion, Multnomah, Polk, Tillamook, Washington WA: Clark, Jefferson, Grays Harbor



## APPENDIX A – ESA CONSULTATION AND SPECIES LISTS

Common Name	Scientific Name	Federal Status	Counties
Bald eagle	<i>Haliaeetus leucocephalus</i>	SC	OR: Benton, Clackamas, Clatsop, Columbia, Deschutes, Hood River, Jefferson, Lane, Lincoln, Linn, Marion, Multnomah, Polk, Tillamook, Wasco WA: Clallam, Clark, Cowlitz, Grays Harbor, Jefferson, Klickitat, Lewis, Mason, Pacific, Pierce, Skamania, Thurston, Wahkiakum, Yakima
Band-tailed pigeon	<i>Columba fasciata</i>	SC	OR: Benton, Clackamas, Clatsop, Columbia, Hood River, Lane, Lincoln, Linn, Marion, Multnomah, Polk, Tillamook, Wasco, Washington, Yamhill
Black oystercatcher	<i>Haematopus bachmani</i>	SC	OR: Clatsop, Lane, Lincoln, Tillamook
Black swift	<i>Cypseloides niger</i>	SC	WA: Yakima
Black tern	<i>Chlidonias niger</i>	SC	OR: Benton, Deschutes, Lane, Linn, Polk
Brown pelican	<i>Pelecanus occidentalis</i>	SC	OR: Clatsop, Lane, Lincoln, Tillamook WA: Clallam, Grays Harbor, Jefferson, Pacific
Burrowing owl	<i>Athene cunicularia</i>	SC	OR: Benton, Deschutes, Jefferson, Lane, Linn, Multnomah, Wasco WA: Klickitat, Yakima
Cassin's auklet	<i>Ptychoramphus aleuticus</i>	SC	WA: Clallam, Jefferson
Ferruginous hawk	<i>Buteo regalis</i>	SC	OR: Deschutes, Wasco WA: Klickitat, Yakima
Harlequin duck	<i>Histrionicus histrionicus</i>	SC	OR: Clackamas, Clatsop, Hood River, Lane, Lincoln, Linn, Marion, Multnomah, Tillamook
Lewis' woodpecker	<i>Melanerpes lewis</i>	SC	OR: Benton, Clatsop, Columbia, Deschutes, Hood River, Jefferson, Lane, Lincoln, Linn, Marion, Multnomah, Polk, Tillamook, Wasco, Washington, Yamhill
Loggerhead shrike	<i>Lanius ludovicianus</i>	SC	WA: Klickitat, Yakima
Mountain quail	<i>Oreortyx pictus</i>	SC	OR: Benton, Clackamas, Clatsop, Columbia, Deschutes, Hood River, Jefferson, Lane, Lincoln, Linn, Marion, Multnomah, Polk, Tillamook, Wasco, Washington, Yamhill
Northern goshawk	<i>Accipiter gentilis</i>	SC	OR: Benton, Clackamas, Deschutes, Hood River, Jefferson, Lane, Lincoln, Linn, Marion, Multnomah, Wasco WA: Clallam, Clark, Cowlitz, Grays Harbor, Jefferson, Klickitat, Lewis, Mason, Pacific, Pierce, Skamania, Thurston, Wahkiakum, Yakima
Olive-sided flycatcher	<i>Contopus cooperi</i>	SC	OR: Benton, Clackamas, Clatsop, Columbia, Deschutes, Hood River, Jefferson, Lane, Lincoln, Linn, Marion, Multnomah, Polk, Tillamook, Wasco, Washington, Yamhill WA: Clallam, Clark, Cowlitz, Grays Harbor, Jefferson, Klickitat, Lewis, Mason, Pacific, Pierce, Skamania, Thurston, Wahkiakum, Yakima



APPENDIX A – ESA CONSULTATION AND SPECIES LISTS

Common Name	Scientific Name	Federal Status	Counties
Oregon vesper sparrow	<i>Poocetes gramineus affinis</i>	SC	OR: Benton, Clackamas, Columbia, Lane, Linn, Marion, Multnomah, Polk, Washington, Yamhill WA: Clallam, Lewis, Pierce, Thurston
Peregrine falcon	<i>Falco peregrinus</i>	SC	OR: Benton, Clackamas, Clatsop, Columbia, Deschutes, Hood River, Jefferson, Lane, Lincoln, Linn, Marion, Multnomah, Polk, Tillamook, Wasco WA: Clallam, Clark, Cowlitz, Jefferson, Grays Harbor, Klickitat, Lewis, Mason, Pacific, Pierce, Skamania, Wahkiakum, Yakima
Purple martin	<i>Progne subis</i>	SC	OR: Benton, Clackamas, Clatsop, Columbia, Hood River, Lane, Lincoln, Marion, Multnomah, Polk, Tillamook, Wasco, Washington, Yamhill
Slender-billed white-breasted nuthatch	<i>Sitta carolinensis aculeata</i>	SC	WA: Clark, Pierce, Thurston
Tricolored blackbird	<i>Agelaius tricolor</i>	SC	OR: Multnomah, Wasco
Tufted puffin	<i>Fratercula cirrhata</i>	SC	WA: Clallam, Jefferson, Grays Harbor
White-headed woodpecker	<i>Picoides albolarvatus</i>	SC	OR: Deschutes, Hood River, Jefferson, Wasco
Willow flycatcher	<i>Empidonax traillii adastus</i>	SC	OR: Deschutes, Hood River, Jefferson, Wasco
Yellow-breasted chat	<i>Icteria virens</i>	SC	OR: Benton, Clackamas, Columbia, Deschutes, Hood River, Jefferson, Lane, Linn, Marion, Multnomah, Polk, Wasco, Washington, Yamhill
<b>MAMMALS</b>			
Camas pocket gopher	<i>Thomomys bulbivorus</i>	SC	OR: Benton, Clackamas, Columbia, Lane, Linn, Marion, Multnomah, Polk, Washington, Yamhill
Destruction Island shrew	<i>Sorex trowbridgii destructioni</i>	SC	WA: Jefferson
Fringed myotis (bat)	<i>Myotis thysanodes</i>	SC	OR: Benton, Clackamas, Clatsop, Columbia, Lane, Lincoln, Tillamook, Washington
Long-eared myotis (bat)	<i>Myotis evotis</i>	SC	OR: Benton, Clackamas, Clatsop, Columbia, Deschutes, Hood River, Jefferson, Lane, Lincoln, Linn, Marion, Multnomah, Polk, Tillamook, Wasco, Yamhill WA: Clallam, Clark, Cowlitz, Grays Harbor, Jefferson, Klickitat, Lewis, Mason, Pacific, Pierce, Skamania, Thurston, Wahkiakum, Yakima
Long-legged myotis (bat)	<i>Myotis volans</i>	SC	OR: Benton, Clackamas, Clatsop, Columbia, Deschutes, Jefferson, Lane, Lincoln, Linn, Marion, Multnomah, Tillamook, Wasco, Washington WA: Clark, Cowlitz, Grays Harbor, Jefferson, Lewis, Mason, Pacific, Pierce, Skamania, Thurston, Wahkiakum



Common Name	Scientific Name	Federal Status	Counties
Northern sea otter	<i>Enhydra lutris kenyoni</i>	SC	WA: Clallam, Jefferson, Grays Harbor, Mason, Pacific, Pierce, Thurston
Pacific (=Townsend's) western big-eared bat	<i>Corynorhinus townsendii townsendii</i>	SC	OR: Benton, Clackamas, Clatsop, Deschutes, Jefferson, Lane, Marion, Multnomah, Tillamook, Wasco, Washington. WA: Clallam, Clark, Cowlitz, Grays Harbor, Jefferson, Klickitat, Lewis, Mason, Pacific, Pierce, Skamania, Thurston, Wahkiakum
Pale (=pallid) western (=Townsend's) big-eared bat	<i>Corynorhinus townsendii pallescens</i>	SC	WA: Klickitat, Yakima
Pallid bat (west of Cascade crest)	<i>Antrozous pallidus pacificus</i>	SC	OR: Jefferson, Lane, Multnomah, Wasco
Preble's shrew	<i>Sorex preblei</i>	SC	OR: Deschutes
Pygmy rabbit	<i>Brachylagus idahoensis</i>	SC	OR: Deschutes, Jefferson, Wasco
Red tree vole	<i>Arborimus longicaudus</i>	SC	OR: Benton, Clackamas, Clatsop, Columbia, Hood River, Lane, Lincoln, Linn, Marion, Multnomah, Polk, Tillamook, Washington, Yamhill
Silver-haired bat	<i>Lasionycteris noctivagans</i>	SC	OR: Benton, Clackamas, Clatsop, Columbia, Deschutes, Hood River, Jefferson, Lane, Lincoln, Linn, Marion, Multnomah, Polk, Tillamook, Wasco, Washington, Yamhill
Small-footed myotis	<i>Myotis ciliolabrum</i>	SC	OR: Deschutes, Hood River, Jefferson, Wasco
Spotted bat	<i>Euderma maculatum</i>	SC	OR: Deschutes, Jefferson, Wasco
Townsend's ground squirrel	<i>Spermophilis townsendii</i>	SC	WA: Klickitat, Yakima
Western gray squirrel	<i>Sciurus griseus griseus</i>	SC	WA: Clark, Grays Harbor, Klickitat, Lewis, Pierce, Skamania, Thurston, Yakima
White-footed vole	<i>Arborimus albipes</i>	SC	OR: Benton, Clatsop, Columbia, Lane, Lincoln, Linn, Polk, Tillamook, Washington, Yamhill
Wolverine	<i>Gulo gulo</i>	SC	OR: Deschutes, Hood River, Jefferson, Lane, Lincoln, Linn, Marion, Tillamook, Wasco WA: Clark, Cowlitz, Klickitat, Lewis, Pierce, Skamania, Thurston, Yakima
Yuma myotis (bat)	<i>Myotis yumanensis</i>	SC	OR: Benton, Clackamas, Clatsop, Columbia, Deschutes, Hood River, Jefferson, Lane, Lincoln, Linn, Marion, Multnomah, Polk, Tillamook, Wasco, Washington, Yamhill



Common Name	Scientific Name	Federal Status	Counties
<b>REPTILES AND AMPHIBIANS</b>			
(Coastal) tailed frog	<i>Ascaphus truei</i>	SC	OR: Benton, Clackamas, Clatsop, Columbia, Deschutes, Hood River, Jefferson, Lane, Lincoln, Linn, Marion, Multnomah, Polk, Tillamook, Wasco, Washington, Yamhill WA: Clallam, Clark, Cowlitz, Grays Harbor, Jefferson, Lewis, Mason, Pacific, Pierce, Skamania, Thurston, Wahkiakum
Cascades frog	<i>Rana cascadae</i>	SC	OR: Clackamas, Deschutes, Hood River, Jefferson, Lane, Linn, Marion, Multnomah, Wasco WA: Clallam, Clark, Cowlitz, Grays Harbor, Jefferson, Lewis, Mason, Pierce, Skamania, Thurston, Wahkiakum
Columbia torrent salamander	<i>Rhyacotriton kezeri</i>	SC	WA: Cowlitz, Grays Harbor, Lewis, Pacific, Wahkiakum
Foothill yellow-legged frog	<i>Rana boylei</i>	SC	OR: Lane, Linn, Marion
Larch Mountain salamander	<i>Plethodon larselli</i>	SC	OR: Clackamas, Hood River, Multnomah WA: Clark, Cowlitz, Klickitat, Lewis, Pierce, Skamania, Yakima
Northern Pacific pond turtle	<i>Actinemys marmorata marmorata</i>	SC	OR: Benton, Clackamas, Columbia, Hood River, Lane, Linn, Marion, Multnomah, Polk, Tillamook, Wasco, Washington, Yamhill
Northern red-legged frog	<i>Rana aurora aurora</i>	SC	OR: Benton, Clackamas, Clatsop, Columbia, Hood River, Lane, Lincoln, Linn, Marion, Multnomah, Polk, Tillamook, Wasco, Washington, Yamhill
Northwestern pond turtle	<i>Clemmys marmorata marmorata</i>	SC	WA: Clark, Cowlitz, Klickitat, Lewis, Pierce, Skamania, Thurston
Olympic torrent salamander	<i>Rhyacotriton olympicus</i>	SC	WA: Clallam, Jefferson, Grays Harbor, Mason
Oregon slender salamander	<i>Batrachoseps wrighti</i>	SC	OR: Clackamas, Deschutes, Hood River, Jefferson, Lane, Linn, Marion, Multnomah, Wasco
Sagebrush lizard	<i>Sceloporus graciosus</i>	SC	OR: Deschutes, Jefferson, Wasco WA: Klickitat, Yakima
Sharptail snake	<i>Contia tenuis</i>	SC	WA: Klickitat, Yakima
Southern torrent (seep) salamander	<i>Rhyacotriton variegatus</i>	SC	OR: Benton, Lane, Lincoln, Polk, Tillamook, Yamhill
Van Dyke's salamander	<i>Plethodon vandykei</i>	SC	WA: Clallam, Clark, Cowlitz, Jefferson, Grays Harbor, Lewis, Mason, Pacific, Pierce, Skamania, Thurston, Wahkiakum
Western toad	<i>Bufo boreas</i>	SC	WA: Clallam, Clark, Cowlitz, Jefferson, Grays Harbor, Lewis, Mason, Pacific, Skamania, Wahkiakum



Common Name	Scientific Name	Federal Status	Counties
<b>INVERTEBRATES</b>			
American acetropis grass bug	<i>Acetropis americana</i>	SC	OR: Benton, Yamhill
Beller's ground beetle	<i>Agonum belleri</i>	SC	OR: Clackamas, Wasco
California floater (mussel)	<i>Anodonta californiensis</i>	SC	OR: Columbia, Clatsop, Deschutes, Hood River, Linn, Multnomah, Wasco, Washington WA: Klickitat
Cascades apatanian caddisfly	<i>Apatania tavala</i>	SC	OR: Clackamas, Jefferson, Linn
Columbia Gorge neothremman caddisfly	<i>Neothremma andersoni</i>	SC	OR: Multnomah
Fender's soliperlan stonefly	<i>Soliperla fenderi</i>	SC	WA: Pierce, Skamania
Giant Columbia River spire snail	<i>Fluminicola columbiana</i>	SC	OR: Multnomah, Wasco WA: Klickitat
Goeden's lepidostoman caddisfly	<i>Lepidostoma goedeni</i>	SC	OR: Benton, Hood River, Lincoln
Haddock's rhyacophilan caddisfly	<i>Rhyacophila haddocki</i>	SC	OR: Benton
Insular blue (butterfly)	<i>Plebejus saepiolus insulanus</i>	SC	OR: Lane
Makah's copper (butterfly)	<i>Lycaena mariposa charlottensis</i>	SC	WA: Clallam, Grays Harbor, Pacific
Minor Pacific sideband (snail)	<i>Monadenia fidelis minor</i>	SC	OR: Wasco
Mt. Hood farulan caddisfly	<i>Farula jewetti</i>	SC	OR: Clackamas, Hood River, Multnomah
Mt. Hood primitive brachycentrid caddisfly	<i>Eobrachycentrus gelidae</i>	SC	OR: Clackamas, Hood River, Linn, Multnomah
Newcomb's littorine snail	<i>Alamagorda newcombiana</i>	SC	OR: Lincoln WA: Grays Harbor, Pacific
One-spot rhyacophilan caddisfly	<i>Rhyacophila unipunctata</i>	SC	OR: Hood River, Lane
Oregon giant earthworm	<i>Megascolides (=Driloleirus) macelfreshi</i>	SC	OR: Benton, Clackamas
Roth's blind ground beetle	<i>Pterostichus rothi</i>	SC	OR: Benton, Lincoln
Scott's apatanian caddisfly	<i>Allomyia scotti</i>	SC	OR: Clackamas



APPENDIX A – ESA CONSULTATION AND SPECIES LISTS

Common Name	Scientific Name	Federal Status	Counties
Siskiyou chloelalis grasshopper	<i>Chloelalis aspasma</i>	SC	OR: Benton
Tombstone Prairie farulan caddisfly	<i>Farula reapi</i>	SC	OR: Lane, Linn
Tombstone Prairie oligophlebodes caddisfly	<i>Oligophlebodes mostbento</i>	SC	OR: Lane, Linn
Valley silverspot butterfly	<i>Speyeria zerene bremeri</i>	SC	WA: Clallam, Cowlitz, Jefferson, Lewis, Pierce, Thurston, Wahkiakum
Wahkeena Falls flightless stonefly	<i>Zapada wahkeena</i>	SC	OR: Multnomah
<p><sup>1</sup>Critical habitat for this species has been designated within the project area.            Key: E = endangered, T = threatened, C = candidate, P = proposed, and SC = species of concern            Sources: USFWS 2010a, b, c.</p>			

**LISTED AND PROPOSED ENDANGERED AND THREATENED SPECIES AND CRITICAL  
HABITAT; CANDIDATE SPECIES; AND SPECIES OF CONCERN  
IN CLALLAM COUNTY  
AS PREPARED BY  
THE U.S. FISH AND WILDLIFE SERVICE  
WASHINGTON FISH AND WILDLIFE OFFICE**

**(Revised August 26, 2010)**

**LISTED**

Bull trout (*Salvelinus confluentus*) – Coastal-Puget Sound DPS

Marbled murrelet (*Brachyramphus marmoratus*)

Northern spotted owl (*Strix occidentalis caurina*)

Short-tailed albatross (*Phoebastria albatrus*) [outer coast]

Major concerns that should be addressed in your Biological Assessment of project impacts to listed animal species include:

1. Level of use of the project area by listed species.
2. Effect of the project on listed species' primary food stocks, prey species, and foraging in all areas influenced by the project.
3. Impacts from project activities and implementation (e.g., increased noise levels, increased human activity and/or access, loss or degradation of habitat) that may result in disturbance to listed species and/or their avoidance of the project area.

**DESIGNATED**

Critical habitat for bull trout

Critical habitat for the marbled murrelet

Critical habitat for the northern spotted owl

**PROPOSED**

Dolly Varden (*Salvelinus malma*) similarity of appearance

Revised critical habitat for bull trout

**CANDIDATE**

Fisher (*Martes pennanti*) – West Coast DPS

(Olympic) Mazama pocket gopher (*Thomomys mazama ssp. melanops*)

Taylor's checkerspot (*Euphydryas editha taylori*)

**SPECIES OF CONCERN**

Bald eagle (*Haliaeetus leucocephalus*)

Brown pelican (*Pelecanus occidentalis*) [outer coast]  
Cascades frog (*Rana cascadae*)  
Cassin's auklet (*Ptychoramphus aleuticus*)  
Long-eared myotis (*Myotis evotis*)  
Long-legged myotis (*Myotis volans*)  
Makah's copper (*Lycaena mariposa charlottensis*)  
Northern goshawk (*Accipiter gentilis*)  
Northern sea otter (*Enhydra lutris kenyoni*)  
Olive-sided flycatcher (*Contopus cooperi*)  
Oregon vesper sparrow (*Pooecetes gramineus affinis*)  
Pacific lamprey (*Lampetra tridentata*)  
Pacific Townsend's big-eared bat (*Corynorhinus townsendii townsendii*)  
Peregrine falcon (*Falco peregrinus*)  
Olympic torrent salamander (*Rhyacotriton olympicus*)  
River lamprey (*Lampetra ayresi*)  
Tailed frog (*Ascaphus truei*)  
Tufted puffin (*Fratercula cirrhata*)  
Valley silverspot (*Speyeria zerene bremeri*)  
Van Dyke's salamander (*Plethodon vandykei*)  
Western toad (*Bufo boreas*)  
*Astragalus australis* var. *olympicus* (Cotton's milk vetch)  
*Cimicifuga elata* (tall bugbane)

**LISTED AND PROPOSED ENDANGERED AND THREATENED SPECIES AND  
CRITICAL HABITAT; CANDIDATE SPECIES; AND SPECIES OF CONCERN  
IN CLARK COUNTY  
AS PREPARED BY  
THE U.S. FISH AND WILDLIFE SERVICE  
WASHINGTON FISH AND WILDLIFE OFFICE**

**(Revised December 15, 2010)**

**LISTED**

Bull trout (*Salvelinus confluentus*) – Coastal-Puget Sound DPS

Gray wolf (*Canis lupus*)

Northern spotted owl (*Strix occidentalis caurina*)

Major concerns that should be addressed in your Biological Assessment of project impacts to listed animal species include:

1. Level of use of the project area by listed species.
2. Effect of the project on listed species' primary food stocks, prey species, and foraging areas in all areas influenced by the project.
3. Impacts from project activities and implementation (e.g., increased noise levels, increased human activity and/or access, loss or degradation of habitat) that may result in disturbance to listed species and/or their avoidance of the project area.

*Castilleja levisecta* (golden paintbrush) [historic]

*Howellia aquatilis* (water howellia)

*Lomatium bradshawii* (Bradshaw's lomatium)

Major concerns that should be addressed in your Biological Assessment of project impacts to listed plant species include:

1. Distribution of taxon in project vicinity.
2. Disturbance (trampling, uprooting, collecting, etc.) of individual plants and loss of habitat.
3. Changes in hydrology where taxon is found.

**DESIGNATED**

Critical habitat for bull trout

**PROPOSED**

Revised critical habitat for bull trout

## CANDIDATE

(Brush Prairie) Mazama pocket gopher (*Thomomys mazama* ssp. *oregonus*)  
North American wolverine (*Gulo gulo luteus*) – contiguous U.S. DPS  
Oregon spotted frog (*Rana pretiosa*) [historic]

## SPECIES OF CONCERN

Aleutian Canada goose (*Branta canadensis leucopareia*)  
Bald eagle (*Haliaeetus leucocephalus*)  
Cascades frog (*Rana cascadae*)  
Coastal cutthroat trout (*Oncorhynchus clarki clarki*) [southwest Washington DPS]  
Larch Mountain salamander (*Plethodon larselli*)  
Long-eared myotis (*Myotis evotis*)  
Long-legged myotis (*Myotis volans*)  
Northern goshawk (*Accipiter gentilis*)  
Northwestern pond turtle (*Emys* (= *Clemmys*) *marmorata marmorata*)  
Olive-sided flycatcher (*Contopus cooperi*)  
Pacific lamprey (*Lampetra tridentata*)  
Pacific Townsend's big-eared bat (*Corynorhinus townsendii townsendii*)  
Peregrine falcon (*Falco peregrinus*)  
River lamprey (*Lampetra ayresi*)  
Slender-billed white-breasted nuthatch (*Sitta carolinensis aculeata*)  
Tailed frog (*Ascaphus truei*)  
Van Dyke's salamander (*Plethodon vandykei*)  
Western gray squirrel (*Sciurus griseus griseus*)  
Western toad (*Bufo boreas*)  
*Cimicifuga elata* (tall bugbane)  
*Corydalis aquae-gelidae* (Clackamas corydalis)  
*Lathyrus torreyi* (Torrey's peavine) [historic]

**LISTED AND PROPOSED ENDANGERED AND THREATENED SPECIES AND CRITICAL  
HABITAT; CANDIDATE SPECIES; AND SPECIES OF CONCERN  
IN COWLITZ COUNTY  
AS PREPARED BY  
THE U.S. FISH AND WILDLIFE SERVICE  
WASHINGTON FISH AND WILDLIFE OFFICE**

**(Revised December 15, 2010)**

**LISTED**

Bull trout (*Salvelinus confluentus*) – Coastal-Puget Sound DPS  
Columbian white-tailed deer (*Odocoileus virginianus leucurus*)  
Marbled murrelet (*Brachyramphus marmoratus*)  
Northern spotted owl (*Strix occidentalis caurina*)

Major concerns that should be addressed in your Biological Assessment of project impacts to listed animal species include:

1. Level of use of the project area by listed species.
2. Effect of the project on listed species' primary food stocks, prey species, and foraging areas in all areas influenced by the project.
3. Impacts from project activities and implementation (e.g., increased noise levels, increased human activity and/or access, loss or degradation of habitat) that may result in disturbance to listed species and/or their avoidance of the project area.

*Sidalcea nelsoniana* (Nelson's checker-mallow)

Major concerns that should be addressed in your Biological Assessment of project impacts to listed plant species include:

1. Distribution of taxon in project vicinity.
2. Disturbance (trampling, uprooting, collecting, etc.) of individual plants and loss of habitat.
3. Changes in hydrology where taxon is found.

**DESIGNATED**

Critical habitat for bull trout  
Critical habitat for the marbled murrelet

**PROPOSED**

Revised critical habitat for bull trout

## CANDIDATE

North American wolverine (*Gulo gulo luteus*) – contiguous U.S. DPS

## SPECIES OF CONCERN

Bald eagle (*Haliaeetus leucocephalus*)

Cascades frog (*Rana cascadae*)

Coastal cutthroat trout (*Oncorhynchus clarki clarki*)

Columbia torrent salamander (*Rhyacotriton kezeri*)

Larch Mountain salamander (*Plethodon larselli*)

Long-eared myotis (*Myotis evotis*)

Long-legged myotis (*Myotis volans*)

Northern goshawk (*Accipiter gentilis*)

Northwestern pond turtle (*Emys* (= *Clemmys*) *marmorata marmorata*)

Olive-sided flycatcher (*Contopus cooperi*)

Pacific lamprey (*Lampetra tridentata*)

Pacific Townsend's big-eared bat (*Corynorhinus townsendii townsendii*)

Peregrine falcon (*Falco peregrinus*)

River lamprey (*Lampetra ayresi*)

Tailed frog (*Ascaphus truei*)

Valley silverspot (butterfly) (*Speyeria zerene bremeri*)

Van Dyke's salamander (*Plethodon vandykei*)

Western toad (*Bufo boreas*)

*Cimicifuga elata* (tall bugbane)

**LISTED AND PROPOSED ENDANGERED AND THREATENED SPECIES AND CRITICAL  
HABITAT; CANDIDATE SPECIES; AND SPECIES OF CONCERN  
IN GRAYS HARBOR COUNTY  
AS PREPARED BY  
THE U.S. FISH AND WILDLIFE SERVICE  
WASHINGTON FISH AND WILDLIFE OFFICE**

**(Revised August 26, 2010)**

**LISTED**

Bull trout (*Salvelinus confluentus*) – Coastal-Puget Sound DPS

Marbled murrelet (*Brachyramphus marmoratus*)

Northern spotted owl (*Strix occidentalis caurina*)

Oregon silverspot butterfly (*Speyeria zerene hippolyta*)

Short-tailed albatross (*Phoebastria albatrus*) [outer coast]

Western snowy plover (*Charadrius alexandrinus nivosus*)

Major concerns that should be addressed in your Biological Assessment of project impacts to listed animal species include:

1. Level of use of the project area by listed species.
2. Effect of the project on listed species' primary food stocks, prey species, and foraging areas in all areas influenced by the project.
3. Impacts from project activities and implementation (e.g., increased noise levels, increased human activity and/or access, loss or degradation of habitat) that may result in disturbance to listed species and/or their avoidance of the project area.

**DESIGNATED**

Critical habitat for bull trout

Critical habitat for the marbled murrelet

Critical habitat for the northern spotted owl

Critical habitat for the western snowy plover

**PROPOSED**

Revised critical habitat for bull trout

**CANDIDATE**

Fisher (*Martes pennanti*) – West Coast DPS

Streaked horned lark (*Eremophila alpestris strigata*)

Yellow-billed cuckoo (*Coccyzus americanus*)

## SPECIES OF CONCERN

Aleutian Canada goose (*Branta canadensis leucopareia*)  
Bald eagle (*Haliaeetus leucocephalus*)  
Brown pelican (*Pelecanus occidentalis*) [outer coast]  
Cascades frog (*Rana cascadae*)  
Coastal cutthroat trout (*Oncorhynchus clarki clarki*) [southwest Washington DPS]  
Columbia torrent salamander (*Rhyacotriton kezeri*)  
Long-eared myotis (*Myotis evotis*)  
Long-legged myotis (*Myotis volans*)  
Makah's copper (butterfly) (*Lycaena mariposa charlottensis*)  
Newcomb's littorine snail (*Algamorda newcombiana*)  
Northern goshawk (*Accipiter gentilis*)  
Northern sea otter (*Enhydra lutris kenyoni*)  
Olive-sided flycatcher (*Contopus cooperi*)  
Olympic torrent salamander (*Rhyacotriton olympicus*)  
Pacific lamprey (*Lampetra tridentata*)  
Pacific Townsend's big-eared bat (*Corynorhinus townsendii townsendii*)  
Peregrine falcon (*Falco peregrinus*)  
River lamprey (*Lampetra ayresi*)  
Tailed frog (*Ascaphus truei*)  
Tufted puffin (*Fratercula cirrhata*)  
Van Dyke's salamander (*Plethodon vandykei*)  
Western gray squirrel (*Sciurus griseus griseus*)  
Western toad (*Bufo boreas*)  
*Aster curtus* (white-top aster)  
*Cimicifuga elata* (tall bugbane)  
*Dodecatheon austrofrigidum* (frigid shootingstar)  
*Sanicula arctopoides* (footsteps of spring; bear's-foot sanicle)

**LISTED AND PROPOSED ENDANGERED AND THREATENED SPECIES AND CRITICAL  
HABITAT; CANDIDATE SPECIES; AND SPECIES OF CONCERN  
IN JEFFERSON COUNTY  
AS PREPARED BY  
THE U.S. FISH AND WILDLIFE SERVICE  
WASHINGTON FISH AND WILDLIFE OFFICE**

**(Revised August 26, 2010)**

**LISTED**

Bull trout (*Salvelinus confluentus*) – Coastal-Puget Sound DPS

Marbled murrelet (*Brachyramphus marmoratus*)

Northern spotted owl (*Strix occidentalis caurina*)

Short-tailed albatross (*Phoebastria albatrus*) [outer coast]

Major concerns that should be addressed in your Biological Assessment of project impacts to listed animal species include:

1. Level of use of the project area by listed species.
2. Effect of the project on listed species' primary food stocks, prey species, and foraging areas in all areas influenced by the project.
3. Impacts from project activities and implementation (e.g., increased noise levels, increased human activity and/or access, loss or degradation of habitat) that may result in disturbance to listed species and/or their avoidance of the project area.

**DESIGNATED**

Critical habitat for bull trout

Critical habitat for the marbled murrelet

Critical habitat for the northern spotted owl

**PROPOSED**

Dolly Varden (*Salvelinus malma*) due to similarity of appearance

Revised critical habitat for bull trout

**CANDIDATE**

Fisher (*Martes pennanti*) – West Coast DPS

**SPECIES OF CONCERN**

Aleutian Canada goose (*Branta canadensis leucopareia*)

Bald eagle (*Haliaeetus leucocephalus*)

Brown pelican (*Pelecanus occidentalis*) [outer coast]

Cascades frog (*Rana cascadae*)  
Cassin's auklet (*Ptychoramphus aleuticus*)  
Coastal cutthroat trout (*Oncorhynchus clarki clarki*) [southwest Washington DPS]  
Destruction Island shrew (*Sorex trowbridgii destructioni*)  
Long-eared myotis (*Myotis evotis*)  
Long-legged myotis (*Myotis volans*)  
Northern goshawk (*Accipiter gentilis*)  
Northern sea otter (*Enhydra lutris kenyoni*)  
Olive-sided flycatcher (*Contopus cooperi*)  
Olympic torrent salamander (*Rhyacotriton olympicus*)  
Pacific lamprey (*Lampetra tridentata*)  
Pacific Townsend's big-eared bat (*Corynorhinus townsendii townsendii*)  
Peregrine falcon (*Falco peregrinus*)  
River lamprey (*Lampetra ayresi*)  
Tailed frog (*Ascaphus truei*)  
Tufted puffin (*Fratercula cirrhata*)  
Valley silverspot (*Speyeria zerene bremeri*)  
Van Dyke's salamander (*Plethodon vandykei*)  
Western toad (*Bufo boreas*)

**LISTED AND PROPOSED ENDANGERED AND THREATENED SPECIES AND CRITICAL  
HABITAT; CANDIDATE SPECIES; AND SPECIES OF CONCERN  
IN KLIKITAT COUNTY  
AS PREPARED BY  
THE U.S. FISH AND WILDLIFE SERVICE  
CENTRAL WASHINGTON FIELD OFFICE**

**(Revised December 15, 2010)**

**LISTED**

Bull trout (*Salvelinus confluentus*) – Columbia River DPS

Gray wolf (*Canis lupus*)

Northern spotted owl (*Strix occidentalis caurina*)

Major concerns that should be addressed in your Biological Assessment of project impacts to listed animal species include:

1. Level of use of the project area by listed species.
2. Effect of the project on listed species' primary food stocks, prey species, and foraging areas in all areas influenced by the project.
3. Impacts from project activities and implementation (e.g., increased noise levels, increased human activity and/or access, loss or degradation of habitat) that may result in disturbance to listed species and/or their avoidance of the project area.

*Spiranthes diluvialis* (Ute ladies'-tresses)

Major concerns that should be addressed in your Biological Assessment of project impacts to listed plant species include:

1. Distribution of taxon in the project vicinity.
2. Disturbance (trampling, uprooting, collecting, etc.) of individual plants and loss of habitat.
3. Changes in hydrology where taxon is found.

**DESIGNATED**

Critical habitat for the bull trout

**PROPOSED**

Revised critical habitat for the bull trout

## CANDIDATE

Fisher (*Martes pennanti*) - West Coast DPS  
Mardon skipper (*Polites mardon*)  
North American wolverine (*Gulo gulo luteus*) – contiguous U.S. DPS  
Oregon spotted frog (*Rana pretiosa*)  
Yellow-billed cuckoo (*Coccyzus americanus*)  
*Artemisia campestris* ssp. *borealis* var. *wormskioldii* (northern wormwood)

## SPECIES OF CONCERN

Bald eagle (*Haliaeetus leucocephalus*)  
Burrowing owl (*Athene cunicularia*)  
California floater (*Anodonta californiensis*)  
Ferruginous hawk (*Buteo regalis*)  
Giant Columbia spire snail (*Fluminicola columbiana*)  
Larch Mountain salamander (*Plethodon larselli*)  
Loggerhead shrike (*Lanius ludovicianus*)  
Long-eared myotis (*Myotis evotis*)  
Northern goshawk (*Accipiter gentilis*)  
Olive-sided flycatcher (*Contopus cooperi*)  
Pacific lamprey (*Lampetra tridentata*)  
Pacific Townsend's big-eared bat (*Corynorhinus townsendii townsendii*)  
Pallid Townsend's big-eared bat (*Corynorhinus townsendii pallescens*)  
Peregrine falcon (*Falco peregrinus*)  
Redband trout (*Onchrhynchus mykiss*)  
River lamprey (*Lampetra ayresi*)  
Sagebrush lizard (*Sceloporus graciosus*)  
Sharptail snake (*Contia tenuis*)  
Townsend's ground squirrel (*Spermophilis townsendii*)  
Western brook lamprey (*Lampetra richardsoni*)  
Western gray squirrel (*Sciurus griseus griseus*)  
Western pond turtle (*Clemmys marmorata*)  
Westslope cutthroat trout (*Oncorhynchus clarki lewisi*)  
*Astragalus pulsiferae* var. *suksdorfii* (Ames' milk-vetch)  
*Calochortus longebarbatus* var. *longebarbatus* (long-bearded sego lily)  
*Cypripedium fasciculatum* (clustered lady's-slipper)  
*Lomatium suksdorfii* (Suksdorf's desert-parsley)  
*Meconella oregana* (white meconella)  
*Mimulus jungermannioides* (liverwort monkey-flower)  
*Penstemon barrettiae* (Barrett's beardtongue)  
*Pinus albicaulis* (whitebark pine)  
*Ranunculus reconditus* (obscure buttercup)  
*Rorippa columbiae* (persistent sepal yellowcress)  
*Sisyrinchium sarmentosum* (pale blue-eyed grass)  
*Texosporium sancti-jacobi* (woven spore lichen)

**LISTED AND PROPOSED ENDANGERED AND THREATENED SPECIES AND  
CRITICAL HABITAT; CANDIDATE SPECIES; AND SPECIES OF CONCERN  
IN LEWIS COUNTY  
AS PREPARED BY  
THE U.S. FISH AND WILDLIFE SERVICE  
WASHINGTON FISH AND WILDLIFE OFFICE**

**(Revised December 15, 2010)**

**LISTED**

Canada lynx (*Lynx canadensis*)  
Gray wolf (*Canis lupus*)  
Grizzly bear (*Ursus arctos* = *U. a. horribilis*)  
Marbled murrelet (*Brachyramphus marmoratus*)  
Northern spotted owl (*Strix occidentalis caurina*)

Major concerns that should be addressed in your Biological Assessment of project impacts to listed species include:

1. Level of use of the project area by listed species.
2. Effect of the project on listed species' primary food stocks, prey species, and foraging areas in all areas influenced by the project.
3. Impacts from project activities and implementation (e.g., increased noise levels, increased human activity and/or access, loss or degradation of habitat) that may result in disturbance to listed species and/or their avoidance of the project area.

*Lupinus sulphureus* ssp. *kincaidii* (Kincaid's lupine)  
*Sidalcea nelsoniana* (Nelson's checker-mallow)

Major concerns that should be addressed in your Biological Assessment of project impacts to listed plant species include:

1. Distribution of taxon in project vicinity.
2. Disturbance (trampling, uprooting, collecting, etc.) of individual plants and loss of habitat.
3. Changes in hydrology where taxon is found.

## DESIGNATED

Critical habitat for the marbled murrelet

Critical habitat for the northern spotted owl

Critical habitat for *Lupinus sulphureus* ssp. *kincaidii* (Kincaid's lupine)

## PROPOSED

None

## CANDIDATE

Fisher (*Martes pennanti*) – West Coast DPS

North American wolverine (*Gulo gulo luteus*) – contiguous U.S. DPS

## SPECIES OF CONCERN

Bald eagle (*Haliaeetus leucocephalus*)

Cascades frog (*Rana cascadae*)

Coastal cutthroat trout (*Oncorhynchus clarki clarki*) [southwest Washington DPS]

Columbia torrent salamander (*Rhyacotriton kezeri*)

Larch Mountain salamander (*Plethodon larselli*)

Long-eared myotis (*Myotis evotis*)

Long-legged myotis (*Myotis volans*)

Northern goshawk (*Accipiter gentilis*)

Northwestern pond turtle (*Emys* (= *Clemmys*) *marmorata marmorata*)

Olive-sided flycatcher (*Contopus cooperi*)

Oregon vesper sparrow (*Pooecetes gramineus affinis*)

Pacific lamprey (*Lampetra tridentata*)

Pacific Townsend's big-eared bat (*Corynorhinus townsendii townsendii*)

Peregrine falcon (*Falco peregrinus*)

River lamprey (*Lampetra ayresi*)

Tailed frog (*Ascaphus truei*)

Valley silverspot (*Speyeria zerene bremeri*)

Van Dyke's salamander (*Plethodon vandykei*)

Western gray squirrel (*Sciurus griseus griseus*)

Western toad (*Bufo boreas*)

*Cimicifuga elata* (tall bugbane)

*Delphinium leucophaeum* (pale larkspur)

*Meconella oregana* (white meconella)

**LISTED AND PROPOSED ENDANGERED AND THREATENED SPECIES AND  
CRITICAL HABITAT; CANDIDATE SPECIES; AND SPECIES OF CONCERN  
IN MASON COUNTY**

**AS PREPARED BY  
THE U.S. FISH AND WILDLIFE SERVICE  
WASHINGTON FISH AND WILDLIFE OFFICE**

**(Revised August 26, 2010)**

**LISTED**

Bull trout (*Salvelinus confluentus*) – Coastal-Puget Sound DPS  
Marbled murrelet (*Brachyramphus marmoratus*)  
Northern spotted owl (*Strix occidentalis caurina*)

Major concerns that should be addressed in your Biological Assessment of project impacts to listed species include:

1. Level of use of the project area by listed species.
2. Effect of the project on listed species' primary food stocks, prey species, and foraging areas in all areas influenced by the project.
3. Impacts from project activities and implementation (e.g., increased noise levels, increased human activity and/or access, loss or degradation of habitat) that may result in disturbance to listed species and/or their avoidance of the project area.

**DESIGNATED**

Critical habitat for bull trout  
Critical habitat for the marbled murrelet  
Critical habitat for the northern spotted owl

**PROPOSED**

Revised critical habitat for bull trout

**CANDIDATE**

Fisher (*Martes pennanti*) – West Coast DPS  
(Shelton) Mazama pocket gopher (*Thomomys mazama* ssp. *couchi*)  
Streaked horned lark (*Eremophila alpestris strigata*)

## SPECIES OF CONCERN

Bald eagle (*Haliaeetus leucocephalus*)  
Cascades frog (*Rana cascadae*)  
Coastal cutthroat trout (*Oncorhynchus clarki clarki*) [southwest Washington DPS]  
Long-eared myotis (*Myotis evotis*)  
Long-legged myotis (*Myotis volans*)  
Northern goshawk (*Accipiter gentilis*)  
Northern sea otter (*Enhydra lutris kenyoni*)  
Olive-sided flycatcher (*Contopus cooperi*)  
Olympic torrent salamander (*Rhyacotriton olympicus*)  
Pacific lamprey (*Lampetra tridentata*)  
Pacific Townsend's big-eared bat (*Corynorhinus townsendii townsendii*)  
Peregrine falcon (*Falco peregrinus*)  
River lamprey (*Lampetra ayresi*)  
Tailed frog (*Ascaphus truei*)  
Van Dyke's salamander (*Plethodon vandykei*)  
Western toad (*Bufo boreas*)  
*Botrychium ascendens* (triangular-lobed moonwort)

**LISTED AND PROPOSED ENDANGERED AND THREATENED SPECIES AND  
CRITICAL HABITAT; CANDIDATE SPECIES; AND SPECIES OF CONCERN  
IN PACIFIC COUNTY**

**AS PREPARED BY  
THE U.S. FISH AND WILDLIFE SERVICE  
WASHINGTON FISH AND WILDLIFE OFFICE**

**(Revised August 26, 2010)**

**LISTED**

Bull trout (*Salvelinus confluentus*) – Coastal-Puget Sound DPS

Marbled murrelet (*Brachyramphus marmoratus*)

Northern spotted owl (*Strix occidentalis caurina*)

Oregon silverspot butterfly (*Speyeria zerene hippolyta*)

Short-tailed albatross (*Phoebastria albatrus*) [outer coast]

Western snowy plover (*Charadrius alexandrinus nivosus*)

Major concerns that should be addressed in your Biological Assessment of project impacts to listed species include:

1. Level of use of the project area by listed species.
2. Effect of the project on listed species' primary food stocks, prey species, and foraging areas in all areas influenced by the project.
3. Impacts from project activities and implementation (e.g., increased noise levels, increased human activity and/or access, loss or degradation of habitat) that may result in disturbance to listed species and/or their avoidance of the project area.

**DESIGNATED**

Critical habitat for the marbled murrelet

Critical habitat for the western snowy plover

**PROPOSED**

None

**CANDIDATE**

Streaked horned lark (*Eremophila alpestris strigata*)

## SPECIES OF CONCERN

Bald eagle (*Haliaeetus leucocephalus*)  
Brown pelican (*Pelecanus occidentalis*) [outer coast]  
Coastal cutthroat trout (*Oncorhynchus clarki clarki*) [southwest Washington DPS]  
Columbia torrent salamander (*Rhyacotriton kezeri*)  
Long-eared myotis (*Myotis evotis*)  
Long-legged myotis (*Myotis volans*)  
Makah's copper (butterfly) (*Lycaena mariposa charlottensis*) [historic]  
Newcomb's littorine snail (*Algamorda newcombiana*)  
Northern goshawk (*Accipiter gentilis*)  
Northern sea otter (*Enhydra lutris kenyonii*)  
Olive-sided flycatcher (*Contopus cooperi*)  
Pacific lamprey (*Lampetra tridentata*)  
Pacific Townsend's big-eared bat (*Corynorhinus townsendii townsendii*)  
Peregrine falcon (*Falco peregrinus*)  
River lamprey (*Lampetra ayresi*)  
Tailed frog (*Ascaphus truei*)  
Van Dyke's salamander (*Plethodon vandykei*)  
Western toad (*Bufo boreas*)  
*Abronia umbellata* ssp. *acutalata* (pink sandverbena)  
*Dodecatheon austrofrigidum* (frigid shootingstar)  
*Filipendula occidentalis* (queen of the forest)  
*Sanicula arctopoides* (footsteps of spring; bear's-foot sanicle)

**LISTED AND PROPOSED ENDANGERED AND THREATENED SPECIES AND  
CRITICAL HABITAT; CANDIDATE SPECIES; AND SPECIES OF CONCERN  
IN PIERCE COUNTY**

**AS PREPARED BY  
THE U.S. FISH AND WILDLIFE SERVICE  
WASHINGTON FISH AND WILDLIFE OFFICE**

**(Revised December 15, 2010)**

**LISTED**

Bull trout (*Salvelinus confluentus*) – Coastal-Puget Sound DPS

Canada lynx (*Lynx canadensis*)

Gray wolf (*Canis lupus*)

Grizzly bear (*Ursus arctos* = *U. a. horribilis*)

Marbled murrelet (*Brachyramphus marmoratus*)

Northern spotted owl (*Strix occidentalis caurina*)

Major concerns that should be addressed in your Biological Assessment of project impacts to listed species include:

1. Level of use of the project area by listed species.
2. Effect of the project on listed species' primary food stocks, prey species, and foraging areas in all areas influenced by the project.
3. Impacts from project activities and implementation (e.g., increased noise levels, increased human activity and/or access, loss or degradation of habitat) that may result in disturbance to listed species and/or their avoidance of the project area.

*Arenaria paludicola* (marsh sandwort) [historic]

*Castilleja levisecta* (golden paintbrush) [historic]

*Howellia aquatilis* (water howellia)

Major concerns that should be addressed in your Biological Assessment of project impacts to listed plant species include:

1. Distribution of taxon in project vicinity.
2. Disturbance (trampling, uprooting, collecting, etc.) of individual plants and loss of habitat.
3. Changes in hydrology where taxon is found.

## DESIGNATED

Critical habitat for bull trout  
Critical habitat for the marbled murrelet  
Critical habitat for the northern spotted owl

## PROPOSED

Revised critical habitat for bull trout

## CANDIDATE

Fisher (*Martes pennanti*) – West Coast DPS  
Mardon skipper (*Polites mardon*)  
(Roy Prairie and Tacoma) Mazama pocket gopher (*Thomomys mazama* ssp. *glacialis*  
and *tacomensis* [historic])  
North American wolverine (*Gulo gulo luteus*) – contiguous U.S. DPS  
Oregon spotted frog (*Rana pretiosa*)  
Streaked horned lark (*Eremophila alpestris strigata*)  
Taylor's checkerspot (*Euphydryas editha taylori*)  
Yellow-billed cuckoo (*Coccyzus americanus*)

## SPECIES OF CONCERN

Bald eagle (*Haliaeetus leucocephalus*)  
Cascades frog (*Rana cascadae*)  
Fender's soliperlan stonefly (*Soliperla fenderi*)  
Larch Mountain salamander (*Plethodon larselli*)  
Long-eared myotis (*Myotis evotis*)  
Long-legged myotis (*Myotis volans*)  
Northern goshawk (*Accipiter gentilis*)  
Northern sea otter (*Enhydra lutris kenyoni*)  
Northwestern pond turtle (*Emys* (= *Clemmys*) *marmorata marmorata*)  
Olive-sided flycatcher (*Contopus cooperi*)  
Oregon vesper sparrow (*Pooectetes gramineus affinis*)  
Pacific lamprey (*Lampetra tridentata*)  
Pacific Townsend's big-eared bat (*Corynorhinus townsendii townsendii*)  
Peregrine falcon (*Falco peregrinus*)  
River lamprey (*Lampetra ayresi*)  
Slender-billed white-breasted nuthatch (*Sitta carolinensis aculeata*)  
Tailed frog (*Ascaphus truei*)

Valley silverspot butterfly (*Speyeria zerene bremeri*)  
Western gray squirrel (*Sciurus griseus griseus*)  
Van Dyke's salamander (*Plethodon vandykei*)  
*Aster curtus* (white-top aster)  
*Botrychium ascendens* (triangular-lobed moonwort)  
*Castilleja cryptantha* (obscure paintbrush)  
*Cimicifuga elata* (tall bugbane)  
*Cypripedium fasciculatum* (clustered lady's slipper)  
*Lathyrus torreyi* (Torrey's peavine)

**LISTED AND PROPOSED ENDANGERED AND THREATENED SPECIES AND  
CRITICAL HABITAT; CANDIDATE SPECIES; AND SPECIES OF CONCERN  
IN SKAMANIA COUNTY  
AS PREPARED BY  
THE U.S. FISH AND WILDLIFE SERVICE  
WASHINGTON FISH AND WILDLIFE OFFICE**

**(Revised December 15, 2010)**

**LISTED**

Bull trout (*Salvelinus confluentus*) – Coastal-Puget Sound DPS

Canada lynx (*Lynx canadensis*)

Gray wolf (*Canis lupus*)

Grizzly bear (*Ursus arctos* = *U. a. horribilis*)

Northern spotted owl (*Strix occidentalis caurina*)

Major concerns that should be addressed in your Biological Assessment of project impacts to listed species include:

1. Level of use of the project area by listed species.
2. Effect of the project on listed species' primary food stocks, prey species, and foraging areas in all areas influenced by the project.
3. Impacts from project activities and implementation (e.g., increased noise levels, increased human activity and/or access, loss or degradation of habitat) that may result in disturbance to listed species and/or their avoidance of the project area.

**DESIGNATED**

Critical habitat for bull trout

Critical habitat for the northern spotted owl

**PROPOSED**

Revised critical habitat for bull trout

## CANDIDATE

Fisher (*Martes pennanti*) – West Coast DPS  
Mardon skipper (*Polites mardon*)  
North American wolverine (*Gulo gulo luteus*) – contiguous U.S. DPS  
Oregon spotted frog (*Rana pretiosa*)

## SPECIES OF CONCERN

Bald eagle (*Haliaeetus leucocephalus*)  
Cascades frog (*Rana cascadae*)  
Coastal cutthroat trout (*Oncorhynchus clarki clarki*) [southwest Washington DPS]  
Fender's soliperlan stonefly (*Soliperla fenderi*)  
Larch Mountain salamander (*Plethodon larselli*)  
Long-eared myotis (*Myotis evotis*)  
Long-legged myotis (*Myotis volans*)  
Northern goshawk (*Accipiter gentilis*)  
Northwestern pond turtle (*Emys* (= *Clemmys*) *marmorata marmorata*)  
Olive-sided flycatcher (*Contopus cooperi*)  
Pacific lamprey (*Lampetra tridentata*)  
Pacific Townsend's big-eared bat (*Corynorhinus townsendii townsendii*)  
Peregrine falcon (*Falco peregrinus*)  
River lamprey (*Lampetra ayresi*)  
Tailed frog (*Ascaphus truei*)  
Van Dyke's salamander (*Plethodon vandykei*)  
Western gray squirrel (*Sciurus griseus griseus*)  
Western toad (*Bufo boreas*)  
*Cimicifuga elata* (tall bugbane)  
*Corydalis aquae-gelidae* (Clackamas corydalis)  
*Cypripedium fasciculatum* (clustered lady's slipper) [historic]  
*Erigeron howellii* (Howell's daisy)  
*Erigeron oreganus* (gorge daisy)  
*Penstemon barrettiae* (Barrett's beardtongue)  
*Rorippa columbiae* (Columbian yellowcress)  
*Sisyrinchium sarmentosum* (pale blue-eyed grass)  
*Sullivantia oregana* (Oregon sullivantia)

**LISTED AND PROPOSED ENDANGERED AND THREATENED SPECIES AND  
CRITICAL HABITAT; CANDIDATE SPECIES; AND SPECIES OF CONCERN  
IN THURSTON COUNTY  
AS PREPARED BY  
THE U.S. FISH AND WILDLIFE SERVICE  
WASHINGTON FISH AND WILDLIFE OFFICE**

**(Revised December 15, 2010)**

**LISTED**

Bull trout (*Salvelinus confluentus*) – Coastal-Puget Sound DPS  
Marbled murrelet (*Brachyramphus marmoratus*)  
Northern spotted owl (*Strix occidentalis caurina*)

Major concerns that should be addressed in your Biological Assessment of project impacts to listed species include:

1. Level of use of the project area by listed species.
2. Effect of the project on listed species' primary food stocks, prey species, and foraging areas in all areas influenced by the project.
3. Impacts from project activities and implementation (e.g., increased noise levels, increased human activity and/or access, loss or degradation of habitat) which may result in disturbance to listed species and/or their avoidance of the project area.

*Castilleja levisecta* (golden paintbrush)  
*Howellia aquatilis* (water howellia)

Major concerns that should be addressed in your Biological Assessment of project impacts to listed plant species include:

1. Distribution of taxon in project vicinity.
2. Disturbance (trampling, uprooting, collecting, etc.) of individual plants and habitat loss.
3. Changes in hydrology where taxon is found.

**DESIGNATED**

Critical habitat for the bull trout  
Critical habitat for the marbled murrelet  
Critical habitat for the northern spotted owl

## PROPOSED

Revised critical habitat for bull trout

## CANDIDATE

Fisher (*Martes pennanti*) – West Coast DPS  
Mardon skipper (*Polites mardon*)  
(Olympia, Tenino, and Yelm) Mazama pocket gopher (*Thomomys mazama* ssp. *pugetensis*, *tumuli*, and *yelmensis*)  
North American wolverine (*Gulo gulo luteus*) – contiguous U.S. DPS  
Oregon spotted frog (*Rana pretiosa*)  
Streaked horned lark (*Eremophila alpestris strigata*)  
Taylor's checkerspot (*Euphydryas editha taylori*)

## SPECIES OF CONCERN

Bald eagle (*Haliaeetus leucocephalus*)  
Cascades frog (*Rana cascadae*)  
Coastal cutthroat trout (*Oncorhynchus clarki clarki*) [southwest Washington DPS]  
Long-eared myotis (*Myotis evotis*)  
Long-legged myotis (*Myotis volans*)  
Northern goshawk (*Accipiter gentilis*)  
Northern sea otter (*Enhydra lutris kenyoni*)  
Northwestern pond turtle (*Emys* (= *Clemmys*) *marmorata marmorata*)  
Oregon vesper sparrow (*Pooecetes gramineus affinis*)  
Olive-sided flycatcher (*Contopus cooperi*)  
Pacific lamprey (*Lampetra tridentata*)  
Pacific Townsend's big-eared bat (*Corynorhinus townsendii townsendii*)  
River lamprey (*Lampetra ayresi*)  
Slender-billed white-breasted nuthatch (*Sitta carolinensis aculeata*)  
Tailed frog (*Ascaphus truei*)  
Valley silverspot butterfly (*Speyeria zerene bremeri*)  
Van Dyke's salamander (*Plethodon vandykei*)  
Western gray squirrel (*Sciurus griseus griseus*)  
*Aster curtus* (white-top aster)  
*Cimicifuga elata* (tall bugbane)  
*Sidalcea malviflora* ssp. *virgata* (rose checker-mallow)

**LISTED AND PROPOSED ENDANGERED AND THREATENED SPECIES AND  
CRITICAL HABITAT; CANDIDATE SPECIES; AND SPECIES OF CONCERN  
IN WAHIAKUM COUNTY**

**AS PREPARED BY  
THE U.S. FISH AND WILDLIFE SERVICE  
WASHINGTON FISH AND WILDLIFE OFFICE**

**(Revised August 26, 2010)**

**LISTED**

Bull trout (*Salvelinus confluentus*) – Coastal-Puget Sound DPS

Columbian white-tailed deer (*Odocoileus virginianus leucurus*)

Marbled murrelet (*Brachyramphus marmoratus*)

Northern spotted owl (*Strix occidentalis caurina*)

Major concerns that should be addressed in your Biological Assessment of project impacts to listed species include:

1. Level of use of the project area by listed species.
2. Effect of the project on listed species' primary food stocks, prey species, and foraging areas in all areas influenced by the project.
3. Impacts from project activities and implementation (e.g., increased noise levels, increased human activity and/or access, loss or degradation of habitat) that may result in disturbance to listed species and/or their avoidance of the project area.

**DESIGNATED**

Critical habitat for the marbled murrelet

**PROPOSED**

Revised critical habitat for bull trout

**CANDIDATE**

(Cathlamet) Mazama pocket gopher (*Thomomys mazama* ssp. *louiei*) [historic]

Streaked horned lark (*Eremophila alpestris strigata*)

## **SPECIES OF CONCERN**

Bald eagle (*Haliaeetus leucocephalus*)  
Cascades frog (*Rana cascadae*)  
Coastal cutthroat trout (*Oncorhynchus clarki clarki*) [southwest Washington DPS]  
Columbia torrent salamander (*Rhyacotriton kezeri*)  
Long-eared myotis (*Myotis evotis*)  
Long-legged myotis (*Myotis volans*)  
Northern goshawk (*Accipiter gentilis*)  
Olive-sided flycatcher (*Contopus borealis*)  
Pacific lamprey (*Lampetra tridentata*)  
Pacific Townsend's big-eared bat (*Corynorhinus townsendii townsendii*)  
Peregrine falcon (*Falco peregrinus*)  
River lamprey (*Lampetra ayresi*)  
Tailed frog (*Ascaphus truei*)  
Valley silverspot (*Speyeria zerene bremeri*)  
Van Dyke's salamander (*Plethodon vandykei*)  
Western toad (*Bufo boreas*)  
*Erigeron oreganus* (gorge daisy)

**LISTED AND PROPOSED ENDANGERED AND THREATENED SPECIES AND CRITICAL  
HABITAT; CANDIDATE SPECIES; AND SPECIES OF CONCERN  
IN YAKIMA COUNTY  
AS PREPARED BY  
THE U.S. FISH AND WILDLIFE SERVICE  
CENTRAL WASHINGTON FIELD OFFICE**

**(Revised December 15, 2010)**

**LISTED**

Bull trout (*Salvelinus confluentus*) – Columbia River DPS

Gray wolf (*Canis lupus*)

Grizzly bear (*Ursus arctos horribilis*)

Marbled murrelet (*Brachyramphus marmoratus*)

Northern spotted owl (*Strix occidentalis caurina*)

Major concerns that should be addressed in your Biological Assessment of project impacts to listed animal species include:

1. Level of use of the project area by listed species.
2. Effect of the project on listed species' primary food stocks, prey species, and foraging areas in all areas influenced by the project.
3. Impacts from project activities and implementation (e.g., increased noise levels, increased human activity and/or access, loss or degradation of habitat) that may result in disturbance to listed species and/or their avoidance of the project area.

*Spiranthes diluvialis* (Ute ladies'-tresses)

Major concerns that should be addressed in your Biological Assessment of project impacts to listed plant species include:

1. Distribution of taxon in the project vicinity.
2. Disturbance (trampling, uprooting, collecting, etc.) of individual plants and loss of habitat.
3. Changes in hydrology where taxon is found.

**DESIGNATED**

Critical habitat for the bull trout

Critical habitat for the northern spotted owl

**PROPOSED**

Revised critical habitat for the bull trout

## CANDIDATE

Fisher (*Martes pennanti*) - West Coast DPS  
Greater sage grouse (*Centrocercus urophasianus*) – Columbia Basin DPS  
Mardon skipper (*Polites mardon*)  
North American wolverine (*Gulo gulo luteus*) – contiguous U.S. DPS  
Yellow-billed cuckoo (*Coccyzus americanus*)

## SPECIES OF CONCERN

Bald eagle (*Haliaeetus leucocephalus*)  
Black swift (*Cypseloides niger*)  
Burrowing owl (*Athene cunicularia*)  
Ferruginous hawk (*Buteo regalis*)  
Larch Mountain salamander (*Plethodon larselli*)  
Loggerhead shrike (*Lanius ludovicianus*)  
Long-eared myotis (*Myotis evotis*)  
Northern goshawk (*Accipiter gentilis*)  
Olive-sided flycatcher (*Contopus cooperi*)  
Pacific lamprey (*Lampetra tridentata*)  
Pallid Townsend's big-eared bat (*Corynorhinus townsendii pallescens*)  
Peregrine falcon (*Falco peregrinus*)  
Redband trout (*Oncorhynchus mykiss*)  
River lamprey (*Lampetra ayresi*)  
Sagebrush lizard (*Sceloporus graciosus*)  
Sharptail snake (*Contia tenuis*)  
Townsend's ground squirrel (*Spermophilis townsendii*)  
Western brook lamprey (*Lampetra richardsoni*)  
Western gray squirrel (*Sciurus griseus griseus*)  
Westslope cutthroat trout (*Oncorhynchus clarki lewisi*)  
*Astragalus columbianus* (Columbia milk-vetch)  
*Calochortus longebarbatus* var. *longebarbatus* (long-bearded sego lily)  
*Castilleja cryptantha* (obscure paintbrush)  
*Cryptantha leucophaea* (gray cryptantha)  
*Cypripedium fasciculatum* (clustered lady's-slipper)  
*Erigeron basalticus* (basalt daisy)  
*Lomatium tuberosum* (Hoover's desert-parsley)  
*Pinus albicaulis* (whitebark pine)  
*Sisyrinchium sarmentosum* (pale blue-eyed grass)  
*Tauschia hooveri* (Hoover's tauschia)

**FEDERALLY LISTED, PROPOSED, CANDIDATE SPECIES  
AND SPECIES OF CONCERN  
UNDER THE JURISDICTION OF THE FISH AND WILDLIFE SERVICE  
WHICH MAY OCCUR WITHIN BENTON COUNTY, OREGON**

**LISTED SPECIES**

**Birds**

Marbled murrelet	<i>Brachyramphus marmoratus</i>	CH T
Northern spotted owl	<i>Strix occidentalis caurina</i>	CH T

**Fish**

***Inland:***

Oregon chub	<i>Oregonichthys crameri</i>	CH T
-------------	------------------------------	------

**Invertebrates**

***Insects:***

Fender's blue butterfly	<i>Icaricia icarioides fenderi</i>	CH E
-------------------------	------------------------------------	------

**Plants**

Golden paintbrush	<i>Castilleja levisecta</i>	T
Willamette daisy	<i>Erigeron decumbens var. decumbens</i>	CH E
Water howellia	<i>Howellia aquatilis</i>	T
Bradshaw's desert parsley	<i>Lomatium bradshawii</i>	E
Kincaid's lupine	<i>Lupinus sulphureus ssp. kincaidii</i>	CH T
Nelson's checker-mallow	<i>Sidalcea nelsoniana</i>	T

**PROPOSED SPECIES**

**None**

No Proposed Endangered Species	PE
No Proposed Threatened Species	PT

**CANDIDATE SPECIES**

**Birds**

Streaked horned lark	<i>Eremophila alpestris strigata</i>
----------------------	--------------------------------------

**Invertebrates**

***Insects:***

Taylor's checkerspot	<i>Euphydryas editha taylori</i>
----------------------	----------------------------------

**SPECIES OF CONCERN**

**Mammals**

White-footed vole	<i>Arborimus albipes</i>
Red tree vole	<i>Arborimus longicaudus</i>
Townsend's western big-eared bat	<i>Corynorhinus townsendii townsendii</i>
Silver-haired bat	<i>Lasionycteris noctivagans</i>
Long-eared myotis bat	<i>Myotis evotis</i>

**FEDERALLY LISTED, PROPOSED, CANDIDATE SPECIES  
AND SPECIES OF CONCERN  
UNDER THE JURISDICTION OF THE FISH AND WILDLIFE SERVICE  
WHICH MAY OCCUR WITHIN BENTON COUNTY, OREGON**

Fringed myotis bat  
Long-legged myotis bat  
Yuma myotis bat  
Camas pocket gopher

*Myotis thysanodes*  
*Myotis volans*  
*Myotis yumanensis*  
*Thomomys bulbivorus*

**Birds**

Northern goshawk  
Western burrowing owl  
Black tern  
Olive-sided flycatcher  
Yellow-breasted chat  
Acorn woodpecker  
Lewis' woodpecker  
Mountain quail  
Band-tailed pigeon  
Oregon vesper sparrow  
Purple martin

*Accipiter gentilis*  
*Athene cunicularia hypugaea*  
*Chlidonias niger*  
*Contopus cooperi*  
*Icteria virens*  
*Melanerpes formicivorus*  
*Melanerpes lewis*  
*Oreortyx pictus*  
*Patagioenas fasciata*  
*Pooecetes gramineus affinis*  
*Progne subis*

**Reptiles and Amphibians**

Northern Pacific pond turtle  
Coastal tailed frog  
Northern red-legged frog  
Southern torrent (seep) salamander

*Actinemys marmorata marmorata*  
*Ascaphus truei*  
*Rana aurora aurora*  
*Rhyacotriton variegatus*

**Fish**

Pacific lamprey  
Coastal cutthroat trout

*Lampetra tridentata*  
*Oncorhynchus clarki ssp*

**Invertebrates**

***Insects:***

American acetropis grass bug  
Siskiyou chloealetis grasshopper  
Goeden's lepidostoman caddisfly  
Roth's blind ground beetle  
Haddock's rhyacophilan caddisfly

*Acetropis americana*  
*Chloealetis aspasma*  
*Lepidostoma goedeni*  
*Pterostichus rothi*  
*Rhyacophila haddocki*

***Annelid Worms:***

Oregon giant earthworm

*Megascolides macelfreshi*

**Plants**

Peacock larkspur  
Shaggy horkelia  
Thin leaved peavine  
Frye's Limbella  
Hitchcock's blue-eyed grass

*Delphinium pavonaceum*  
*Horkelia congesta ssp. congesta*  
*Lathyrus holochlorus*  
*Limbella fryei*  
*Sisyrinchium hitchcockii*

**DELISTED SPECIES**

**Birds**

Aleutian Canada goose  
American Peregrine falcon  
Bald eagle

*Branta canadensis leucopareia*  
*Falco peregrinus anatum*  
*Haliaeetus leucocephalus*

**FEDERALLY LISTED, PROPOSED, CANDIDATE SPECIES  
AND SPECIES OF CONCERN  
UNDER THE JURISDICTION OF THE FISH AND WILDLIFE SERVICE  
WHICH MAY OCCUR WITHIN BENTON COUNTY, OREGON**

**Definitions:**

Listed Species: An endangered species is one that is in danger of extinction throughout all or a significant portion of its range. A threatened species is one that is likely to become endangered in the foreseeable future.

Proposed Species: Taxa for which the Fish and Wildlife Service or National Marine Fisheries Service has published a proposal to list as endangered or threatened in the Federal Register.

Candidate Species: Taxa for which the Fish and Wildlife Service has sufficient biological information to support a proposal to list as endangered or threatened.

Species of Concern: Taxa whose conservation status is of concern to the U.S. Fish and Wildlife Service (many previously known as Category 2 candidates), but for which further information is still needed. Such species receive no legal protection and use of the term does not necessarily imply that a species will eventually be proposed for listing.

Delisted Species: A species that has been removed from the Federal list of endangered and threatened wildlife and plants.

**Key:**

E	Endangered
T	Threatened
CH	Critical Habitat has been designated for this species
PE	Proposed Endangered
PT	Proposed Threatened
PCH	Critical Habitat has been proposed for this species

**Notes:**

**Marine & Anadromous Species:** Please consult the National Marine Fisheries Service (NMFS) (<http://www.nmfs.noaa.gov/pr/species/>) for marine and anadromous species. The National Marine Fisheries Service (NMFS) manages mostly marine and anadromous species, while the U.S. Fish and Wildlife Service manages the remainder of the listed species, mostly terrestrial and freshwater species.

**Marine Turtle Conservation and Management:** All six species of sea turtles occurring in the U.S. are protected under the Endangered Species Act of 1973. In 1977, NOAA Fisheries and the U.S. Fish and Wildlife Service signed a Memorandum of Understanding to jointly administer the Endangered Species Act with respect to marine turtles. NOAA Fisheries has the lead responsibility for the conservation and recovery of sea turtles in the marine environment and the U.S. Fish and Wildlife Service has the lead for the conservation and recovery of sea turtles on nesting beaches. For more information, see the NOAA Fisheries webpage on sea turtles <http://www.nmfs.noaa.gov/pr/species/turtles/>.

**Gray Wolf:** On February 27, 2008, the Service published a final rule that established a distinct population segment of the gray wolf (*Canis lupis*) in the northern Rocky Mountains (which includes a portion of Eastern Oregon, east of the centerline of Highway 395 and Highway 78 north of Burns Junction and that portion of Oregon east of the centerline of Highway 95 south of Burns Junction). Any wolves found west of this line in Oregon belong to the conterminous USA population [see 73 FR 10514]. Gray wolves in Oregon are State-listed as endangered, regardless of location.

**FEDERALLY LISTED, PROPOSED, CANDIDATE SPECIES  
AND SPECIES OF CONCERN  
UNDER THE JURISDICTION OF THE FISH AND WILDLIFE SERVICE  
WHICH MAY OCCUR WITHIN BENTON COUNTY, OREGON**

**FEDERALLY LISTED, PROPOSED, CANDIDATE SPECIES  
AND SPECIES OF CONCERN  
UNDER THE JURISDICTION OF THE FISH AND WILDLIFE SERVICE  
WHICH MAY OCCUR WITHIN CLACKAMAS COUNTY, OREGON**

**LISTED SPECIES**

**Birds**

Northern spotted owl	<i>Strix occidentalis caurina</i>	CH T
----------------------	-----------------------------------	------

**Plants**

Willamette daisy	<i>Erigeron decumbens var. decumbens</i>	CH E
Nelson's checker-mallow	<i>Sidalcea nelsoniana</i>	T

**PROPOSED SPECIES**

**None**

No Proposed Endangered Species		PE
No Proposed Threatened Species		PT

**CANDIDATE SPECIES**

**Birds**

Streaked horned lark	<i>Eremophila alpestris strigata</i>	
----------------------	--------------------------------------	--

**SPECIES OF CONCERN**

**Mammals**

Red tree vole	<i>Arborimus longicaudus</i>
Townsend's western big-eared bat	<i>Corynorhinus townsendii townsendii</i>
Silver-haired bat	<i>Lasionycteris noctivagans</i>
Long-eared myotis bat	<i>Myotis evotis</i>
Fringed myotis bat	<i>Myotis thysanodes</i>
Long-legged myotis bat	<i>Myotis volans</i>
Yuma myotis bat	<i>Myotis yumanensis</i>
Camas pocket gopher	<i>Thomomys bulbivorus</i>

**Birds**

Northern goshawk	<i>Accipiter gentilis</i>
Olive-sided flycatcher	<i>Contopus cooperi</i>
Harlequin duck	<i>Histrionicus histrionicus</i>
Yellow-breasted chat	<i>Icteria virens</i>
Acorn woodpecker	<i>Melanerpes formicivorus</i>
Lewis' woodpecker	<i>Melanerpes lewis</i>
Mountain quail	<i>Oreortyx pictus</i>
Band-tailed pigeon	<i>Patagioenas fasciata</i>
Oregon vesper sparrow	<i>Pooecetes gramineus affinis</i>
Purple martin	<i>Progne subis</i>

**Reptiles and Amphibians**

Northern Pacific pond turtle	<i>Actinemys marmorata marmorata</i>
------------------------------	--------------------------------------

**FEDERALLY LISTED, PROPOSED, CANDIDATE SPECIES  
AND SPECIES OF CONCERN  
UNDER THE JURISDICTION OF THE FISH AND WILDLIFE SERVICE  
WHICH MAY OCCUR WITHIN CLACKAMAS COUNTY, OREGON**

Coastal tailed frog  
Oregon slender salamander  
Larch Mountain salamander  
Northern red-legged frog  
Cascades frog

*Ascaphus truei*  
*Batrachoseps wrighti*  
*Plethodon larselli*  
*Rana aurora aurora*  
*Rana cascadae*

**Fish**

Pacific lamprey  
Coastal cutthroat trout

*Lampetra tridentata*  
*Oncorhynchus clarki ssp*

**Invertebrates**

***Insects:***

Beller's ground beetle  
Scott's apatanian caddisfly  
Cascades apatanian caddisfly  
Mt. Hood primitive brachycentrid caddisfly  
Mt. Hood farulan caddisfly

*Agonum belleri*  
*Allomyia scotti*  
*Apatania tavala*  
*Eobrachycentrus gelidae*  
*Farula jewetti*

***Annelid Worms:***

Oregon giant earthworm

*Megascolides macelfreshi*

**Plants**

Cliff paintbrush  
Cold-water corydalis  
Pale larkspur  
Willamette Valley larkspur  
Peacock larkspur  
Howell's daisy  
Thin leaved peavine  
Whitetop aster  
Henderson's checker-mallow  
Pale blue-eyed grass  
Oregon sullivantia

*Castilleja rupicola*  
*Corydalis aquae-gelidae*  
*Delphinium leucophaeum*  
*Delphinium oreganum*  
*Delphinium pavonaceum*  
*Erigeron howellii*  
*Lathyrus holochlorus*  
*Sericocarpus rigidus*  
*Sidalcea hendersonii*  
*Sisyrinchium sarmentosum*  
*Sullivantia oregana*

**DELISTED SPECIES**

**Birds**

American Peregrine falcon  
Bald eagle

*Falco peregrinus anatum*  
*Haliaeetus leucocephalus*

**Definitions:**

Listed Species: An endangered species is one that is in danger of extinction throughout all or a significant portion of its range. A threatened species is one that is likely to become endangered in the foreseeable future.

Proposed Species: Taxa for which the Fish and Wildlife Service or National Marine Fisheries Service has published a proposal to list as endangered or threatened in the Federal Register.

Candidate Species: Taxa for which the Fish and Wildlife Service has sufficient biological information to support a proposal to list as endangered or threatened.

**FEDERALLY LISTED, PROPOSED, CANDIDATE SPECIES  
AND SPECIES OF CONCERN  
UNDER THE JURISDICTION OF THE FISH AND WILDLIFE SERVICE  
WHICH MAY OCCUR WITHIN CLACKAMAS COUNTY, OREGON**

Species of Concern: Taxa whose conservation status is of concern to the U.S. Fish and Wildlife Service (many previously known as Category 2 candidates), but for which further information is still needed. Such species receive no legal protection and use of the term does not necessarily imply that a species will eventually be proposed for listing.

Delisted Species: A species that has been removed from the Federal list of endangered and threatened wildlife and plants.

**Key:**

E      Endangered  
T      Threatened  
CH     Critical Habitat has been designated for this species  
PE     Proposed Endangered  
PT     Proposed Threatened  
PCH    Critical Habitat has been proposed for this species

**Notes:**

**Marine & Anadromous Species**: Please consult the National Marine Fisheries Service (NMFS) (<http://www.nmfs.noaa.gov/pr/species/>) for marine and anadromous species. The National Marine Fisheries Service (NMFS) manages mostly marine and anadromous species, while the U.S. Fish and Wildlife Service manages the remainder of the listed species, mostly terrestrial and freshwater species.

**Marine Turtle Conservation and Management**: All six species of sea turtles occurring in the U.S. are protected under the Endangered Species Act of 1973. In 1977, NOAA Fisheries and the U.S. Fish and Wildlife Service signed a Memorandum of Understanding to jointly administer the Endangered Species Act with respect to marine turtles. NOAA Fisheries has the lead responsibility for the conservation and recovery of sea turtles in the marine environment and the U.S. Fish and Wildlife Service has the lead for the conservation and recovery of sea turtles on nesting beaches. For more information, see the NOAA Fisheries webpage on sea turtles <http://www.nmfs.noaa.gov/pr/species/turtles/>.

**Gray Wolf**: On February 27, 2008, the Service published a final rule that established a distinct population segment of the gray wolf (*Canis lupis*) in the northern Rocky Mountains (which includes a portion of Eastern Oregon, east of the centerline of Highway 395 and Highway 78 north of Burns Junction and that portion of Oregon east of the centerline of Highway 95 south of Burns Junction). Any wolves found west of this line in Oregon belong to the conterminous USA population [see 73 FR 10514]. Gray wolves in Oregon are State-listed as endangered, regardless of location.

**FEDERALLY LISTED, PROPOSED, CANDIDATE SPECIES  
AND SPECIES OF CONCERN  
UNDER THE JURISDICTION OF THE FISH AND WILDLIFE SERVICE  
WHICH MAY OCCUR WITHIN CLATSOP COUNTY, OREGON**

**LISTED SPECIES**

**Mammals**

***Terrestrial:***

Columbian white-tailed deer (Columbia River distinct population segment)	<i>Odocoileus virginianus leucurus</i>	E
---	--	---

**Birds**

Marbled murrelet	<i>Brachyramphus marmoratus</i>	CH T
Western snowy (coastal) plover	<i>Charadrius alexandrinus nivosus</i>	CH T
Short-tailed albatross	<i>Phoebastria albatrus</i>	E
Northern spotted owl	<i>Strix occidentalis caurina</i>	CH T

**Reptiles and Amphibians**

***Marine:***

Loggerhead sea turtle	<i>Caretta caretta</i>	E
Green sea turtle	<i>Chelonia mydas</i>	T
Leatherback sea turtle	<i>Dermochelys coriacea</i>	E
Olive (=Pacific) ridley sea turtle	<i>Lepidochelys olivacea</i>	T

**Invertebrates**

***Insects:***

Oregon silverspot butterfly	<i>Speyeria zerene hippolyta</i>	CH T
-----------------------------	----------------------------------	------

**Plants**

Nelson's checker-mallow	<i>Sidalcea nelsoniana</i>	T
-------------------------	----------------------------	---

**PROPOSED SPECIES**

**None**

No Proposed Endangered Species	PE
No Proposed Threatened Species	PT

**CANDIDATE SPECIES**

**Birds**

Streaked horned lark	<i>Eremophila alpestris strigata</i>
----------------------	--------------------------------------

**SPECIES OF CONCERN**

**Mammals**

White-footed vole	<i>Arborimus albipes</i>
Red tree vole	<i>Arborimus longicaudus</i>
Townsend's western big-eared bat	<i>Corynorhinus townsendii townsendii</i>
Silver-haired bat	<i>Lasiorycteris noctivagans</i>

**FEDERALLY LISTED, PROPOSED, CANDIDATE SPECIES  
AND SPECIES OF CONCERN  
UNDER THE JURISDICTION OF THE FISH AND WILDLIFE SERVICE  
WHICH MAY OCCUR WITHIN CLATSOP COUNTY, OREGON**

Long-eared myotis bat  
Fringed myotis bat  
Long-legged myotis bat  
Yuma myotis bat

*Myotis evotis*  
*Myotis thysanodes*  
*Myotis volans*  
*Myotis yumanensis*

**Birds**

Olive-sided flycatcher  
Black oystercatcher  
Harlequin duck  
Lewis' woodpecker  
Mountain quail  
Band-tailed pigeon  
Purple martin

*Contopus cooperi*  
*Haematopus bachmani*  
*Histrionicus histrionicus*  
*Melanerpes lewis*  
*Oreortyx pictus*  
*Patagioenas fasciata*  
*Progne subis*

**Reptiles and Amphibians**

Coastal tailed frog  
Northern red-legged frog

*Ascaphus truei*  
*Rana aurora aurora*

**Fish**

River lamprey  
Pacific lamprey  
Coastal cutthroat trout

*Lampetra ayresi*  
*Lampetra tridentata*  
*Oncorhynchus clarki ssp*

**Invertebrates**

**Clams:**

California floater mussel

*Anodonta californiensis*

**Plants**

Pink sand-verbena  
Saddle Mountain bittercress  
Chamber's paintbrush  
Frigid shootingstar  
Queen-of-the-forest  
Frye's Limbella  
Saddle Mountain saxifrage  
Bristly-stemmed sidalcea

*Abronia umbellata ssp. breviflora*  
*Cardamine pattersonii*  
*Castilleja chambersii*  
*Dodecatheon austrofrigidum*  
*Filipendula occidentalis*  
*Limbella fryei*  
*Saxifraga hitchcockiana*  
*Sidalcea hirtipes*

**DELISTED SPECIES**

**Birds**

American Peregrine falcon  
Bald eagle  
Brown pelican

*Falco peregrinus anatum*  
*Haliaeetus leucocephalus*  
*Pelecanus occidentalis*

**Definitions:**

Listed Species: An endangered species is one that is in danger of extinction throughout all or a significant portion of its range. A threatened species is one that is likely to become endangered in the foreseeable future.

**FEDERALLY LISTED, PROPOSED, CANDIDATE SPECIES  
AND SPECIES OF CONCERN  
UNDER THE JURISDICTION OF THE FISH AND WILDLIFE SERVICE  
WHICH MAY OCCUR WITHIN CLATSOP COUNTY, OREGON**

Proposed Species: Taxa for which the Fish and Wildlife Service or National Marine Fisheries Service has published a proposal to list as endangered or threatened in the Federal Register.

Candidate Species: Taxa for which the Fish and Wildlife Service has sufficient biological information to support a proposal to list as endangered or threatened.

Species of Concern: Taxa whose conservation status is of concern to the U.S. Fish and Wildlife Service (many previously known as Category 2 candidates), but for which further information is still needed. Such species receive no legal protection and use of the term does not necessarily imply that a species will eventually be proposed for listing.

Delisted Species: A species that has been removed from the Federal list of endangered and threatened wildlife and plants.

**Key:**

E	Endangered
T	Threatened
CH	Critical Habitat has been designated for this species
PE	Proposed Endangered
PT	Proposed Threatened
PCH	Critical Habitat has been proposed for this species

**Notes:**

**Marine & Anadromous Species:** Please consult the National Marine Fisheries Service (NMFS) (<http://www.nmfs.noaa.gov/pr/species/>) for marine and anadromous species. The National Marine Fisheries Service (NMFS) manages mostly marine and anadromous species, while the U.S. Fish and Wildlife Service manages the remainder of the listed species, mostly terrestrial and freshwater species.

**Marine Turtle Conservation and Management:** All six species of sea turtles occurring in the U.S. are protected under the Endangered Species Act of 1973. In 1977, NOAA Fisheries and the U.S. Fish and Wildlife Service signed a Memorandum of Understanding to jointly administer the Endangered Species Act with respect to marine turtles. NOAA Fisheries has the lead responsibility for the conservation and recovery of sea turtles in the marine environment and the U.S. Fish and Wildlife Service has the lead for the conservation and recovery of sea turtles on nesting beaches. For more information, see the NOAA Fisheries webpage on sea turtles <http://www.nmfs.noaa.gov/pr/species/turtles/>.

**Gray Wolf:** On February 27, 2008, the Service published a final rule that established a distinct population segment of the gray wolf (*Canis lupis*) in the northern Rocky Mountains (which includes a portion of Eastern Oregon, east of the centerline of Highway 395 and Highway 78 north of Burns Junction and that portion of Oregon east of the centerline of Highway 95 south of Burns Junction). Any wolves found west of this line in Oregon belong to the conterminous USA population [see 73 FR 10514]. Gray wolves in Oregon are State-listed as endangered, regardless of location.

**FEDERALLY LISTED, PROPOSED, CANDIDATE SPECIES  
AND SPECIES OF CONCERN  
UNDER THE JURISDICTION OF THE FISH AND WILDLIFE SERVICE  
WHICH MAY OCCUR WITHIN CLATSOP COUNTY, OREGON**

**LISTED SPECIES**

**Mammals**

***Terrestrial:***

Columbian white-tailed deer (Columbia River distinct population segment)	<i>Odocoileus virginianus leucurus</i>	E
---	--	---

**Birds**

Marbled murrelet	<i>Brachyramphus marmoratus</i>	CH T
Western snowy (coastal) plover	<i>Charadrius alexandrinus nivosus</i>	CH T
Short-tailed albatross	<i>Phoebastria albatrus</i>	E
Northern spotted owl	<i>Strix occidentalis caurina</i>	CH T

**Reptiles and Amphibians**

***Marine:***

Loggerhead sea turtle	<i>Caretta caretta</i>	E
Green sea turtle	<i>Chelonia mydas</i>	T
Leatherback sea turtle	<i>Dermochelys coriacea</i>	E
Olive (=Pacific) ridley sea turtle	<i>Lepidochelys olivacea</i>	T

**Invertebrates**

***Insects:***

Oregon silverspot butterfly	<i>Speyeria zerene hippolyta</i>	CH T
-----------------------------	----------------------------------	------

**Plants**

Nelson's checker-mallow	<i>Sidalcea nelsoniana</i>	T
-------------------------	----------------------------	---

**PROPOSED SPECIES**

**None**

No Proposed Endangered Species	PE
No Proposed Threatened Species	PT

**CANDIDATE SPECIES**

**Birds**

Streaked horned lark	<i>Eremophila alpestris strigata</i>
----------------------	--------------------------------------

**SPECIES OF CONCERN**

**Mammals**

White-footed vole	<i>Arborimus albipes</i>
Red tree vole	<i>Arborimus longicaudus</i>
Townsend's western big-eared bat	<i>Corynorhinus townsendii townsendii</i>
Silver-haired bat	<i>Lasiorycteris noctivagans</i>

**FEDERALLY LISTED, PROPOSED, CANDIDATE SPECIES  
AND SPECIES OF CONCERN  
UNDER THE JURISDICTION OF THE FISH AND WILDLIFE SERVICE  
WHICH MAY OCCUR WITHIN CLATSOP COUNTY, OREGON**

Long-eared myotis bat  
Fringed myotis bat  
Long-legged myotis bat  
Yuma myotis bat

*Myotis evotis*  
*Myotis thysanodes*  
*Myotis volans*  
*Myotis yumanensis*

**Birds**

Olive-sided flycatcher  
Black oystercatcher  
Harlequin duck  
Lewis' woodpecker  
Mountain quail  
Band-tailed pigeon  
Purple martin

*Contopus cooperi*  
*Haematopus bachmani*  
*Histrionicus histrionicus*  
*Melanerpes lewis*  
*Oreortyx pictus*  
*Patagioenas fasciata*  
*Progne subis*

**Reptiles and Amphibians**

Coastal tailed frog  
Northern red-legged frog

*Ascaphus truei*  
*Rana aurora aurora*

**Fish**

River lamprey  
Pacific lamprey  
Coastal cutthroat trout

*Lampetra ayresi*  
*Lampetra tridentata*  
*Oncorhynchus clarki ssp*

**Invertebrates**

**Clams:**

California floater mussel

*Anodonta californiensis*

**Plants**

Pink sand-verbena  
Saddle Mountain bittercress  
Chamber's paintbrush  
Frigid shootingstar  
Queen-of-the-forest  
Frye's Limbella  
Saddle Mountain saxifrage  
Bristly-stemmed sidalcea

*Abronia umbellata ssp. breviflora*  
*Cardamine pattersonii*  
*Castilleja chambersii*  
*Dodecatheon austrofrigidum*  
*Filipendula occidentalis*  
*Limbella fryei*  
*Saxifraga hitchcockiana*  
*Sidalcea hirtipes*

**DELISTED SPECIES**

**Birds**

American Peregrine falcon  
Bald eagle  
Brown pelican

*Falco peregrinus anatum*  
*Haliaeetus leucocephalus*  
*Pelecanus occidentalis*

**Definitions:**

Listed Species: An endangered species is one that is in danger of extinction throughout all or a significant portion of its range. A threatened species is one that is likely to become endangered in the foreseeable future.

**FEDERALLY LISTED, PROPOSED, CANDIDATE SPECIES  
AND SPECIES OF CONCERN  
UNDER THE JURISDICTION OF THE FISH AND WILDLIFE SERVICE  
WHICH MAY OCCUR WITHIN CLATSOP COUNTY, OREGON**

Proposed Species: Taxa for which the Fish and Wildlife Service or National Marine Fisheries Service has published a proposal to list as endangered or threatened in the Federal Register.

Candidate Species: Taxa for which the Fish and Wildlife Service has sufficient biological information to support a proposal to list as endangered or threatened.

Species of Concern: Taxa whose conservation status is of concern to the U.S. Fish and Wildlife Service (many previously known as Category 2 candidates), but for which further information is still needed. Such species receive no legal protection and use of the term does not necessarily imply that a species will eventually be proposed for listing.

Delisted Species: A species that has been removed from the Federal list of endangered and threatened wildlife and plants.

**Key:**

E      Endangered  
T      Threatened  
CH     Critical Habitat has been designated for this species  
PE     Proposed Endangered  
PT     Proposed Threatened  
PCH    Critical Habitat has been proposed for this species

**Notes:**

**Marine & Anadromous Species:** Please consult the National Marine Fisheries Service (NMFS) (<http://www.nmfs.noaa.gov/pr/species/>) for marine and anadromous species. The National Marine Fisheries Service (NMFS) manages mostly marine and anadromous species, while the U.S. Fish and Wildlife Service manages the remainder of the listed species, mostly terrestrial and freshwater species.

**Marine Turtle Conservation and Management:** All six species of sea turtles occurring in the U.S. are protected under the Endangered Species Act of 1973. In 1977, NOAA Fisheries and the U.S. Fish and Wildlife Service signed a Memorandum of Understanding to jointly administer the Endangered Species Act with respect to marine turtles. NOAA Fisheries has the lead responsibility for the conservation and recovery of sea turtles in the marine environment and the U.S. Fish and Wildlife Service has the lead for the conservation and recovery of sea turtles on nesting beaches. For more information, see the NOAA Fisheries webpage on sea turtles <http://www.nmfs.noaa.gov/pr/species/turtles/>.

**Gray Wolf:** On February 27, 2008, the Service published a final rule that established a distinct population segment of the gray wolf (*Canis lupis*) in the northern Rocky Mountains (which includes a portion of Eastern Oregon, east of the centerline of Highway 395 and Highway 78 north of Burns Junction and that portion of Oregon east of the centerline of Highway 95 south of Burns Junction). Any wolves found west of this line in Oregon belong to the conterminous USA population [see 73 FR 10514]. Gray wolves in Oregon are State-listed as endangered, regardless of location.

**FEDERALLY LISTED, PROPOSED, CANDIDATE SPECIES  
AND SPECIES OF CONCERN  
UNDER THE JURISDICTION OF THE FISH AND WILDLIFE SERVICE  
WHICH MAY OCCUR WITHIN COLUMBIA COUNTY, OREGON**

**LISTED SPECIES**

**Mammals**

***Terrestrial:***

Columbian white-tailed deer (Columbia River distinct population segment)	<i>Odocoileus virginianus leucurus</i>	E
---	--	---

**Birds**

Northern spotted owl	<i>Strix occidentalis caurina</i>	CH T
----------------------	-----------------------------------	------

**Plants**

Water howellia	<i>Howellia aquatilis</i>	T
Nelson's checker-mallow	<i>Sidalcea nelsoniana</i>	T

**PROPOSED SPECIES**

**None**

No Proposed Endangered Species	PE
No Proposed Threatened Species	PT

**CANDIDATE SPECIES**

**Birds**

Streaked horned lark	<i>Eremophila alpestris strigata</i>
----------------------	--------------------------------------

**SPECIES OF CONCERN**

**Mammals**

White-footed vole	<i>Arborimus albipes</i>
Red tree vole	<i>Arborimus longicaudus</i>
Silver-haired bat	<i>Lasionycteris noctivagans</i>
Long-eared myotis bat	<i>Myotis evotis</i>
Fringed myotis bat	<i>Myotis thysanodes</i>
Long-legged myotis bat	<i>Myotis volans</i>
Yuma myotis bat	<i>Myotis yumanensis</i>
Camas pocket gopher	<i>Thomomys bulbivorus</i>

**Birds**

Olive-sided flycatcher	<i>Contopus cooperi</i>
Yellow-breasted chat	<i>Icteria virens</i>
Lewis' woodpecker	<i>Melanerpes lewis</i>
Mountain quail	<i>Oreortyx pictus</i>
Band-tailed pigeon	<i>Patagioenas fasciata</i>
Oregon vesper sparrow	<i>Pooecetes gramineus affinis</i>
Purple martin	<i>Progne subis</i>

**FEDERALLY LISTED, PROPOSED, CANDIDATE SPECIES  
AND SPECIES OF CONCERN  
UNDER THE JURISDICTION OF THE FISH AND WILDLIFE SERVICE  
WHICH MAY OCCUR WITHIN COLUMBIA COUNTY, OREGON**

**Reptiles and Amphibians**

Northern Pacific pond turtle  
Coastal tailed frog  
Northern red-legged frog

*Actinemys marmorata marmorata*  
*Ascaphus truei*  
*Rana aurora aurora*

**Fish**

Malheur mottled sculpin  
River lamprey  
Pacific lamprey  
Coastal cutthroat trout

*Cottus bairdi ssp.*  
*Lampetra ayresi*  
*Lampetra tridentata*  
*Oncorhynchus clarki ssp*

**Invertebrates**

**Clams:**

California floater mussel

*Anodonta californiensis*

**Plants**

Oregon sullivania

*Sullivantia oregana*

**DELISTED SPECIES**

**Birds**

Aleutian Canada goose  
American Peregrine falcon  
Bald eagle

*Branta canadensis leucopareia*  
*Falco peregrinus anatum*  
*Haliaeetus leucocephalus*

**Definitions:**

Listed Species: An endangered species is one that is in danger of extinction throughout all or a significant portion of its range. A threatened species is one that is likely to become endangered in the foreseeable future.

Proposed Species: Taxa for which the Fish and Wildlife Service or National Marine Fisheries Service has published a proposal to list as endangered or threatened in the Federal Register.

Candidate Species: Taxa for which the Fish and Wildlife Service has sufficient biological information to support a proposal to list as endangered or threatened.

Species of Concern: Taxa whose conservation status is of concern to the U.S. Fish and Wildlife Service (many previously known as Category 2 candidates), but for which further information is still needed. Such species receive no legal protection and use of the term does not necessarily imply that a species will eventually be proposed for listing.

Delisted Species: A species that has been removed from the Federal list of endangered and threatened wildlife and plants.

**Key:**

E Endangered  
T Threatened  
CH Critical Habitat has been designated for this species

**FEDERALLY LISTED, PROPOSED, CANDIDATE SPECIES  
AND SPECIES OF CONCERN  
UNDER THE JURISDICTION OF THE FISH AND WILDLIFE SERVICE  
WHICH MAY OCCUR WITHIN COLUMBIA COUNTY, OREGON**

PE Proposed Endangered  
PT Proposed Threatened  
PCH Critical Habitat has been proposed for this species

**Notes:**

**Marine & Anadromous Species:** Please consult the National Marine Fisheries Service (NMFS) (<http://www.nmfs.noaa.gov/pr/species/>) for marine and anadromous species. The National Marine Fisheries Service (NMFS) manages mostly marine and anadromous species, while the U.S. Fish and Wildlife Service manages the remainder of the listed species, mostly terrestrial and freshwater species.

**Marine Turtle Conservation and Management:** All six species of sea turtles occurring in the U.S. are protected under the Endangered Species Act of 1973. In 1977, NOAA Fisheries and the U.S. Fish and Wildlife Service signed a Memorandum of Understanding to jointly administer the Endangered Species Act with respect to marine turtles. NOAA Fisheries has the lead responsibility for the conservation and recovery of sea turtles in the marine environment and the U.S. Fish and Wildlife Service has the lead for the conservation and recovery of sea turtles on nesting beaches. For more information, see the NOAA Fisheries webpage on sea turtles <http://www.nmfs.noaa.gov/pr/species/turtles/>.

**Gray Wolf:** On February 27, 2008, the Service published a final rule that established a distinct population segment of the gray wolf (*Canis lupis*) in the northern Rocky Mountains (which includes a portion of Eastern Oregon, east of the centerline of Highway 395 and Highway 78 north of Burns Junction and that portion of Oregon east of the centerline of Highway 95 south of Burns Junction). Any wolves found west of this line in Oregon belong to the conterminous USA population [see 73 FR 10514]. Gray wolves in Oregon are State-listed as endangered, regardless of location.

**FEDERALLY LISTED, PROPOSED, CANDIDATE SPECIES  
AND SPECIES OF CONCERN  
UNDER THE JURISDICTION OF THE FISH AND WILDLIFE SERVICE  
WHICH MAY OCCUR WITHIN DESCHUTES COUNTY, OREGON**

**LISTED SPECIES**

**Birds**

Northern spotted owl *Strix occidentalis caurina* CH T

**Fish**

***Inland:***

Bull trout *Salvelinus confluentus* CH T

**PROPOSED SPECIES**

**None**

No Proposed Endangered Species PE  
No Proposed Threatened Species PT

**CANDIDATE SPECIES**

**Birds**

Greater sage-grouse *Centrocercus urophasianus*  
Yellow-billed cuckoo *Coccyzus americanus*

**Reptiles and Amphibians**

***Inland:***

Oregon spotted frog *Rana pretiosa*

**SPECIES OF CONCERN**

**Mammals**

***Terrestrial:***

Pygmy rabbit *Brachylagus idahoensis*  
Townsend's western big-eared bat *Corynorhinus townsendii townsendii*  
Spotted bat *Euderma maculatum*  
Silver-haired bat *Lasionycteris noctivagans*  
Small-footed myotis bat *Myotis ciliolabrum*  
Long-eared myotis bat *Myotis evotis*  
Long-legged myotis bat *Myotis volans*  
Yuma myotis bat *Myotis yumanensis*  
Preble's shrew *Sorex preblei*

**Birds**

Northern goshawk *Accipiter gentilis*  
Western burrowing owl *Athene cunicularia hypugaea*  
Ferruginous hawk *Buteo regalis*  
Black tern *Chlidonias niger*  
Olive-sided flycatcher *Contopus cooperi*  
Willow flycatcher *Empidonax traillii adastus*

**FEDERALLY LISTED, PROPOSED, CANDIDATE SPECIES  
AND SPECIES OF CONCERN  
UNDER THE JURISDICTION OF THE FISH AND WILDLIFE SERVICE  
WHICH MAY OCCUR WITHIN DESCHUTES COUNTY, OREGON**

Yellow-breasted chat  
Lewis' woodpecker  
Mountain quail  
White-headed woodpecker

*Icteria virens*  
*Melanerpes lewis*  
*Oreortyx pictus*  
*Plcoides albolarvatus*

**Reptiles and Amphibians**

Coastal tailed frog  
Oregon slender salamander  
Cascades frog  
Northern sagebrush lizard

*Ascaphus truei*  
*Batrachoseps wrighti*  
*Rana cascadae*  
*Sceloporus graciosus graciosus*

**Invertebrates**

**Clams:**

California floater mussel

*Anodonta californiensis*

**Plants**

Estes' artemisia  
Cliff paintbrush  
Cusick's buckwheat  
Peck's penstemon  
Howell's thelypody

*Artemisia ludoviciana ssp. estesii*  
*Castilleja rupicola*  
*Eriogonum cusickii*  
*Penstemon peckii*  
*Thelypodium howellii ssp. howellii*

**DELISTED SPECIES**

**Birds**

American Peregrine falcon  
Bald eagle

*Falco peregrinus anatum*  
*Haliaeetus leucocephalus*

**Definitions:**

Listed Species: An endangered species is one that is in danger of extinction throughout all or a significant portion of its range. A threatened species is one that is likely to become endangered in the foreseeable future.

Proposed Species: Taxa for which the Fish and Wildlife Service or National Marine Fisheries Service has published a proposal to list as endangered or threatened in the Federal Register.

Candidate Species: Taxa for which the Fish and Wildlife Service has sufficient biological information to support a proposal to list as endangered or threatened.

Species of Concern: Taxa whose conservation status is of concern to the U.S. Fish and Wildlife Service (many previously known as Category 2 candidates), but for which further information is still needed. Such species receive no legal protection and use of the term does not necessarily imply that a species will eventually be proposed for listing.

Delisted Species: A species that has been removed from the Federal list of endangered and threatened wildlife and plants.

**Key:**

**FEDERALLY LISTED, PROPOSED, CANDIDATE SPECIES  
AND SPECIES OF CONCERN  
UNDER THE JURISDICTION OF THE FISH AND WILDLIFE SERVICE  
WHICH MAY OCCUR WITHIN DESCHUTES COUNTY, OREGON**

E	Endangered
T	Threatened
CH	Critical Habitat has been designated for this species
PE	Proposed Endangered
PT	Proposed Threatened
PCH	Critical Habitat has been proposed for this species

**Notes:**

**Marine & Anadromous Species:** Please consult the National Marine Fisheries Service (NMFS) (<http://www.nmfs.noaa.gov/pr/species/>) for marine and anadromous species. The National Marine Fisheries Service (NMFS) manages mostly marine and anadromous species, while the U.S. Fish and Wildlife Service manages the remainder of the listed species, mostly terrestrial and freshwater species.

**Marine Turtle Conservation and Management:** All six species of sea turtles occurring in the U.S. are protected under the Endangered Species Act of 1973. In 1977, NOAA Fisheries and the U.S. Fish and Wildlife Service signed a Memorandum of Understanding to jointly administer the Endangered Species Act with respect to marine turtles. NOAA Fisheries has the lead responsibility for the conservation and recovery of sea turtles in the marine environment and the U.S. Fish and Wildlife Service has the lead for the conservation and recovery of sea turtles on nesting beaches. For more information, see the NOAA Fisheries webpage on sea turtles <http://www.nmfs.noaa.gov/pr/species/turtles/>.

**Gray Wolf:** On February 27, 2008, the Service published a final rule that established a distinct population segment of the gray wolf (*Canis lupis*) in the northern Rocky Mountains (which includes a portion of Eastern Oregon, east of the centerline of Highway 395 and Highway 78 north of Burns Junction and that portion of Oregon east of the centerline of Highway 95 south of Burns Junction). Any wolves found west of this line in Oregon belong to the conterminous USA population [see 73 FR 10514]. Gray wolves in Oregon are State-listed as endangered, regardless of location.

**FEDERALLY LISTED, PROPOSED, CANDIDATE SPECIES  
AND SPECIES OF CONCERN  
UNDER THE JURISDICTION OF THE FISH AND WILDLIFE SERVICE  
WHICH MAY OCCUR WITHIN HOOD RIVER COUNTY, OREGON**

**LISTED SPECIES**

**Birds**

Northern spotted owl	<i>Strix occidentalis caurina</i>	CH T
----------------------	-----------------------------------	------

**Fish**

***Inland:***

Bull trout	<i>Salvelinus confluentus</i>	CH T
------------	-------------------------------	------

**PROPOSED SPECIES**

**None**

No Proposed Endangered Species		PE
No Proposed Threatened Species		PT

**SPECIES OF CONCERN**

**Mammals**

Red tree vole	<i>Arborimus longicaudus</i>
Silver-haired bat	<i>Lasionycteris noctivagans</i>
Small-footed myotis bat	<i>Myotis ciliolabrum</i>
Long-eared myotis bat	<i>Myotis evotis</i>
Yuma myotis bat	<i>Myotis yumanensis</i>

**Birds**

Northern goshawk	<i>Accipiter gentilis</i>
Olive-sided flycatcher	<i>Contopus cooperi</i>
Willow flycatcher	<i>Empidonax traillii adastus</i>
Harlequin duck	<i>Histrionicus histrionicus</i>
Yellow-breasted chat	<i>Icteria virens</i>
Lewis' woodpecker	<i>Melanerpes lewis</i>
Mountain quail	<i>Oreortyx pictus</i>
Band-tailed pigeon	<i>Patagioenas fasciata</i>
White-headed woodpecker	<i>Plcoides albolarvatus</i>
Purple martin	<i>Progne subis</i>

**Reptiles and Amphibians**

Northern Pacific pond turtle	<i>Actinemys marmorata marmorata</i>
Coastal tailed frog	<i>Ascaphus truei</i>
Oregon slender salamander	<i>Batrachoseps wrighti</i>
Larch Mountain salamander	<i>Plethodon larselli</i>
Northern red-legged frog	<i>Rana aurora aurora</i>
Cascades frog	<i>Rana cascadae</i>

**Fish**

Pacific lamprey	<i>Lampetra tridentata</i>
Coastal cutthroat trout	<i>Oncorhynchus clarki ssp</i>

**FEDERALLY LISTED, PROPOSED, CANDIDATE SPECIES  
AND SPECIES OF CONCERN  
UNDER THE JURISDICTION OF THE FISH AND WILDLIFE SERVICE  
WHICH MAY OCCUR WITHIN HOOD RIVER COUNTY, OREGON**

**Invertebrates**

***Insects:***

Mt. Hood primitive brachycentrid caddisfly	<i>Eobrachycentrus gelidae</i>
Mt. Hood farulan caddisfly	<i>Farula jewetti</i>
Goeden's lepidostoman caddisfly	<i>Lepidostoma goedeni</i>
One-spot rhyacophilan caddisfly	<i>Rhyacophila unipunctata</i>

**Plants**

Howell's bentgrass	<i>Agrostis howellii</i>
Mountain grape fern	<i>Botrychium montanum</i>
Cliff paintbrush	<i>Castilleja rupicola</i>
Howell's daisy	<i>Erigeron howellii</i>
Oregon fleabane	<i>Erigeron oregonus</i>
Suksdorf's desert parsley	<i>Lomatium suksdorfii</i>
White meconella	<i>Meconella oregana</i>
Barrett's penstemon	<i>Penstemon barrettiae</i>
Oregon sullivania	<i>Sullivantia oregana</i>

**DELISTED SPECIES**

**Birds**

American Peregrine falcon	<i>Falco peregrinus anatum</i>
Bald eagle	<i>Haliaeetus leucocephalus</i>

**Definitions:**

Listed Species: An endangered species is one that is in danger of extinction throughout all or a significant portion of its range. A threatened species is one that is likely to become endangered in the foreseeable future.

Proposed Species: Taxa for which the Fish and Wildlife Service or National Marine Fisheries Service has published a proposal to list as endangered or threatened in the Federal Register.

Candidate Species: Taxa for which the Fish and Wildlife Service has sufficient biological information to support a proposal to list as endangered or threatened.

Species of Concern: Taxa whose conservation status is of concern to the U.S. Fish and Wildlife Service (many previously known as Category 2 candidates), but for which further information is still needed. Such species receive no legal protection and use of the term does not necessarily imply that a species will eventually be proposed for listing.

Delisted Species: A species that has been removed from the Federal list of endangered and threatened wildlife and plants.

**Key:**

E	Endangered
T	Threatened
CH	Critical Habitat has been designated for this species

**FEDERALLY LISTED, PROPOSED, CANDIDATE SPECIES  
AND SPECIES OF CONCERN  
UNDER THE JURISDICTION OF THE FISH AND WILDLIFE SERVICE  
WHICH MAY OCCUR WITHIN HOOD RIVER COUNTY, OREGON**

PE Proposed Endangered  
PT Proposed Threatened  
PCH Critical Habitat has been proposed for this species

**Notes:**

**Marine & Anadromous Species:** Please consult the National Marine Fisheries Service (NMFS) (<http://www.nmfs.noaa.gov/pr/species/>) for marine and anadromous species. The National Marine Fisheries Service (NMFS) manages mostly marine and anadromous species, while the U.S. Fish and Wildlife Service manages the remainder of the listed species, mostly terrestrial and freshwater species.

**Marine Turtle Conservation and Management:** All six species of sea turtles occurring in the U.S. are protected under the Endangered Species Act of 1973. In 1977, NOAA Fisheries and the U.S. Fish and Wildlife Service signed a Memorandum of Understanding to jointly administer the Endangered Species Act with respect to marine turtles. NOAA Fisheries has the lead responsibility for the conservation and recovery of sea turtles in the marine environment and the U.S. Fish and Wildlife Service has the lead for the conservation and recovery of sea turtles on nesting beaches. For more information, see the NOAA Fisheries webpage on sea turtles <http://www.nmfs.noaa.gov/pr/species/turtles/>.

**Gray Wolf:** On February 27, 2008, the Service published a final rule that established a distinct population segment of the gray wolf (*Canis lupis*) in the northern Rocky Mountains (which includes a portion of Eastern Oregon, east of the centerline of Highway 395 and Highway 78 north of Burns Junction and that portion of Oregon east of the centerline of Highway 95 south of Burns Junction). Any wolves found west of this line in Oregon belong to the conterminous USA population [see 73 FR 10514]. Gray wolves in Oregon are State-listed as endangered, regardless of location.

**FEDERALLY LISTED, PROPOSED, CANDIDATE SPECIES  
AND SPECIES OF CONCERN  
UNDER THE JURISDICTION OF THE FISH AND WILDLIFE SERVICE  
WHICH MAY OCCUR WITHIN JEFFERSON COUNTY, OREGON**

**LISTED SPECIES**

**Birds**

Northern spotted owl	<i>Strix occidentalis caurina</i>	CH T
----------------------	-----------------------------------	------

**Fish**

***Inland:***

Bull trout	<i>Salvelinus confluentus</i>	CH T
------------	-------------------------------	------

**PROPOSED SPECIES**

**None**

No Proposed Endangered Species	PE
No Proposed Threatened Species	PT

**CANDIDATE SPECIES**

**Reptiles and Amphibians**

***Inland:***

Oregon spotted frog	<i>Rana pretiosa</i>
---------------------	----------------------

**SPECIES OF CONCERN**

**Mammals**

Pallid bat	<i>Antrozous pallidus pacificus</i>
Townsend's western big-eared bat	<i>Corynorhinus townsendii townsendii</i>
Spotted bat	<i>Euderma maculatum</i>
Silver-haired bat	<i>Lasionycteris noctivagans</i>
Small-footed myotis bat	<i>Myotis ciliolabrum</i>
Long-eared myotis bat	<i>Myotis evotis</i>
Long-legged myotis bat	<i>Myotis volans</i>
Yuma myotis bat	<i>Myotis yumanensis</i>

**Birds**

Northern goshawk	<i>Accipiter gentilis</i>
Western burrowing owl	<i>Athene cunicularia hypugaea</i>
Olive-sided flycatcher	<i>Contopus cooperi</i>
Willow flycatcher	<i>Empidonax traillii adastus</i>
Yellow-breasted chat	<i>Icteria virens</i>
Lewis' woodpecker	<i>Melanerpes lewis</i>
Mountain quail	<i>Oreortyx pictus</i>
White-headed woodpecker	<i>Plcoides albolarvatus</i>

**Reptiles and Amphibians**

Coastal tailed frog	<i>Ascaphus truei</i>
Oregon slender salamander	<i>Batrachoseps wrighti</i>

**FEDERALLY LISTED, PROPOSED, CANDIDATE SPECIES  
AND SPECIES OF CONCERN  
UNDER THE JURISDICTION OF THE FISH AND WILDLIFE SERVICE  
WHICH MAY OCCUR WITHIN JEFFERSON COUNTY, OREGON**

Cascades frog  
Northern sagebrush lizard

*Rana cascadae*  
*Sceloporus graciosus graciosus*

**Fish**

Pacific lamprey

*Lampetra tridentata*

**Invertebrates**

***Insects:***

Cascades aptanian caddisfly

*Apatania tavalala*

**Plants**

Estes' artemisia  
Sessile mousetail  
Peck's penstemon  
Woven-spored Lichen

*Artemisia ludoviciana ssp. estesii*  
*Myosurus sessilis*  
*Penstemon peckii*  
*Texosporium sancti-jacobi*

**DELISTED SPECIES**

**Birds**

American Peregrine falcon  
Bald eagle

*Falco peregrinus anatum*  
*Haliaeetus leucocephalus*

**Definitions:**

Listed Species: An endangered species is one that is in danger of extinction throughout all or a significant portion of its range. A threatened species is one that is likely to become endangered in the foreseeable future.

Proposed Species: Taxa for which the Fish and Wildlife Service or National Marine Fisheries Service has published a proposal to list as endangered or threatened in the Federal Register.

Candidate Species: Taxa for which the Fish and Wildlife Service has sufficient biological information to support a proposal to list as endangered or threatened.

Species of Concern: Taxa whose conservation status is of concern to the U.S. Fish and Wildlife Service (many previously known as Category 2 candidates), but for which further information is still needed. Such species receive no legal protection and use of the term does not necessarily imply that a species will eventually be proposed for listing.

Delisted Species: A species that has been removed from the Federal list of endangered and threatened wildlife and plants.

**Key:**

E Endangered  
T Threatened  
CH Critical Habitat has been designated for this species  
PE Proposed Endangered  
PT Proposed Threatened  
PCH Critical Habitat has been proposed for this species

**FEDERALLY LISTED, PROPOSED, CANDIDATE SPECIES  
AND SPECIES OF CONCERN  
UNDER THE JURISDICTION OF THE FISH AND WILDLIFE SERVICE  
WHICH MAY OCCUR WITHIN JEFFERSON COUNTY, OREGON**

**Notes:**

**Marine & Anadromous Species:** Please consult the National Marine Fisheries Service (NMFS) (<http://www.nmfs.noaa.gov/pr/species/>) for marine and anadromous species. The National Marine Fisheries Service (NMFS) manages mostly marine and anadromous species, while the U.S. Fish and Wildlife Service manages the remainder of the listed species, mostly terrestrial and freshwater species.

**Marine Turtle Conservation and Management:** All six species of sea turtles occurring in the U.S. are protected under the Endangered Species Act of 1973. In 1977, NOAA Fisheries and the U.S. Fish and Wildlife Service signed a Memorandum of Understanding to jointly administer the Endangered Species Act with respect to marine turtles. NOAA Fisheries has the lead responsibility for the conservation and recovery of sea turtles in the marine environment and the U.S. Fish and Wildlife Service has the lead for the conservation and recovery of sea turtles on nesting beaches. For more information, see the NOAA Fisheries webpage on sea turtles <http://www.nmfs.noaa.gov/pr/species/turtles/>.

**Gray Wolf:** On February 27, 2008, the Service published a final rule that established a distinct population segment of the gray wolf (*Canis lupis*) in the northern Rocky Mountains (which includes a portion of Eastern Oregon, east of the centerline of Highway 395 and Highway 78 north of Burns Junction and that portion of Oregon east of the centerline of Highway 95 south of Burns Junction). Any wolves found west of this line in Oregon belong to the conterminous USA population [see 73 FR 10514]. Gray wolves in Oregon are State-listed as endangered, regardless of location.

**FEDERALLY LISTED, PROPOSED, CANDIDATE SPECIES  
AND SPECIES OF CONCERN  
UNDER THE JURISDICTION OF THE FISH AND WILDLIFE SERVICE  
WHICH MAY OCCUR WITHIN LANE COUNTY, OREGON**

**LISTED SPECIES**

**Birds**

Marbled murrelet	<i>Brachyramphus marmoratus</i>	CH T
Western snowy (coastal) plover	<i>Charadrius alexandrinus nivosus</i>	CH T
Short-tailed albatross	<i>Phoebastria albatrus</i>	E
Northern spotted owl	<i>Strix occidentalis caurina</i>	CH T

**Reptiles and Amphibians**

**Marine:**

Loggerhead sea turtle	<i>Caretta caretta</i>	E
Green sea turtle	<i>Chelonia mydas</i>	T
Leatherback sea turtle	<i>Dermochelys coriacea</i>	E
Olive (=Pacific) ridley sea turtle	<i>Lepidochelys olivacea</i>	T

**Fish**

**Inland:**

Oregon chub	<i>Oregonichthys crameri</i>	CH T
Bull trout	<i>Salvelinus confluentus</i>	CH T

**Invertebrates**

**Insects:**

Fender's blue butterfly	<i>Icaricia icarioides fenderi</i>	CH E
Oregon silverspot butterfly	<i>Speyeria zerene hippolyta</i>	CH T

**Plants**

Willamette daisy	<i>Erigeron decumbens var. decumbens</i>	CH E
Bradshaw's desert parsley	<i>Lomatium bradshawii</i>	E
Kincaid's lupine	<i>Lupinus sulphureus ssp. kincaidii</i>	CH T

**PROPOSED SPECIES**

**None**

No Proposed Endangered Species	PE
No Proposed Threatened Species	PT

**CANDIDATE SPECIES**

**Mammals**

North American wolverine	<i>Gulo gulo luscus</i>
--------------------------	-------------------------

**Birds**

Streaked horned lark	<i>Eremophila alpestris strigata</i>
----------------------	--------------------------------------

**Reptiles and Amphibians**

**Inland:**

**FEDERALLY LISTED, PROPOSED, CANDIDATE SPECIES  
AND SPECIES OF CONCERN  
UNDER THE JURISDICTION OF THE FISH AND WILDLIFE SERVICE  
WHICH MAY OCCUR WITHIN LANE COUNTY, OREGON**

Oregon spotted frog

*Rana pretiosa*

**SPECIES OF CONCERN**

**Mammals**

Pallid bat  
White-footed vole  
Red tree vole  
Townsend's western big-eared bat  
Silver-haired bat  
Long-eared myotis bat  
Fringed myotis bat  
Long-legged myotis bat  
Yuma myotis bat  
Camas pocket gopher

*Antrozous pallidus pacificus*  
*Arborimus albipes*  
*Arborimus longicaudus*  
*Corynorhinus townsendii townsendii*  
*Lasionycteris noctivagans*  
*Myotis evotis*  
*Myotis thysanodes*  
*Myotis volans*  
*Myotis yumanensis*  
*Thomomys bulbivorus*

**Birds**

Northern goshawk  
Western burrowing owl  
Black tern  
Olive-sided flycatcher  
Black oystercatcher  
Harlequin duck  
Yellow-breasted chat  
Acorn woodpecker  
Lewis' woodpecker  
Mountain quail  
Band-tailed pigeon  
Oregon vesper sparrow  
Purple martin

*Accipiter gentilis*  
*Athene cunicularia hypugaea*  
*Chlidonias niger*  
*Contopus cooperi*  
*Haematopus bachmani*  
*Histrionicus histrionicus*  
*Icteria virens*  
*Melanerpes formicivorus*  
*Melanerpes lewis*  
*Oreortyx pictus*  
*Patagioenas fasciata*  
*Poocetes gramineus affinis*  
*Progne subis*

**Reptiles and Amphibians**

Northern Pacific pond turtle  
Coastal tailed frog  
Oregon slender salamander  
Northern red-legged frog  
Foothill yellow-legged frog  
Cascades frog  
Southern torrent (seep) salamander

*Actinemys marmorata marmorata*  
*Ascaphus truei*  
*Batrachoseps wrighti*  
*Rana aurora aurora*  
*Rana boylei*  
*Rana cascadae*  
*Rhyacotriton variegatus*

**Fish**

Malheur mottled sculpin  
Pacific lamprey  
Coastal cutthroat trout

*Cottus bairdi ssp.*  
*Lampetra tridentata*  
*Oncorhynchus clarki ssp.*

**Invertebrates**

***Insects:***

Tombstone Prairie farulan caddisfly  
Tombstone Prairie oligophlebodes caddisfly  
Insular blue butterfly  
One-spot rhyacophilan caddisfly

*Farula reaperi*  
*Oligophlebodes mostbento*  
*Plebejus saepiolus insulanus*  
*Rhyacophila unipunctata*

**FEDERALLY LISTED, PROPOSED, CANDIDATE SPECIES  
AND SPECIES OF CONCERN  
UNDER THE JURISDICTION OF THE FISH AND WILDLIFE SERVICE  
WHICH MAY OCCUR WITHIN LANE COUNTY, OREGON**

**Plants**

Pink sand-verbena  
Crenulate grape fern  
Cliff paintbrush  
Cold-water corydalis  
Willamette Valley larkspur  
Peacock larkspur  
Wayside aster  
Shaggy horkelia  
Thin leaved peavine  
Frye's Limbella  
Whitetop aster  
Henderson's checker-mallow  
Hitchcock's blue-eyed grass

*Abronia umbellata ssp. breviflora*  
*Botrychium crenulatum*  
*Castilleja rupicola*  
*Corydalis aquae-gelidae*  
*Delphinium oregonum*  
*Delphinium pavonaceum*  
*Eucephalus vialis*  
*Horkelia congesta ssp. congesta*  
*Lathyrus holochlorus*  
*Limbella fryei*  
*Sericocarpus rigidus*  
*Sidalcea hendersonii*  
*Sisyrinchium hitchcockii*

**DELISTED SPECIES**

**Birds**

American Peregrine falcon  
Bald eagle  
Brown pelican

*Falco peregrinus anatum*  
*Haliaeetus leucocephalus*  
*Pelecanus occidentalis*

**Definitions:**

Listed Species: An endangered species is one that is in danger of extinction throughout all or a significant portion of its range. A threatened species is one that is likely to become endangered in the foreseeable future.

Proposed Species: Taxa for which the Fish and Wildlife Service or National Marine Fisheries Service has published a proposal to list as endangered or threatened in the Federal Register.

Candidate Species: Taxa for which the Fish and Wildlife Service has sufficient biological information to support a proposal to list as endangered or threatened.

Species of Concern: Taxa whose conservation status is of concern to the U.S. Fish and Wildlife Service (many previously known as Category 2 candidates), but for which further information is still needed. Such species receive no legal protection and use of the term does not necessarily imply that a species will eventually be proposed for listing.

Delisted Species: A species that has been removed from the Federal list of endangered and threatened wildlife and plants.

**Key:**

E      Endangered  
T      Threatened  
CH     Critical Habitat has been designated for this species  
PE     Proposed Endangered  
PT     Proposed Threatened

**FEDERALLY LISTED, PROPOSED, CANDIDATE SPECIES  
AND SPECIES OF CONCERN  
UNDER THE JURISDICTION OF THE FISH AND WILDLIFE SERVICE  
WHICH MAY OCCUR WITHIN LANE COUNTY, OREGON**

PCH Critical Habitat has been proposed for this species

**Notes:**

**Marine & Anadromous Species:** Please consult the National Marine Fisheries Service (NMFS) (<http://www.nmfs.noaa.gov/pr/species/>) for marine and anadromous species. The National Marine Fisheries Service (NMFS) manages mostly marine and anadromous species, while the U.S. Fish and Wildlife Service manages the remainder of the listed species, mostly terrestrial and freshwater species.

**Marine Turtle Conservation and Management:** All six species of sea turtles occurring in the U.S. are protected under the Endangered Species Act of 1973. In 1977, NOAA Fisheries and the U.S. Fish and Wildlife Service signed a Memorandum of Understanding to jointly administer the Endangered Species Act with respect to marine turtles. NOAA Fisheries has the lead responsibility for the conservation and recovery of sea turtles in the marine environment and the U.S. Fish and Wildlife Service has the lead for the conservation and recovery of sea turtles on nesting beaches. For more information, see the NOAA Fisheries webpage on sea turtles <http://www.nmfs.noaa.gov/pr/species/turtles/>.

**Gray Wolf:** On February 27, 2008, the Service published a final rule that established a distinct population segment of the gray wolf (*Canis lupis*) in the northern Rocky Mountains (which includes a portion of Eastern Oregon, east of the centerline of Highway 395 and Highway 78 north of Burns Junction and that portion of Oregon east of the centerline of Highway 95 south of Burns Junction). Any wolves found west of this line in Oregon belong to the conterminous USA population [see 73 FR 10514]. Gray wolves in Oregon are State-listed as endangered, regardless of location.

**FEDERALLY LISTED, PROPOSED, CANDIDATE SPECIES  
AND SPECIES OF CONCERN  
UNDER THE JURISDICTION OF THE FISH AND WILDLIFE SERVICE  
WHICH MAY OCCUR WITHIN LINCOLN COUNTY, OREGON**

**LISTED SPECIES**

**Birds**

Marbled murrelet	<i>Brachyramphus marmoratus</i>	CH T
Western snowy (coastal) plover	<i>Charadrius alexandrinus nivosus</i>	CH T
Short-tailed albatross	<i>Phoebastria albatrus</i>	E
Northern spotted owl	<i>Strix occidentalis caurina</i>	CH T

**Reptiles and Amphibians**

**Marine:**

Loggerhead sea turtle	<i>Caretta caretta</i>	E
Green sea turtle	<i>Chelonia mydas</i>	T
Leatherback sea turtle	<i>Dermochelys coriacea</i>	E
Olive (=Pacific) ridley sea turtle	<i>Lepidochelys olivacea</i>	T

**Invertebrates**

**Insects:**

Oregon silverspot butterfly	<i>Speyeria zerene hippolyta</i>	CH T
-----------------------------	----------------------------------	------

**PROPOSED SPECIES**

**None**

No Proposed Endangered Species	PE
No Proposed Threatened Species	PT

**SPECIES OF CONCERN**

**Mammals**

White-footed vole	<i>Arborimus albipes</i>
Red tree vole	<i>Arborimus longicaudus</i>
Silver-haired bat	<i>Lasionycteris noctivagans</i>
Long-eared myotis bat	<i>Myotis evotis</i>
Fringed myotis bat	<i>Myotis thysanodes</i>
Long-legged myotis bat	<i>Myotis volans</i>
Yuma myotis bat	<i>Myotis yumanensis</i>

**Birds**

Northern goshawk	<i>Accipiter gentilis</i>
Olive-sided flycatcher	<i>Contopus cooperi</i>
Black oystercatcher	<i>Haematopus bachmani</i>
Harlequin duck	<i>Histrionicus histrionicus</i>
Lewis' woodpecker	<i>Melanerpes lewis</i>
Mountain quail	<i>Oreortyx pictus</i>
Band-tailed pigeon	<i>Patagioenas fasciata</i>
Purple martin	<i>Progne subis</i>

**Reptiles and Amphibians**

**FEDERALLY LISTED, PROPOSED, CANDIDATE SPECIES  
AND SPECIES OF CONCERN  
UNDER THE JURISDICTION OF THE FISH AND WILDLIFE SERVICE  
WHICH MAY OCCUR WITHIN LINCOLN COUNTY, OREGON**

Coastal tailed frog  
Northern red-legged frog  
Southern torrent (seep) salamander

*Ascaphus truei*  
*Rana aurora aurora*  
*Rhyacotriton variegatus*

**Fish**

River lamprey  
Pacific lamprey  
Coastal cutthroat trout

*Lampetra ayresi*  
*Lampetra tridentata*  
*Oncorhynchus clarki ssp*

**Invertebrates**

**Snails:**

Newcomb's littorine snail

*Algamorda newcombiana*

**Insects:**

Goeden's lepidostoman caddisfly  
Roth's blind ground beetle

*Lepidostoma goedeni*  
*Pterostichus rothi*

**Plants**

Bog anemone  
Pt. Reyes bird's-beak  
Coast Range fawn lily  
Queen-of-the-forest  
Seaside gilia  
Frye's Limbella  
San Francisco bluegrass  
Bristly-stemmed sidalcea

*Anemone oregana var. felix*  
*Cordylanthus maritimus ssp. palustris*  
*Erythronium elegans*  
*Filipendula occidentalis*  
*Gilia millefoliata*  
*Limbella fryei*  
*Poa unilateralis*  
*Sidalcea hirtipes*

**DELISTED SPECIES**

**Birds**

American Peregrine falcon  
Bald eagle  
Brown pelican

*Falco peregrinus anatum*  
*Haliaeetus leucocephalus*  
*Pelecanus occidentalis*

**Definitions:**

Listed Species: An endangered species is one that is in danger of extinction throughout all or a significant portion of its range. A threatened species is one that is likely to become endangered in the foreseeable future.

Proposed Species: Taxa for which the Fish and Wildlife Service or National Marine Fisheries Service has published a proposal to list as endangered or threatened in the Federal Register.

Candidate Species: Taxa for which the Fish and Wildlife Service has sufficient biological information to support a proposal to list as endangered or threatened.

Species of Concern: Taxa whose conservation status is of concern to the U.S. Fish and Wildlife Service (many previously known as Category 2 candidates), but for which further information is still needed. Such species receive no legal protection and use of the term does not necessarily imply that a species will eventually be proposed for listing.

**FEDERALLY LISTED, PROPOSED, CANDIDATE SPECIES  
AND SPECIES OF CONCERN  
UNDER THE JURISDICTION OF THE FISH AND WILDLIFE SERVICE  
WHICH MAY OCCUR WITHIN LINCOLN COUNTY, OREGON**

Delisted Species: A species that has been removed from the Federal list of endangered and threatened wildlife and plants.

**Key:**

E      Endangered  
T      Threatened  
CH     Critical Habitat has been designated for this species  
PE     Proposed Endangered  
PT     Proposed Threatened  
PCH    Critical Habitat has been proposed for this species

**Notes:**

**Marine & Anadromous Species:** Please consult the National Marine Fisheries Service (NMFS) (<http://www.nmfs.noaa.gov/pr/species/>) for marine and anadromous species. The National Marine Fisheries Service (NMFS) manages mostly marine and anadromous species, while the U.S. Fish and Wildlife Service manages the remainder of the listed species, mostly terrestrial and freshwater species.

**Marine Turtle Conservation and Management:** All six species of sea turtles occurring in the U.S. are protected under the Endangered Species Act of 1973. In 1977, NOAA Fisheries and the U.S. Fish and Wildlife Service signed a Memorandum of Understanding to jointly administer the Endangered Species Act with respect to marine turtles. NOAA Fisheries has the lead responsibility for the conservation and recovery of sea turtles in the marine environment and the U.S. Fish and Wildlife Service has the lead for the conservation and recovery of sea turtles on nesting beaches. For more information, see the NOAA Fisheries webpage on sea turtles <http://www.nmfs.noaa.gov/pr/species/turtles/>.

**Gray Wolf:** On February 27, 2008, the Service published a final rule that established a distinct population segment of the gray wolf (*Canis lupis*) in the northern Rocky Mountains (which includes a portion of Eastern Oregon, east of the centerline of Highway 395 and Highway 78 north of Burns Junction and that portion of Oregon east of the centerline of Highway 95 south of Burns Junction). Any wolves found west of this line in Oregon belong to the conterminous USA population [see 73 FR 10514]. Gray wolves in Oregon are State-listed as endangered, regardless of location.

**FEDERALLY LISTED, PROPOSED, CANDIDATE SPECIES  
AND SPECIES OF CONCERN  
UNDER THE JURISDICTION OF THE FISH AND WILDLIFE SERVICE  
WHICH MAY OCCUR WITHIN LINN COUNTY, OREGON**

**LISTED SPECIES**

**Birds**

Northern spotted owl *Strix occidentalis caurina* CH T

**Fish**

***Inland:***

Oregon chub *Oregonichthys crameri* CH T

Bull trout *Salvelinus confluentus* CH T

**Invertebrates**

***Insects:***

Fender's blue butterfly *Icaricia icarioides fenderi* CH E

**Plants**

Golden paintbrush *Castilleja levisecta* T

Willamette daisy *Erigeron decumbens var. decumbens* CH E

Bradshaw's desert parsley *Lomatium bradshawii* E

Kincaid's lupine *Lupinus sulphureus ssp. kincaidii* CH T

Nelson's checker-mallow *Sidalcea nelsoniana* T

**PROPOSED SPECIES**

**None**

No Proposed Endangered Species PE

No Proposed Threatened Species PT

**CANDIDATE SPECIES**

**Birds**

Streaked horned lark *Eremophila alpestris strigata*

**SPECIES OF CONCERN**

**Mammals**

White-footed vole *Arborimus albipes*

Red tree vole *Arborimus longicaudus*

Silver-haired bat *Lasionycteris noctivagans*

Long-eared myotis bat *Myotis evotis*

Long-legged myotis bat *Myotis volans*

Yuma myotis bat *Myotis yumanensis*

Camas pocket gopher *Thomomys bulbivorus*

**Birds**

Northern goshawk *Accipiter gentilis*

**FEDERALLY LISTED, PROPOSED, CANDIDATE SPECIES  
AND SPECIES OF CONCERN  
UNDER THE JURISDICTION OF THE FISH AND WILDLIFE SERVICE  
WHICH MAY OCCUR WITHIN LINN COUNTY, OREGON**

Western burrowing owl  
Black tern  
Olive-sided flycatcher  
Harlequin duck  
Yellow-breasted chat  
Acorn woodpecker  
Lewis' woodpecker  
Mountain quail  
Band-tailed pigeon  
Oregon vesper sparrow  
Purple martin

*Athene cunicularia hypugaea*  
*Chlidonias niger*  
*Contopus cooperi*  
*Histrionicus histrionicus*  
*Icteria virens*  
*Melanerpes formicivorus*  
*Melanerpes lewis*  
*Oreortyx pictus*  
*Patagioenas fasciata*  
*Poocetes gramineus affinis*  
*Progne subis*

**Reptiles and Amphibians**

Northern Pacific pond turtle  
Coastal tailed frog  
Oregon slender salamander  
Northern red-legged frog  
Foothill yellow-legged frog  
Cascades frog

*Actinemys marmorata marmorata*  
*Ascaphus truei*  
*Batrachoseps wrighti*  
*Rana aurora aurora*  
*Rana boylei*  
*Rana cascadae*

**Fish**

Malheur mottled sculpin  
Pacific lamprey  
Coastal cutthroat trout

*Cottus bairdi* ssp.  
*Lampetra tridentata*  
*Oncorhynchus clarki* ssp

**Invertebrates**

***Insects:***

Cascades apatanian caddisfly  
Mt. Hood primitive brachycentrid caddisfly  
Tombstone Prairie farulan caddisfly  
Tombstone Prairie oligophlebodes caddisfly

*Apatania tavala*  
*Eobrachycentrus gelidae*  
*Farula reaperi*  
*Oligophlebodes mostbento*

***Clams:***

California floater mussel

*Anodonta californiensis*

**Plants**

Pink sand-verbena  
Howell's bentgrass  
Bog anemone  
Hell's Canyon rock-cress  
Mountain grape fern  
Cliff paintbrush  
Cold-water corydalis  
Willamette Valley larkspur  
Wayside aster  
Shaggy horkelia  
Thin leaved peavine  
Whitetop aster

*Abronia umbellata* ssp. *breviflora*  
*Agrostis howellii*  
*Anemone oregana* var. *felix*  
*Arabis hastatula*  
*Botrychium montanum*  
*Castilleja rupicola*  
*Corydalis aquae-gelidae*  
*Delphinium oreganum*  
*Eucephalus vialis*  
*Horkelia congesta* ssp. *congesta*  
*Lathyrus holochlorus*  
*Sericocarpus rigidus*

**DELISTED SPECIES**

**Birds**

**FEDERALLY LISTED, PROPOSED, CANDIDATE SPECIES  
AND SPECIES OF CONCERN  
UNDER THE JURISDICTION OF THE FISH AND WILDLIFE SERVICE  
WHICH MAY OCCUR WITHIN LINN COUNTY, OREGON**

American Peregrine falcon  
Bald eagle

*Falco peregrinus anatum*  
*Haliaeetus leucocephalus*

**Definitions:**

Listed Species: An endangered species is one that is in danger of extinction throughout all or a significant portion of its range. A threatened species is one that is likely to become endangered in the foreseeable future.

Proposed Species: Taxa for which the Fish and Wildlife Service or National Marine Fisheries Service has published a proposal to list as endangered or threatened in the Federal Register.

Candidate Species: Taxa for which the Fish and Wildlife Service has sufficient biological information to support a proposal to list as endangered or threatened.

Species of Concern: Taxa whose conservation status is of concern to the U.S. Fish and Wildlife Service (many previously known as Category 2 candidates), but for which further information is still needed. Such species receive no legal protection and use of the term does not necessarily imply that a species will eventually be proposed for listing.

Delisted Species: A species that has been removed from the Federal list of endangered and threatened wildlife and plants.

**Key:**

E Endangered  
T Threatened  
CH Critical Habitat has been designated for this species  
PE Proposed Endangered  
PT Proposed Threatened  
PCH Critical Habitat has been proposed for this species

**Notes:**

**Marine & Anadromous Species:** Please consult the National Marine Fisheries Service (NMFS) (<http://www.nmfs.noaa.gov/pr/species/>) for marine and anadromous species. The National Marine Fisheries Service (NMFS) manages mostly marine and anadromous species, while the U.S. Fish and Wildlife Service manages the remainder of the listed species, mostly terrestrial and freshwater species.

**Marine Turtle Conservation and Management:** All six species of sea turtles occurring in the U.S. are protected under the Endangered Species Act of 1973. In 1977, NOAA Fisheries and the U.S. Fish and Wildlife Service signed a Memorandum of Understanding to jointly administer the Endangered Species Act with respect to marine turtles. NOAA Fisheries has the lead responsibility for the conservation and recovery of sea turtles in the marine environment and the U.S. Fish and Wildlife Service has the lead for the conservation and recovery of sea turtles on nesting beaches. For more information, see the NOAA Fisheries webpage on sea turtles <http://www.nmfs.noaa.gov/pr/species/turtles/>.

**Gray Wolf:** On February 27, 2008, the Service published a final rule that established a distinct population segment of the gray wolf (*Canis lupis*) in the northern Rocky Mountains (which includes a portion of Eastern Oregon, east of the centerline of Highway 395 and Highway 78 north of Burns Junction and that portion of Oregon east of the centerline of Highway 95 south of Burns Junction). Any wolves found west of this line in

**FEDERALLY LISTED, PROPOSED, CANDIDATE SPECIES  
AND SPECIES OF CONCERN  
UNDER THE JURISDICTION OF THE FISH AND WILDLIFE SERVICE  
WHICH MAY OCCUR WITHIN LINN COUNTY, OREGON**

Oregon belong to the conterminous USA population [see 73 FR 10514]. Gray wolves in Oregon are State-listed as endangered, regardless of location.

**FEDERALLY LISTED, PROPOSED, CANDIDATE SPECIES  
AND SPECIES OF CONCERN  
UNDER THE JURISDICTION OF THE FISH AND WILDLIFE SERVICE  
WHICH MAY OCCUR WITHIN MARION COUNTY, OREGON**

**LISTED SPECIES**

**Birds**

Northern spotted owl *Strix occidentalis caurina* CH T

**Fish**

***Inland:***

Oregon chub *Oregonichthys crameri* CH T

**Plants**

Golden paintbrush	<i>Castilleja levisecta</i>	T
Willamette daisy	<i>Erigeron decumbens</i> var. <i>decumbens</i>	CH E
Water howellia	<i>Howellia aquatilis</i>	T
Bradshaw's desert parsley	<i>Lomatium bradshawii</i>	E
Kincaid's lupine	<i>Lupinus sulphureus</i> ssp. <i>kincaidii</i>	CH T
Nelson's checker-mallow	<i>Sidalcea nelsoniana</i>	T

**PROPOSED SPECIES**

**None**

No Proposed Endangered Species	PE
No Proposed Threatened Species	PT

**CANDIDATE SPECIES**

**Birds**

Streaked horned lark *Eremophila alpestris strigata*

**SPECIES OF CONCERN**

**Mammals**

Red tree vole	<i>Arborimus longicaudus</i>
Townsend's western big-eared bat	<i>Corynorhinus townsendii townsendii</i>
Silver-haired bat	<i>Lasionycteris noctivagans</i>
Long-eared myotis bat	<i>Myotis evotis</i>
Long-legged myotis bat	<i>Myotis volans</i>
Yuma myotis bat	<i>Myotis yumanensis</i>
Camas pocket gopher	<i>Thomomys bulbivorus</i>

**Birds**

Northern goshawk	<i>Accipiter gentilis</i>
Olive-sided flycatcher	<i>Contopus cooperi</i>
Harlequin duck	<i>Histrionicus histrionicus</i>
Yellow-breasted chat	<i>Icteria virens</i>
Acorn woodpecker	<i>Melanerpes formicivorus</i>
Lewis' woodpecker	<i>Melanerpes lewis</i>

**FEDERALLY LISTED, PROPOSED, CANDIDATE SPECIES  
AND SPECIES OF CONCERN  
UNDER THE JURISDICTION OF THE FISH AND WILDLIFE SERVICE  
WHICH MAY OCCUR WITHIN MARION COUNTY, OREGON**

Mountain quail  
Band-tailed pigeon  
Oregon vesper sparrow  
Purple martin

*Oreortyx pictus*  
*Patagioenas fasciata*  
*Pooecetes gramineus affinis*  
*Progne subis*

**Reptiles and Amphibians**

Northern Pacific pond turtle  
Coastal tailed frog  
Oregon slender salamander  
Northern red-legged frog  
Foothill yellow-legged frog  
Cascades frog

*Actinemys marmorata marmorata*  
*Ascaphus truei*  
*Batrachoseps wrighti*  
*Rana aurora aurora*  
*Rana boylei*  
*Rana cascadae*

**Fish**

Pacific lamprey  
Coastal cutthroat trout

*Lampetra tridentata*  
*Oncorhynchus clarki ssp*

**Plants**

Mountain grape fern  
Cold-water corydalis  
Pale larkspur  
Willamette Valley larkspur  
Peacock larkspur  
Shaggy horkelia  
Thin leaved peavine  
Whitetop aster  
Pale blue-eyed grass

*Botrychium montanum*  
*Corydalis aquae-gelidae*  
*Delphinium leucophaeum*  
*Delphinium oregonum*  
*Delphinium pavonaceum*  
*Horkelia congesta ssp. congesta*  
*Lathyrus holochlorus*  
*Sericocarpus rigidus*  
*Sisyrinchium sarmentosum*

**DELISTED SPECIES**

**Birds**

Aleutian Canada goose  
American Peregrine falcon  
Bald eagle

*Branta canadensis leucopareia*  
*Falco peregrinus anatum*  
*Haliaeetus leucocephalus*

**Definitions:**

Listed Species: An endangered species is one that is in danger of extinction throughout all or a significant portion of its range. A threatened species is one that is likely to become endangered in the foreseeable future.

Proposed Species: Taxa for which the Fish and Wildlife Service or National Marine Fisheries Service has published a proposal to list as endangered or threatened in the Federal Register.

Candidate Species: Taxa for which the Fish and Wildlife Service has sufficient biological information to support a proposal to list as endangered or threatened.

Species of Concern: Taxa whose conservation status is of concern to the U.S. Fish and Wildlife Service (many previously known as Category 2 candidates), but for which further information is still needed. Such species receive no legal protection and use of the term does not necessarily imply that a species will eventually be proposed for listing.

**FEDERALLY LISTED, PROPOSED, CANDIDATE SPECIES  
AND SPECIES OF CONCERN  
UNDER THE JURISDICTION OF THE FISH AND WILDLIFE SERVICE  
WHICH MAY OCCUR WITHIN MARION COUNTY, OREGON**

Delisted Species: A species that has been removed from the Federal list of endangered and threatened wildlife and plants.

**Key:**

E      Endangered  
T      Threatened  
CH     Critical Habitat has been designated for this species  
PE     Proposed Endangered  
PT     Proposed Threatened  
PCH    Critical Habitat has been proposed for this species

**Notes:**

**Marine & Anadromous Species:** Please consult the National Marine Fisheries Service (NMFS) (<http://www.nmfs.noaa.gov/pr/species/>) for marine and anadromous species. The National Marine Fisheries Service (NMFS) manages mostly marine and anadromous species, while the U.S. Fish and Wildlife Service manages the remainder of the listed species, mostly terrestrial and freshwater species.

**Marine Turtle Conservation and Management:** All six species of sea turtles occurring in the U.S. are protected under the Endangered Species Act of 1973. In 1977, NOAA Fisheries and the U.S. Fish and Wildlife Service signed a Memorandum of Understanding to jointly administer the Endangered Species Act with respect to marine turtles. NOAA Fisheries has the lead responsibility for the conservation and recovery of sea turtles in the marine environment and the U.S. Fish and Wildlife Service has the lead for the conservation and recovery of sea turtles on nesting beaches. For more information, see the NOAA Fisheries webpage on sea turtles <http://www.nmfs.noaa.gov/pr/species/turtles/>.

**Gray Wolf:** On February 27, 2008, the Service published a final rule that established a distinct population segment of the gray wolf (*Canis lupis*) in the northern Rocky Mountains (which includes a portion of Eastern Oregon, east of the centerline of Highway 395 and Highway 78 north of Burns Junction and that portion of Oregon east of the centerline of Highway 95 south of Burns Junction). Any wolves found west of this line in Oregon belong to the conterminous USA population [see 73 FR 10514]. Gray wolves in Oregon are State-listed as endangered, regardless of location.

**FEDERALLY LISTED, PROPOSED, CANDIDATE SPECIES  
AND SPECIES OF CONCERN  
UNDER THE JURISDICTION OF THE FISH AND WILDLIFE SERVICE  
WHICH MAY OCCUR WITHIN MULTNOMAH COUNTY, OREGON**

**LISTED SPECIES**

**Mammals**

***Terrestrial:***

Columbian white-tailed deer (Columbia River distinct population segment)	<i>Odocoileus virginianus leucurus</i>	E
---	--	---

**Birds**

Northern spotted owl	<i>Strix occidentalis caurina</i>	CH T
----------------------	-----------------------------------	------

**Fish**

***Inland:***

Bull trout	<i>Salvelinus confluentus</i>	CH T
------------	-------------------------------	------

**Plants**

Willamette daisy	<i>Erigeron decumbens var. decumbens</i>	CH E
Water howellia	<i>Howellia aquatilis</i>	T
Bradshaw's desert parsley	<i>Lomatium bradshawii</i>	E
Kincaid's lupine	<i>Lupinus sulphureus ssp. kincaidii</i>	CH T
Nelson's checker-mallow	<i>Sidalcea nelsoniana</i>	T

**PROPOSED SPECIES**

**None**

No Proposed Endangered Species	PE
No Proposed Threatened Species	PT

**CANDIDATE SPECIES**

**Mammals**

North American wolverine	<i>Gulo gulo luscus</i>
--------------------------	-------------------------

**Birds**

Streaked horned lark	<i>Eremophila alpestris strigata</i>
----------------------	--------------------------------------

**Plants**

Northern wormwood	<i>Artemisia campestris var. wormskioldii</i>
-------------------	---

**SPECIES OF CONCERN**

**Mammals**

Pallid bat	<i>Antrozous pallidus pacificus</i>
Red tree vole	<i>Arborimus longicaudus</i>
Townsend's western big-eared bat	<i>Corynorhinus townsendii townsendii</i>
Silver-haired bat	<i>Lasionycteris noctivagans</i>

**FEDERALLY LISTED, PROPOSED, CANDIDATE SPECIES  
AND SPECIES OF CONCERN  
UNDER THE JURISDICTION OF THE FISH AND WILDLIFE SERVICE  
WHICH MAY OCCUR WITHIN MULTNOMAH COUNTY, OREGON**

Long-eared myotis bat  
Long-legged myotis bat  
Yuma myotis bat  
Camas pocket gopher

*Myotis evotis*  
*Myotis volans*  
*Myotis yumanensis*  
*Thomomys bulbivorus*

**Birds**

Northern goshawk  
Tricolored blackbird  
Western burrowing owl  
Olive-sided flycatcher  
Harlequin duck  
Yellow-breasted chat  
Lewis' woodpecker  
Mountain quail  
Band-tailed pigeon  
Oregon vesper sparrow  
Purple martin

*Accipiter gentilis*  
*Agelaius tricolor*  
*Athene cunicularia hypugaea*  
*Contopus cooperi*  
*Histrionicus histrionicus*  
*Icteria virens*  
*Melanerpes lewis*  
*Oreortyx pictus*  
*Patagioenas fasciata*  
*Poocetes gramineus affinis*  
*Progne subis*

**Reptiles and Amphibians**

Northern Pacific pond turtle  
Coastal tailed frog  
Oregon slender salamander  
Larch Mountain salamander  
Northern red-legged frog  
Cascades frog

*Actinemys marmorata marmorata*  
*Ascaphus truei*  
*Batrachoseps wrighti*  
*Plethodon larselli*  
*Rana aurora aurora*  
*Rana cascadae*

**Fish**

Pacific lamprey  
Coastal cutthroat trout

*Lampetra tridentata*  
*Oncorhynchus clarki ssp*

**Invertebrates**

**Snails:**

Columbia pebblesnail

*Fluminicola fuscus (= columbianus)*

**Insects:**

Mt. Hood primitive brachycentrid caddisfly  
Mt. Hood farulan caddisfly  
Columbia Gorge neothremman caddisfly  
Wahkeena Falls flightless stonefly

*Eobrachycentrus gelidae*  
*Farula jewetti*  
*Neothremma andersoni*  
*Zapada wahkeena*

**Clams:**

California floater mussel

*Anodonta californiensis*

**Plants**

Howell's bentgrass  
Cliff paintbrush  
Cold-water corydalis  
Pale larkspur  
Howell's daisy  
Oregon fleabane  
Barrett's penstemon  
Whitewort aster  
Oregon sullivantia

*Agrostis howellii*  
*Castilleja rupicola*  
*Corydalis aquae-gelidae*  
*Delphinium leucophaeum*  
*Erigeron howellii*  
*Erigeron oregonus*  
*Penstemon barrettiae*  
*Sericocarpus rigidus*  
*Sullivantia oregana*

**FEDERALLY LISTED, PROPOSED, CANDIDATE SPECIES  
AND SPECIES OF CONCERN  
UNDER THE JURISDICTION OF THE FISH AND WILDLIFE SERVICE  
WHICH MAY OCCUR WITHIN MULTNOMAH COUNTY, OREGON**

**DELISTED SPECIES**

**Birds**

Aleutian Canada goose

*Branta canadensis leucopareia*

American Peregrine falcon

*Falco peregrinus anatum*

Bald eagle

*Haliaeetus leucocephalus*

**Definitions:**

Listed Species: An endangered species is one that is in danger of extinction throughout all or a significant portion of its range. A threatened species is one that is likely to become endangered in the foreseeable future.

Proposed Species: Taxa for which the Fish and Wildlife Service or National Marine Fisheries Service has published a proposal to list as endangered or threatened in the Federal Register.

Candidate Species: Taxa for which the Fish and Wildlife Service has sufficient biological information to support a proposal to list as endangered or threatened.

Species of Concern: Taxa whose conservation status is of concern to the U.S. Fish and Wildlife Service (many previously known as Category 2 candidates), but for which further information is still needed. Such species receive no legal protection and use of the term does not necessarily imply that a species will eventually be proposed for listing.

Delisted Species: A species that has been removed from the Federal list of endangered and threatened wildlife and plants.

**Key:**

E      Endangered  
T      Threatened  
CH     Critical Habitat has been designated for this species  
PE     Proposed Endangered  
PT     Proposed Threatened  
PCH    Critical Habitat has been proposed for this species

**Notes:**

**Marine & Anadromous Species:** Please consult the National Marine Fisheries Service (NMFS) (<http://www.nmfs.noaa.gov/pr/species/>) for marine and anadromous species. The National Marine Fisheries Service (NMFS) manages mostly marine and anadromous species, while the U.S. Fish and Wildlife Service manages the remainder of the listed species, mostly terrestrial and freshwater species.

**Marine Turtle Conservation and Management:** All six species of sea turtles occurring in the U.S. are protected under the Endangered Species Act of 1973. In 1977, NOAA Fisheries and the U.S. Fish and Wildlife Service signed a Memorandum of Understanding to jointly administer the Endangered Species Act with respect to marine turtles. NOAA Fisheries has the lead responsibility for the conservation and recovery of sea turtles in the marine environment and the U.S. Fish and Wildlife Service has the lead for the conservation

**FEDERALLY LISTED, PROPOSED, CANDIDATE SPECIES  
AND SPECIES OF CONCERN  
UNDER THE JURISDICTION OF THE FISH AND WILDLIFE SERVICE  
WHICH MAY OCCUR WITHIN MULTNOMAH COUNTY, OREGON**

and recovery of sea turtles on nesting beaches. For more information, see the NOAA Fisheries webpage on sea turtles <http://www.nmfs.noaa.gov/pr/species/turtles/>.

**Gray Wolf:** On February 27, 2008, the Service published a final rule that established a distinct population segment of the gray wolf (*Canis lupis*) in the northern Rocky Mountains (which includes a portion of Eastern Oregon, east of the centerline of Highway 395 and Highway 78 north of Burns Junction and that portion of Oregon east of the centerline of Highway 95 south of Burns Junction). Any wolves found west of this line in Oregon belong to the conterminous USA population [see 73 FR 10514]. Gray wolves in Oregon are State-listed as endangered, regardless of location.

**FEDERALLY LISTED, PROPOSED, CANDIDATE SPECIES  
AND SPECIES OF CONCERN  
UNDER THE JURISDICTION OF THE FISH AND WILDLIFE SERVICE  
WHICH MAY OCCUR WITHIN POLK COUNTY, OREGON**

**LISTED SPECIES**

**Birds**

Marbled murrelet	<i>Brachyramphus marmoratus</i>	CH T
Northern spotted owl	<i>Strix occidentalis caurina</i>	CH T

**Fish**

***Inland:***

Oregon chub	<i>Oregonichthys crameri</i>	CH T
-------------	------------------------------	------

**Invertebrates**

***Insects:***

Fender's blue butterfly	<i>Icaricia icarioides fenderi</i>	CH E
-------------------------	------------------------------------	------

**Plants**

Golden paintbrush	<i>Castilleja levisecta</i>	T
Willamette daisy	<i>Erigeron decumbens</i> var. <i>decumbens</i>	CH E
Water howellia	<i>Howellia aquatilis</i>	T
Bradshaw's desert parsley	<i>Lomatium bradshawii</i>	E
Kincaid's lupine	<i>Lupinus sulphureus</i> ssp. <i>kincaidii</i>	CH T
Nelson's checker-mallow	<i>Sidalcea nelsoniana</i>	T

**PROPOSED SPECIES**

**None**

No Proposed Endangered Species		PE
No Proposed Threatened Species		PT

**CANDIDATE SPECIES**

**Birds**

Streaked horned lark	<i>Eremophila alpestris strigata</i>
----------------------	--------------------------------------

**SPECIES OF CONCERN**

**Mammals**

White-footed vole	<i>Arborimus albipes</i>
Red tree vole	<i>Arborimus longicaudus</i>
Silver-haired bat	<i>Lasionycteris noctivagans</i>
Long-eared myotis bat	<i>Myotis evotis</i>
Yuma myotis bat	<i>Myotis yumanensis</i>
Camas pocket gopher	<i>Thomomys bulbivorus</i>

**Birds**

Black tern	<i>Chlidonias niger</i>
------------	-------------------------

**FEDERALLY LISTED, PROPOSED, CANDIDATE SPECIES  
AND SPECIES OF CONCERN  
UNDER THE JURISDICTION OF THE FISH AND WILDLIFE SERVICE  
WHICH MAY OCCUR WITHIN POLK COUNTY, OREGON**

Olive-sided flycatcher  
Yellow-breasted chat  
Acorn woodpecker  
Lewis' woodpecker  
Mountain quail  
Band-tailed pigeon  
Oregon vesper sparrow  
Purple martin

*Contopus cooperi*  
*Icteria virens*  
*Melanerpes formicivorus*  
*Melanerpes lewis*  
*Oreortyx pictus*  
*Patagioenas fasciata*  
*Pooecetes gramineus affinis*  
*Progne subis*

**Reptiles and Amphibians**

Northern Pacific pond turtle  
Coastal tailed frog  
Northern red-legged frog  
Southern torrent (seep) salamander

*Actinemys marmorata marmorata*  
*Ascaphus truei*  
*Rana aurora aurora*  
*Rhyacotriton variegatus*

**Fish**

Pacific lamprey  
Coastal cutthroat trout

*Lampetra tridentata*  
*Oncorhynchus clarki ssp*

**Plants**

Bog anemone  
Willamette Valley larkspur  
Peacock larkspur  
Coast Range fawn lily  
Queen-of-the-forest  
Shaggy horkelia  
Thin leaved peavine  
Frye's Limbella

*Anemone oregana var. felix*  
*Delphinium oreganum*  
*Delphinium pavonaceum*  
*Erythronium elegans*  
*Filipendula occidentalis*  
*Horkelia congesta ssp. congesta*  
*Lathyrus holochlorus*  
*Limbella fryei*

**DELISTED SPECIES**

**Birds**

Aleutian Canada goose  
American Peregrine falcon  
Bald eagle

*Branta canadensis leucopareia*  
*Falco peregrinus anatum*  
*Haliaeetus leucocephalus*

**Definitions:**

Listed Species: An endangered species is one that is in danger of extinction throughout all or a significant portion of its range. A threatened species is one that is likely to become endangered in the foreseeable future.

Proposed Species: Taxa for which the Fish and Wildlife Service or National Marine Fisheries Service has published a proposal to list as endangered or threatened in the Federal Register.

Candidate Species: Taxa for which the Fish and Wildlife Service has sufficient biological information to support a proposal to list as endangered or threatened.

Species of Concern: Taxa whose conservation status is of concern to the U.S. Fish and Wildlife Service

**FEDERALLY LISTED, PROPOSED, CANDIDATE SPECIES  
AND SPECIES OF CONCERN  
UNDER THE JURISDICTION OF THE FISH AND WILDLIFE SERVICE  
WHICH MAY OCCUR WITHIN POLK COUNTY, OREGON**

(many previously known as Category 2 candidates), but for which further information is still needed. Such species receive no legal protection and use of the term does not necessarily imply that a species will eventually be proposed for listing.

Delisted Species: A species that has been removed from the Federal list of endangered and threatened wildlife and plants.

**Key:**

E      Endangered  
T      Threatened  
CH     Critical Habitat has been designated for this species  
PE     Proposed Endangered  
PT     Proposed Threatened  
PCH    Critical Habitat has been proposed for this species

**Notes:**

**Marine & Anadromous Species:** Please consult the National Marine Fisheries Service (NMFS) (<http://www.nmfs.noaa.gov/pr/species/>) for marine and anadromous species. The National Marine Fisheries Service (NMFS) manages mostly marine and anadromous species, while the U.S. Fish and Wildlife Service manages the remainder of the listed species, mostly terrestrial and freshwater species.

**Marine Turtle Conservation and Management:** All six species of sea turtles occurring in the U.S. are protected under the Endangered Species Act of 1973. In 1977, NOAA Fisheries and the U.S. Fish and Wildlife Service signed a Memorandum of Understanding to jointly administer the Endangered Species Act with respect to marine turtles. NOAA Fisheries has the lead responsibility for the conservation and recovery of sea turtles in the marine environment and the U.S. Fish and Wildlife Service has the lead for the conservation and recovery of sea turtles on nesting beaches. For more information, see the NOAA Fisheries webpage on sea turtles <http://www.nmfs.noaa.gov/pr/species/turtles/>.

**Gray Wolf:** On February 27, 2008, the Service published a final rule that established a distinct population segment of the gray wolf (*Canis lupis*) in the northern Rocky Mountains (which includes a portion of Eastern Oregon, east of the centerline of Highway 395 and Highway 78 north of Burns Junction and that portion of Oregon east of the centerline of Highway 95 south of Burns Junction). Any wolves found west of this line in Oregon belong to the conterminous USA population [see 73 FR 10514]. Gray wolves in Oregon are State-listed as endangered, regardless of location.

**FEDERALLY LISTED, PROPOSED, CANDIDATE SPECIES  
AND SPECIES OF CONCERN  
UNDER THE JURISDICTION OF THE FISH AND WILDLIFE SERVICE  
WHICH MAY OCCUR WITHIN TILLAMOOK COUNTY, OREGON**

**LISTED SPECIES**

**Birds**

Marbled murrelet	<i>Brachyramphus marmoratus</i>	CH T
Western snowy (coastal) plover	<i>Charadrius alexandrinus nivosus</i>	CH T
Short-tailed albatross	<i>Phoebastria albatrus</i>	E
Northern spotted owl	<i>Strix occidentalis caurina</i>	CH T

**Reptiles and Amphibians**

**Marine:**

Loggerhead sea turtle	<i>Caretta caretta</i>	E
Green sea turtle	<i>Chelonia mydas</i>	T
Leatherback sea turtle	<i>Dermochelys coriacea</i>	E
Olive (=Pacific) ridley sea turtle	<i>Lepidochelys olivacea</i>	T

**Invertebrates**

**Insects:**

Oregon silverspot butterfly	<i>Speyeria zerene hippolyta</i>	CH T
-----------------------------	----------------------------------	------

**Plants**

Nelson's checker-mallow	<i>Sidalcea nelsoniana</i>	T
-------------------------	----------------------------	---

**PROPOSED SPECIES**

**None**

No Proposed Endangered Species		PE
No Proposed Threatened Species		PT

**SPECIES OF CONCERN**

**Mammals**

White-footed vole	<i>Arborimus albipes</i>
Red tree vole	<i>Arborimus longicaudus</i>
Townsend's western big-eared bat	<i>Corynorhinus townsendii townsendii</i>
Silver-haired bat	<i>Lasionycteris noctivagans</i>
Long-eared myotis bat	<i>Myotis evotis</i>
Fringed myotis bat	<i>Myotis thysanodes</i>
Long-legged myotis bat	<i>Myotis volans</i>
Yuma myotis bat	<i>Myotis yumanensis</i>

**Birds**

Olive-sided flycatcher	<i>Contopus cooperi</i>
Black oystercatcher	<i>Haematopus bachmani</i>
Harlequin duck	<i>Histrionicus histrionicus</i>
Lewis' woodpecker	<i>Melanerpes lewis</i>
Mountain quail	<i>Oreortyx pictus</i>
Band-tailed pigeon	<i>Patagioenas fasciata</i>

**FEDERALLY LISTED, PROPOSED, CANDIDATE SPECIES  
AND SPECIES OF CONCERN  
UNDER THE JURISDICTION OF THE FISH AND WILDLIFE SERVICE  
WHICH MAY OCCUR WITHIN TILLAMOOK COUNTY, OREGON**

Purple martin

*Progne subis*

**Reptiles and Amphibians**

Northern Pacific pond turtle

*Actinemys marmorata marmorata*

Coastal tailed frog

*Ascaphus truei*

Northern red-legged frog

*Rana aurora aurora*

Southern torrent (seep) salamander

*Rhyacotriton variegatus*

**Fish**

River lamprey

*Lampetra ayresi*

Pacific lamprey

*Lampetra tridentata*

Coastal cutthroat trout

*Oncorhynchus clarki ssp*

**Plants**

Pink sand-verbena

*Abronia umbellata ssp. breviflora*

Bog anemone

*Anemone oregana var. felix*

Saddle Mountain bittercress

*Cardamine pattersonii*

Pt. Reyes bird's-beak

*Cordylanthus maritimus ssp. palustris*

Frigid shootingstar

*Dodecatheon austrofrigidum*

Coast Range fawn lily

*Erythronium elegans*

Queen-of-the-forest

*Filipendula occidentalis*

Frye's Limbella

*Limbella fryei*

San Francisco bluegrass

*Poa unilateralis*

Saddle Mountain saxifrage

*Saxifraga hitchcockiana*

Henderson's checker-mallow

*Sidalcea hendersonii*

Bristly-stemmed sidalcea

*Sidalcea hirtipes*

Cascade Head catchfly

*Silene douglasii var. oraria*

**DELISTED SPECIES**

**Birds**

Aleutian Canada goose

*Branta canadensis leucopareia*

American Peregrine falcon

*Falco peregrinus anatum*

Bald eagle

*Haliaeetus leucocephalus*

Brown pelican

*Pelecanus occidentalis*

**Definitions:**

Listed Species: An endangered species is one that is in danger of extinction throughout all or a significant portion of its range. A threatened species is one that is likely to become endangered in the foreseeable future.

Proposed Species: Taxa for which the Fish and Wildlife Service or National Marine Fisheries Service has published a proposal to list as endangered or threatened in the Federal Register.

Candidate Species: Taxa for which the Fish and Wildlife Service has sufficient biological information to support a proposal to list as endangered or threatened.

Species of Concern: Taxa whose conservation status is of concern to the U.S. Fish and Wildlife Service

**FEDERALLY LISTED, PROPOSED, CANDIDATE SPECIES  
AND SPECIES OF CONCERN  
UNDER THE JURISDICTION OF THE FISH AND WILDLIFE SERVICE  
WHICH MAY OCCUR WITHIN TILLAMOOK COUNTY, OREGON**

(many previously known as Category 2 candidates), but for which further information is still needed. Such species receive no legal protection and use of the term does not necessarily imply that a species will eventually be proposed for listing.

Delisted Species: A species that has been removed from the Federal list of endangered and threatened wildlife and plants.

**Key:**

E	Endangered
T	Threatened
CH	Critical Habitat has been designated for this species
PE	Proposed Endangered
PT	Proposed Threatened
PCH	Critical Habitat has been proposed for this species

**Notes:**

**Marine & Anadromous Species:** Please consult the National Marine Fisheries Service (NMFS) (<http://www.nmfs.noaa.gov/pr/species/>) for marine and anadromous species. The National Marine Fisheries Service (NMFS) manages mostly marine and anadromous species, while the U.S. Fish and Wildlife Service manages the remainder of the listed species, mostly terrestrial and freshwater species.

**Marine Turtle Conservation and Management:** All six species of sea turtles occurring in the U.S. are protected under the Endangered Species Act of 1973. In 1977, NOAA Fisheries and the U.S. Fish and Wildlife Service signed a Memorandum of Understanding to jointly administer the Endangered Species Act with respect to marine turtles. NOAA Fisheries has the lead responsibility for the conservation and recovery of sea turtles in the marine environment and the U.S. Fish and Wildlife Service has the lead for the conservation and recovery of sea turtles on nesting beaches. For more information, see the NOAA Fisheries webpage on sea turtles <http://www.nmfs.noaa.gov/pr/species/turtles/>.

**Gray Wolf:** On February 27, 2008, the Service published a final rule that established a distinct population segment of the gray wolf (*Canis lupis*) in the northern Rocky Mountains (which includes a portion of Eastern Oregon, east of the centerline of Highway 395 and Highway 78 north of Burns Junction and that portion of Oregon east of the centerline of Highway 95 south of Burns Junction). Any wolves found west of this line in Oregon belong to the conterminous USA population [see 73 FR 10514]. Gray wolves in Oregon are State-listed as endangered, regardless of location.

**FEDERALLY LISTED, PROPOSED, CANDIDATE SPECIES  
AND SPECIES OF CONCERN  
UNDER THE JURISDICTION OF THE FISH AND WILDLIFE SERVICE  
WHICH MAY OCCUR WITHIN WASCO COUNTY, OREGON**

**LISTED SPECIES**

**Birds**

Northern spotted owl *Strix occidentalis caurina* CH T

**Fish**

***Inland:***

Bull trout *Salvelinus confluentus* CH T

**PROPOSED SPECIES**

**None**

No Proposed Endangered Species PE  
No Proposed Threatened Species PT

**CANDIDATE SPECIES**

**Reptiles and Amphibians**

***Inland:***

Oregon spotted frog *Rana pretiosa*

**Plants**

Northern wormwood *Artemisia campestris var. wormskioldii*

**SPECIES OF CONCERN**

**Mammals**

Pallid bat *Antrozous pallidus pacificus*  
Townsend's western big-eared bat *Corynorhinus townsendii townsendii*  
Spotted bat *Euderma maculatum*  
Silver-haired bat *Lasionycteris noctivagans*  
Small-footed myotis bat *Myotis ciliolabrum*  
Long-eared myotis bat *Myotis evotis*  
Long-legged myotis bat *Myotis volans*  
Yuma myotis bat *Myotis yumanensis*

**Birds**

Northern goshawk *Accipiter gentilis*  
Tricolored blackbird *Agelaius tricolor*  
Western burrowing owl *Athene cunicularia hypugaea*  
Ferruginous hawk *Buteo regalis*  
Olive-sided flycatcher *Contopus cooperi*  
Willow flycatcher *Empidonax traillii adastus*  
Yellow-breasted chat *Icteria virens*  
Acorn woodpecker *Melanerpes formicivorus*  
Lewis' woodpecker *Melanerpes lewis*

**FEDERALLY LISTED, PROPOSED, CANDIDATE SPECIES  
AND SPECIES OF CONCERN  
UNDER THE JURISDICTION OF THE FISH AND WILDLIFE SERVICE  
WHICH MAY OCCUR WITHIN WASCO COUNTY, OREGON**

Mountain quail  
Band-tailed pigeon  
White-headed woodpecker  
Purple martin

*Oreortyx pictus*  
*Patagioenas fasciata*  
*Plcooides albolarvatus*  
*Progne subis*

**Reptiles and Amphibians**

Northern Pacific pond turtle  
Coastal tailed frog  
Oregon slender salamander  
Northern red-legged frog  
Cascades frog  
Northern sagebrush lizard

*Actinemys marmorata marmorata*  
*Ascaphus truei*  
*Batrachoseps wrighti*  
*Rana aurora aurora*  
*Rana cascadae*  
*Sceloporus graciosus graciosus*

**Fish**

Pacific lamprey  
Coastal cutthroat trout

*Lampetra tridentata*  
*Oncorhynchus clarki ssp*

**Invertebrates**

**Snails:**

Columbia pebblesnail  
Minor Pacific sideband snail

*Fluminicola fuscus (= columbianus)*  
*Monadenia fidelis minor*

**Insects:**

Beller's ground beetle

*Agonum belleri*

**Clams:**

California floater mussel

*Anodonta californiensis*

**Plants**

Henderson ricegrass  
Henderson's bentgrass  
Mountain grape fern  
Dwarf evening-primrose  
Oregon fleabane  
Suksdorf's desert parsley  
White meconella  
Barrett's penstemon  
Dalles Mt. buttercup

*Achnatherum hendersonii*  
*Agrostis hendersonii*  
*Botrychium montanum*  
*Camissonia pygmaea*  
*Erigeron oreganus*  
*Lomatium suksdorfii*  
*Meconella oregana*  
*Penstemon barrettiae*  
*Ranunculus tritermatus*

**DELISTED SPECIES**

**Birds**

American Peregrine falcon  
Bald eagle

*Falco peregrinus anatum*  
*Haliaeetus leucocephalus*

**Definitions:**

Listed Species: An endangered species is one that is in danger of extinction throughout all or a significant portion of its range. A threatened species is one that is likely to become endangered in the foreseeable future.

Proposed Species: Taxa for which the Fish and Wildlife Service or National Marine Fisheries Service has published a proposal to list as endangered or threatened in the Federal Register.

**FEDERALLY LISTED, PROPOSED, CANDIDATE SPECIES  
AND SPECIES OF CONCERN  
UNDER THE JURISDICTION OF THE FISH AND WILDLIFE SERVICE  
WHICH MAY OCCUR WITHIN WASCO COUNTY, OREGON**

Candidate Species: Taxa for which the Fish and Wildlife Service has sufficient biological information to support a proposal to list as endangered or threatened.

Species of Concern: Taxa whose conservation status is of concern to the U.S. Fish and Wildlife Service (many previously known as Category 2 candidates), but for which further information is still needed. Such species receive no legal protection and use of the term does not necessarily imply that a species will eventually be proposed for listing.

Delisted Species: A species that has been removed from the Federal list of endangered and threatened wildlife and plants.

**Key:**

E	Endangered
T	Threatened
CH	Critical Habitat has been designated for this species
PE	Proposed Endangered
PT	Proposed Threatened
PCH	Critical Habitat has been proposed for this species

**Notes:**

**Marine & Anadromous Species**: Please consult the National Marine Fisheries Service (NMFS) (<http://www.nmfs.noaa.gov/pr/species/>) for marine and anadromous species. The National Marine Fisheries Service (NMFS) manages mostly marine and anadromous species, while the U.S. Fish and Wildlife Service manages the remainder of the listed species, mostly terrestrial and freshwater species.

**Marine Turtle Conservation and Management**: All six species of sea turtles occurring in the U.S. are protected under the Endangered Species Act of 1973. In 1977, NOAA Fisheries and the U.S. Fish and Wildlife Service signed a Memorandum of Understanding to jointly administer the Endangered Species Act with respect to marine turtles. NOAA Fisheries has the lead responsibility for the conservation and recovery of sea turtles in the marine environment and the U.S. Fish and Wildlife Service has the lead for the conservation and recovery of sea turtles on nesting beaches. For more information, see the NOAA Fisheries webpage on sea turtles <http://www.nmfs.noaa.gov/pr/species/turtles/>.

**Gray Wolf**: On February 27, 2008, the Service published a final rule that established a distinct population segment of the gray wolf (*Canis lupis*) in the northern Rocky Mountains (which includes a portion of Eastern Oregon, east of the centerline of Highway 395 and Highway 78 north of Burns Junction and that portion of Oregon east of the centerline of Highway 95 south of Burns Junction). Any wolves found west of this line in Oregon belong to the conterminous USA population [see 73 FR 10514]. Gray wolves in Oregon are State-listed as endangered, regardless of location.

**FEDERALLY LISTED, PROPOSED, CANDIDATE SPECIES  
AND SPECIES OF CONCERN  
UNDER THE JURISDICTION OF THE FISH AND WILDLIFE SERVICE  
WHICH MAY OCCUR WITHIN WASHINGTON COUNTY, OREGON**

**LISTED SPECIES**

**Birds**

Marbled murrelet	<i>Brachyramphus marmoratus</i>	CH T
Northern spotted owl	<i>Strix occidentalis caurina</i>	CH T

**Plants**

Kincaid's lupine	<i>Lupinus sulphureus ssp. kincaidii</i>	CH T
Nelson's checker-mallow	<i>Sidalcea nelsoniana</i>	T

**PROPOSED SPECIES**

**None**

No Proposed Endangered Species	PE
No Proposed Threatened Species	PT

**CANDIDATE SPECIES**

**Birds**

Streaked horned lark	<i>Eremophila alpestris strigata</i>
----------------------	--------------------------------------

**SPECIES OF CONCERN**

**Mammals**

White-footed vole	<i>Arborimus albipes</i>
Red tree vole	<i>Arborimus longicaudus</i>
Townsend's western big-eared bat	<i>Corynorhinus townsendii townsendii</i>
Silver-haired bat	<i>Lasionycteris noctivagans</i>
Fringed myotis bat	<i>Myotis thysanodes</i>
Long-legged myotis bat	<i>Myotis volans</i>
Yuma myotis bat	<i>Myotis yumanensis</i>
Camas pocket gopher	<i>Thomomys bulbivorus</i>

**Birds**

Olive-sided flycatcher	<i>Contopus cooperi</i>
Yellow-breasted chat	<i>Icteria virens</i>
Acorn woodpecker	<i>Melanerpes formicivorus</i>
Lewis' woodpecker	<i>Melanerpes lewis</i>
Mountain quail	<i>Oreortyx pictus</i>
Band-tailed pigeon	<i>Patagioenas fasciata</i>
Oregon vesper sparrow	<i>Pooecetes gramineus affinis</i>
Purple martin	<i>Progne subis</i>

**Reptiles and Amphibians**

Northern Pacific pond turtle	<i>Actinemys marmorata marmorata</i>
Coastal tailed frog	<i>Ascaphus truei</i>

**FEDERALLY LISTED, PROPOSED, CANDIDATE SPECIES  
AND SPECIES OF CONCERN  
UNDER THE JURISDICTION OF THE FISH AND WILDLIFE SERVICE  
WHICH MAY OCCUR WITHIN WASHINGTON COUNTY, OREGON**

Northern red-legged frog

*Rana aurora aurora*

**Fish**

Malheur mottled sculpin

*Cottus bairdi ssp.*

Pacific lamprey

*Lampetra tridentata*

Coastal cutthroat trout

*Oncorhynchus clarki ssp*

**Invertebrates**

**Clams:**

California floater mussel

*Anodonta californiensis*

**Plants**

Pale larkspur

*Delphinium leucophaeum*

Shaggy horkelia

*Horkelia congesta ssp. congesta*

Thin leaved peavine

*Lathyrus holochlorus*

**DELISTED SPECIES**

**Birds**

Aleutian Canada goose

*Branta canadensis leucopareia*

American Peregrine falcon

*Falco peregrinus anatum*

Bald eagle

*Haliaeetus leucocephalus*

**Definitions:**

Listed Species: An endangered species is one that is in danger of extinction throughout all or a significant portion of its range. A threatened species is one that is likely to become endangered in the foreseeable future.

Proposed Species: Taxa for which the Fish and Wildlife Service or National Marine Fisheries Service has published a proposal to list as endangered or threatened in the Federal Register.

Candidate Species: Taxa for which the Fish and Wildlife Service has sufficient biological information to support a proposal to list as endangered or threatened.

Species of Concern: Taxa whose conservation status is of concern to the U.S. Fish and Wildlife Service (many previously known as Category 2 candidates), but for which further information is still needed. Such species receive no legal protection and use of the term does not necessarily imply that a species will eventually be proposed for listing.

Delisted Species: A species that has been removed from the Federal list of endangered and threatened wildlife and plants.

**Key:**

E Endangered

T Threatened

CH Critical Habitat has been designated for this species

PE Proposed Endangered

PT Proposed Threatened

**FEDERALLY LISTED, PROPOSED, CANDIDATE SPECIES  
AND SPECIES OF CONCERN  
UNDER THE JURISDICTION OF THE FISH AND WILDLIFE SERVICE  
WHICH MAY OCCUR WITHIN WASHINGTON COUNTY, OREGON**

PCH Critical Habitat has been proposed for this species

**Notes:**

**Marine & Anadromous Species:** Please consult the National Marine Fisheries Service (NMFS) (<http://www.nmfs.noaa.gov/pr/species/>) for marine and anadromous species. The National Marine Fisheries Service (NMFS) manages mostly marine and anadromous species, while the U.S. Fish and Wildlife Service manages the remainder of the listed species, mostly terrestrial and freshwater species.

**Marine Turtle Conservation and Management:** All six species of sea turtles occurring in the U.S. are protected under the Endangered Species Act of 1973. In 1977, NOAA Fisheries and the U.S. Fish and Wildlife Service signed a Memorandum of Understanding to jointly administer the Endangered Species Act with respect to marine turtles. NOAA Fisheries has the lead responsibility for the conservation and recovery of sea turtles in the marine environment and the U.S. Fish and Wildlife Service has the lead for the conservation and recovery of sea turtles on nesting beaches. For more information, see the NOAA Fisheries webpage on sea turtles <http://www.nmfs.noaa.gov/pr/species/turtles/>.

**Gray Wolf:** On February 27, 2008, the Service published a final rule that established a distinct population segment of the gray wolf (*Canis lupis*) in the northern Rocky Mountains (which includes a portion of Eastern Oregon, east of the centerline of Highway 395 and Highway 78 north of Burns Junction and that portion of Oregon east of the centerline of Highway 95 south of Burns Junction). Any wolves found west of this line in Oregon belong to the conterminous USA population [see 73 FR 10514]. Gray wolves in Oregon are State-listed as endangered, regardless of location.

**FEDERALLY LISTED, PROPOSED, CANDIDATE SPECIES  
AND SPECIES OF CONCERN  
UNDER THE JURISDICTION OF THE FISH AND WILDLIFE SERVICE  
WHICH MAY OCCUR WITHIN YAMHILL COUNTY, OREGON**

**LISTED SPECIES**

**Birds**

Marbled murrelet	<i>Brachyramphus marmoratus</i>	CH T
Northern spotted owl	<i>Strix occidentalis caurina</i>	CH T

**Invertebrates**

***Insects:***

Fender's blue butterfly	<i>Icaricia icarioides fenderi</i>	CH E
Oregon silverspot butterfly	<i>Speyeria zerene hippolyta</i>	CH T

**Plants**

Willamette daisy	<i>Erigeron decumbens var. decumbens</i>	CH E
Water howellia	<i>Howellia aquatilis</i>	T
Kincaid's lupine	<i>Lupinus sulphureus ssp. kincaidii</i>	CH T
Nelson's checker-mallow	<i>Sidalcea nelsoniana</i>	T

**PROPOSED SPECIES**

**None**

No Proposed Endangered Species	PE
No Proposed Threatened Species	PT

**CANDIDATE SPECIES**

**Birds**

Streaked horned lark	<i>Eremophila alpestris strigata</i>
----------------------	--------------------------------------

**SPECIES OF CONCERN**

**Mammals**

White-footed vole	<i>Arborimus albipes</i>
Red tree vole	<i>Arborimus longicaudus</i>
Long-eared myotis bat	<i>Myotis evotis</i>
Yuma myotis bat	<i>Myotis yumanensis</i>
Camas pocket gopher	<i>Thomomys bulbivorus</i>

**Birds**

Olive-sided flycatcher	<i>Contopus cooperi</i>
Yellow-breasted chat	<i>Icteria virens</i>
Acorn woodpecker	<i>Melanerpes formicivorus</i>
Lewis' woodpecker	<i>Melanerpes lewis</i>
Mountain quail	<i>Oreortyx pictus</i>
Band-tailed pigeon	<i>Patagioenas fasciata</i>
Oregon vesper sparrow	<i>Pooecetes gramineus affinis</i>
Purple martin	<i>Progne subis</i>

**FEDERALLY LISTED, PROPOSED, CANDIDATE SPECIES  
AND SPECIES OF CONCERN  
UNDER THE JURISDICTION OF THE FISH AND WILDLIFE SERVICE  
WHICH MAY OCCUR WITHIN YAMHILL COUNTY, OREGON**

**Reptiles and Amphibians**

Northern Pacific pond turtle  
Coastal tailed frog  
Northern red-legged frog  
Southern torrent (seep) salamander

*Actinemys marmorata marmorata*  
*Ascaphus truei*  
*Rana aurora aurora*  
*Rhyacotriton variegatus*

**Fish**

Pacific lamprey  
Coastal cutthroat trout

*Lampetra tridentata*  
*Oncorhynchus clarki ssp*

**Invertebrates**

***Insects:***

American acetropis grass bug

*Acetropis americana*

**Plants**

Bog anemone  
Pale larkspur  
Willamette Valley larkspur  
Coast Range fawn lily  
Thin leaved peavine

*Anemone oregana var. felix*  
*Delphinium leucophaeum*  
*Delphinium oreganum*  
*Erythronium elegans*  
*Lathyrus holochlorus*

**DELISTED SPECIES**

**Birds**

Aleutian Canada goose  
American Peregrine falcon  
Bald eagle

*Branta canadensis leucopareia*  
*Falco peregrinus anatum*  
*Haliaeetus leucocephalus*

**Definitions:**

Listed Species: An endangered species is one that is in danger of extinction throughout all or a significant portion of its range. A threatened species is one that is likely to become endangered in the foreseeable future.

Proposed Species: Taxa for which the Fish and Wildlife Service or National Marine Fisheries Service has published a proposal to list as endangered or threatened in the Federal Register.

Candidate Species: Taxa for which the Fish and Wildlife Service has sufficient biological information to support a proposal to list as endangered or threatened.

Species of Concern: Taxa whose conservation status is of concern to the U.S. Fish and Wildlife Service (many previously known as Category 2 candidates), but for which further information is still needed. Such species receive no legal protection and use of the term does not necessarily imply that a species will eventually be proposed for listing.

Delisted Species: A species that has been removed from the Federal list of endangered and threatened wildlife and plants.

**Key:**

**FEDERALLY LISTED, PROPOSED, CANDIDATE SPECIES  
AND SPECIES OF CONCERN  
UNDER THE JURISDICTION OF THE FISH AND WILDLIFE SERVICE  
WHICH MAY OCCUR WITHIN YAMHILL COUNTY, OREGON**

E	Endangered
T	Threatened
CH	Critical Habitat has been designated for this species
PE	Proposed Endangered
PT	Proposed Threatened
PCH	Critical Habitat has been proposed for this species

**Notes:**

**Marine & Anadromous Species:** Please consult the National Marine Fisheries Service (NMFS) (<http://www.nmfs.noaa.gov/pr/species/>) for marine and anadromous species. The National Marine Fisheries Service (NMFS) manages mostly marine and anadromous species, while the U.S. Fish and Wildlife Service manages the remainder of the listed species, mostly terrestrial and freshwater species.

**Marine Turtle Conservation and Management:** All six species of sea turtles occurring in the U.S. are protected under the Endangered Species Act of 1973. In 1977, NOAA Fisheries and the U.S. Fish and Wildlife Service signed a Memorandum of Understanding to jointly administer the Endangered Species Act with respect to marine turtles. NOAA Fisheries has the lead responsibility for the conservation and recovery of sea turtles in the marine environment and the U.S. Fish and Wildlife Service has the lead for the conservation and recovery of sea turtles on nesting beaches. For more information, see the NOAA Fisheries webpage on sea turtles <http://www.nmfs.noaa.gov/pr/species/turtles/>.

**Gray Wolf:** On February 27, 2008, the Service published a final rule that established a distinct population segment of the gray wolf (*Canis lupis*) in the northern Rocky Mountains (which includes a portion of Eastern Oregon, east of the centerline of Highway 395 and Highway 78 north of Burns Junction and that portion of Oregon east of the centerline of Highway 95 south of Burns Junction). Any wolves found west of this line in Oregon belong to the conterminous USA population [see 73 FR 10514]. Gray wolves in Oregon are State-listed as endangered, regardless of location.

# Endangered Species Act Status of West Coast Salmon & Steelhead

(Updated Aug. 11, 2011)

		Species <sup>1</sup>	Current Endangered Species Act Listing Status <sup>2</sup>	ESA Listing Actions Under Review
Sockeye Salmon ( <i>Oncorhynchus nerka</i> )	1	Snake River	Endangered	
	2	Ozette Lake	Threatened	
	3	Baker River	Not Warranted	
	4	Okanogan River	Not Warranted	
	5	Lake Wenatchee	Not Warranted	
	6	Quinalt Lake	Not Warranted	
	7	Lake Pleasant	Not Warranted	
Chinook Salmon ( <i>O. tshawytscha</i> )	8	Sacramento River Winter-run	Endangered	
	9	Upper Columbia River Spring-run	Endangered	
	10	Snake River Spring/Summer-run	Threatened	
	11	Snake River Fall-run	Threatened	
	12	Puget Sound	Threatened	
	13	Lower Columbia River	Threatened	
	14	Upper Willamette River	Threatened	
	15	Central Valley Spring-run	Threatened	
	16	California Coastal	Threatened	
	17	Central Valley Fall and Late Fall-run	Species of Concern	
	18	Upper Klamath-Trinity Rivers	Not Warranted	
	19	Oregon Coast	Not Warranted	
	20	Washington Coast	Not Warranted	
	21	Middle Columbia River spring-run	Not Warranted	
	22	Upper Columbia River summer/fall-run	Not Warranted	
	23	Southern Oregon and Northern California Coast	Not Warranted	
	24	Deschutes River summer/fall-run	Not Warranted	
Coho Salmon ( <i>O. kisutch</i> )	25	Central California Coast	Endangered	
	26	Southern Oregon/Northern California	Threatened	
	27	Lower Columbia River	Threatened	• Critical habitat
	28	Oregon Coast	Threatened	
	29	Southwest Washington	Undetermined	
	30	Puget Sound/Strait of Georgia	Species of Concern	
	31	Olympic Peninsula	Not Warranted	
Chum Salmon ( <i>O. keta</i> )	32	Hood Canal Summer-run	Threatened	
	33	Columbia River	Threatened	
	34	Puget Sound/Strait of Georgia	Not Warranted	
	35	Pacific Coast	Not Warranted	
Steelhead ( <i>O. mykiss</i> )	36	Southern California	Endangered	
	37	Upper Columbia River	Threatened	
	38	Central California Coast	Threatened	
	39	South Central California Coast	Threatened	
	40	Snake River Basin	Threatened	
	41	Lower Columbia River	Threatened	
	42	California Central Valley	Threatened	
	43	Upper Willamette River	Threatened	
	44	Middle Columbia River	Threatened	
	45	Northern California	Threatened	
	46	Oregon Coast	Species of Concern	
	47	Southwest Washington	Not Warranted	
	48	Olympic Peninsula	Not Warranted	
	49	Puget Sound	Threatened	• Critical habitat
	50	Klamath Mountains Province	Not Warranted	
Pink Salmon ( <i>O. gorbuscha</i> )	51	Even-year	Not Warranted	
	52	Odd-year	Not Warranted	

<sup>1</sup> The ESA defines a “species” to include any distinct population segment of any species of vertebrate fish or wildlife. For Pacific salmon, NOAA Fisheries Service considers an evolutionarily significant unit, or “ESU,” a “species” under the ESA. For Pacific steelhead, NOAA Fisheries Service has delineated distinct population segments (DPSs) for consideration as “species” under the ESA.



# Northwest Regional Office

NOAA's National Marine Fisheries Service

[ESA Salmon Listings](#)  
 [ESA Regulations & Permits](#)  
 [Salmon Habitat](#)  
 [Salmon Harvest & Hatcheries](#)  
 [Marine Mammals](#)  
[Salmon & Hydropower](#)  
 [Salmon Recovery Planning](#)  
 [Groundfish & Halibut](#)  
 [Permits & Other Marine Species](#)

[Home](#) > [Marine Mammals](#) > ESA MM List

## ESA-Listed Marine Mammals

Under the jurisdiction of NOAA Fisheries that may occur:

### off Washington & Oregon

- [Southern Resident killer whale](#) (*Orcinus orca*) (E); [critical habitat](#)
- [humpback whale](#) (*Megaptera novaeangliae*) (E)
- [blue whale](#) (*Balaenoptera musculus*) (E)
- [fin whale](#) (*Balaenoptera physalus*) (E)
- [sei whale](#) (*Balaenoptera borealis*) (E)
- [sperm whale](#) (*Physeter macrocephalus*) (E)
- [Steller sea lion](#) (*Eumetopias jubatus*) (T); [critical habitat](#)

### in Puget Sound

- [Southern Resident killer whale](#) (*Orcinus orca*) (E); [critical habitat](#)
- [humpback whale](#) (*Megaptera novaeangliae*) (E)
- [Steller sea lion](#) (*Eumetopias jubatus*) (T); [critical habitat](#)

(E) = Endangered

(T) = Threatened

[Search NOAA Fisheries](#)

[Print Version](#)

[What's New](#)

[About the NWR](#)

[About this Website](#)

[Subject Index](#)

[Species Lists](#)

[Publications](#)

[Biological Opinions](#)

[Public Consultation  
Tracking System  
\(PCTS\)](#)

[Site Map](#)

7600 Sand Point Way NE, Seattle, WA 98115-0070

Email: [Content Manager](#)

[Privacy Policy](#) | [Disclaimer](#) | [About Us](#)

[Important Policies & Links](#)



Page last updated: June 15, 2010



[ESA Salmon Listings](#)   [ESA Regulations & Permits](#)   [Salmon Habitat](#)   [Salmon Harvest & Hatcheries](#)   [Marine Mammals](#)  
[Salmon & Hydropower](#)   [Salmon Recovery Planning](#)   [Groundfish & Halibut](#)   [Permits & Other Marine Species](#)

[Home](#) > [Other Marine Species](#) > ESA Turtle List

Search

## ESA-Listed Marine Turtles

Under the jurisdiction of NOAA Fisheries that may occur off Washington & Oregon:

- [leatherback sea turtle](#) (*Dermochelys coriacea*) (E)
- [green sea turtle](#) (*Chelonia mydas*) (E)
- [olive ridley sea turtle](#) (*Lepidochelys olivacea*) (E)
- [loggerhead sea turtle](#) (*Caretta caretta*) (T)

Sightings and strandings of these animals are very rare, and there are no breeding beaches in the Northwest Region.

(E) = Endangered  
(T) = Threatened

[Search NOAA Fisheries](#)

[Print Version](#)

[What's New](#)

[About the NWR](#)

[About this Website](#)

[Subject Index](#)

[Species Lists](#)

[Publications](#)

[Biological Opinions](#)

[Public Consultation  
Tracking System  
\(PCTS\)](#)

[Site Map](#)

**Feb. 19, 2010:** NOAA Fisheries extended the comment period on the proposed revision to existing critical habitat for the leatherback turtle under the Endangered Species Act. See the [Federal Register notice](#) (PDF 49KB) for details.

**Jan. 5, 2010:** NOAA Fisheries proposed to revise and expand critical habitat for the leatherback turtle under the Endangered Species Act. Additional information about this proposal can be found in the links below and on [NOAA Fisheries' Office of Protected Resources Website](#).

- [News Release](#) (PDF 73KB -- links to NOAA Fisheries Website)
- [Federal Register notice](#) (PDF 711KB)

7600 Sand Point Way NE, Seattle, WA 98115-0070

Email: [Content Manager](#)

[Privacy Policy](#) | [Disclaimer](#) | [About Us](#)  
[Important Policies & Links](#)



Page last updated: October 25, 2010



[ESA Salmon Listings](#)  
 [ESA Regulations & Permits](#)  
 [Salmon Habitat](#)  
 [Salmon Harvest & Hatcheries](#)  
 [Marine Mammals](#)  
[Salmon & Hydropower](#)  
 [Salmon Recovery Planning](#)  
 [Groundfish & Halibut](#)  
 [Permits & Other Marine Species](#)

[Home](#) > [Other Marine Species](#) > ESA Other List

Search

## Other ESA-Listed Species

Under the jurisdiction of NOAA Fisheries that may occur off Washington & Oregon:

- distinct population segment, or DPS, of [bocaccio](#) (*Sebastes paucispinis*) (E) in Puget Sound
- distinct population segment, or DPS, of [canary rockfish](#) (*Sebastes pinniger*) (T) in Puget Sound
- distinct population segment, or DPS, of [yelloweye rockfish](#) (*Sebastes ruberrimus*) (T) in Puget Sound
- southern distinct population segment, or DPS, of [eulachon](#) (Columbia River smelt) (*Thaleichthys pacificus*) (T)
- southern distinct population segment, or DPS, of [north American green sturgeon](#) (*Acipenser medirostris*) (T), listed in the [NOAA Fisheries Southwest Region](#)

(E) = Endangered

(T) = Threatened

[Search NOAA Fisheries](#)

[Print Version](#)

[What's New](#)

[About the NWR](#)

[About this Website](#)

[Subject Index](#)

[Species Lists](#)

[Publications](#)

[Biological Opinions](#)

[Public Consultation Tracking System \(PCTS\)](#)

[Site Map](#)

7600 Sand Point Way NE, Seattle, WA 98115-0070

Email: [Content Manager](#)

[Privacy Policy](#) | [Disclaimer](#) | [About Us](#)

[Important Policies & Links](#)



Page last updated: June 15, 2010



**UNITED STATES DEPARTMENT OF COMMERCE**  
**National Oceanic and Atmospheric Administration**  
NATIONAL MARINE FISHERIES SERVICE  
Northwest Region  
7600 Sand Point Way N.E., Bldg. 1  
Seattle, Washington 98115

NMFS Tracking No.:  
2011/03113

February 3, 2012

Department of the Army  
Directorate of Public Works  
Attention: Bill Van Hoesen  
Environmental Division  
Building 2012, Room 302, Liggett Ave.  
Box 339500 MS17  
Joint Base Lewis McChord, WA 98433-9500

Re: Informal Consultation for the Department of the Army Training Operations involving the Department of the Army 160<sup>th</sup> Special Operations Aviation Regiment at various locations in and over: Clackamas, Columbia, Deschutes, Hood River, Jefferson, Lane, Linn, Marion, Multnomah, Wasco, Washington, and Yamhill Counties in Oregon; and Clark, Cowlitz, Grays Harbor, Jefferson, Klickitat, Lewis, Mason, Pacific, Pierce, Skamania, Thurston, and Yakima Counties in Washington (Fourth Field HUC numbers: 17030001-Upper Yakima, 17030002-Naches, 17030003-Lower Yakima, 17070105-Middle Columbia-Hood, 17070106-Klickitat, 17070301-Upper Deschutes, 17070305-Lower Crooked, 17070306-Lower Deschutes, 17080001-Lower Columbia-Sandy, 17080002-Lewis, 17080003-Lower Columbia-Clatskanie, 17080004-Upper Cowlitz, 17080005-Lower Cowlitz, 17090001-Middle Fork Willamette, 17090003-Upper Willamette, 17090004-McKenzie, 17090006-South Santiam, 17090007-Middle Willamette, 17090009-Molalla-Pudding, 17090012-Lower Willamette, 17100102-Queets-Quinalt, 17100103-Upper Chehalis, 17100103-Upper Chehalis, 17100104-Lower Chehalis, 17100105-Gray Harbor, 17100106-Willapa Bay, 17110015-Nisqually, 17110016-Deschutes, and 17110019-Puget Sound).

Dear Mr. Van Hoesen:

This correspondence is in response to your request for informal consultation under the Endangered Species Act (ESA).

### Endangered Species Act

The National Marine Fisheries Service (NMFS) has reviewed the Draft Biological Assessment, received on May 10, 2011 and the July 2011 Final Biological Assessment (BA) for the above-referenced proposal, received on July 13, 2011. The U.S. Department of the Army (DOA) is requesting concurrence with its determination that the proposed action "may affect, but is not likely to adversely affect" certain ESA listed species of fish, marine mammals, sea turtles and designated critical habitat for those species. This informal consultation with NMFS is conducted under section 7(a)(2) of the ESA, and its implementing regulations, 50 CFR Part 402.



## Proposed Action

The Department of the Army (DOA) 160<sup>th</sup> Special Operations Aviation Regiment (SOAR), based out of Joint Base Lewis-McChord (JBLM), is proposing to establish three new helicopter aerial refueling routes (Routes 1-3), see Figure 1; extend one existing aerial refueling route (AR304), see Figure 2; make use of an existing aerial refueling route (AR305), see Figure 2; establish a new low-level flight training area, see Figure 3; and establish a new terrain following multi-mode radar training route (TF/MMR), see Figure 4. The routes and training area would support training operations based out of JBLM, but would be located off-post, primarily in western Washington and northwestern Oregon. Training operations would be conducted by the 160<sup>th</sup> SOAR, with MH-60 Blackhawk helicopters and MH-47 Chinook helicopters. Aerial refueling operations would also involve C-130 Hercules tankers. The 4<sup>th</sup> Battalion of the 160<sup>th</sup> SOAR is expected to begin off-post training as soon as the appropriate approvals are granted. Additionally, 160<sup>th</sup> SOAR units from other installations would use the training routes and area. The proposed routes range from 30-43 nautical miles in length, and each route would include an area of airspace extending out 2-6 nautical miles from each side of the center line (route buffer), depending on the route. The proposed low level training area would cover approximately 496,500 acres (776 square miles). The routes and training area would be available for use 24 hours a day, 365 days a year, with some restrictions on weekend and holiday use during the summer.



Figure 1. Proposed Aerial Refueling Routes 1, 2, and 3.

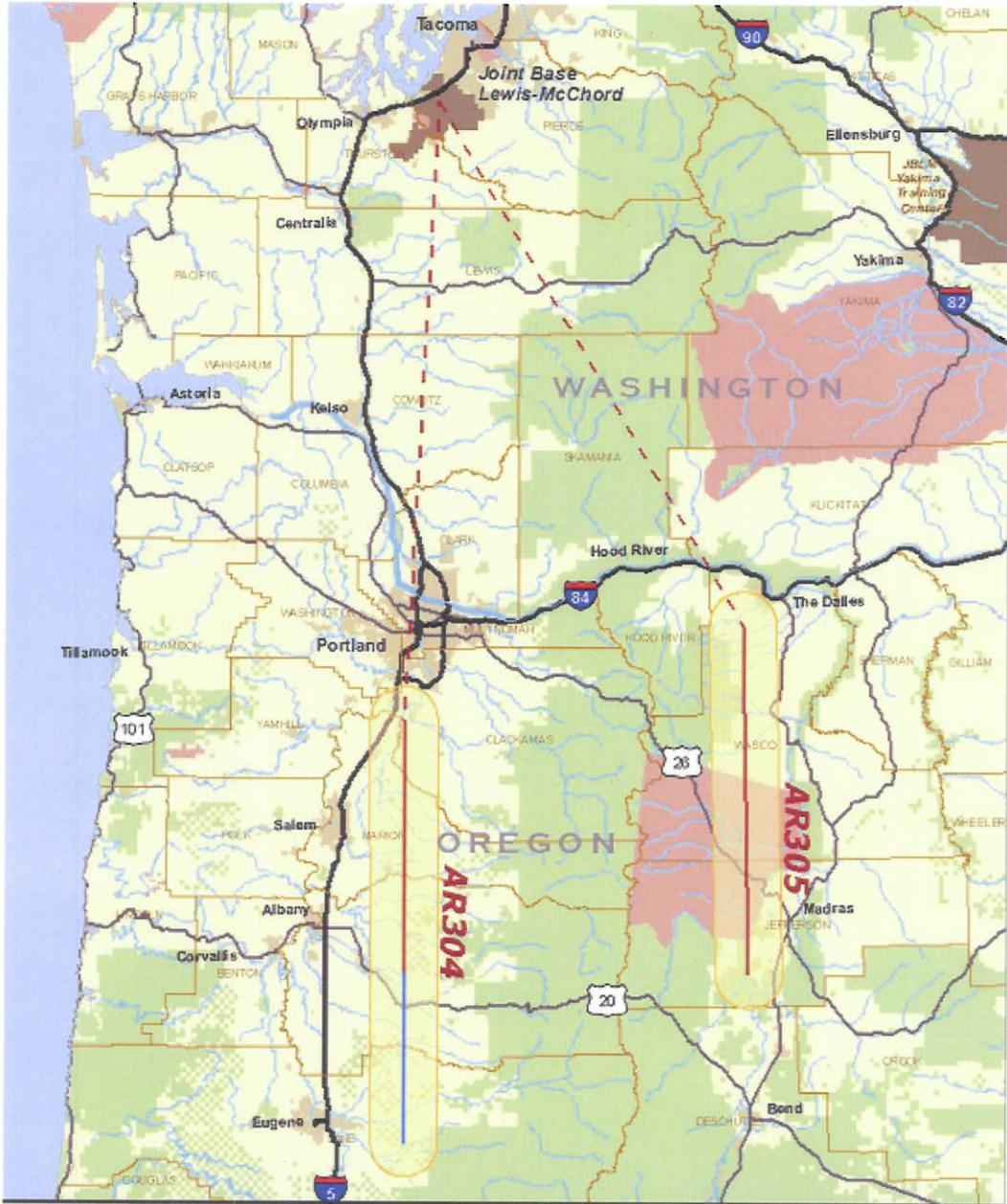


Figure 2. Proposed Aerial Refueling Routes AR304 and AR305

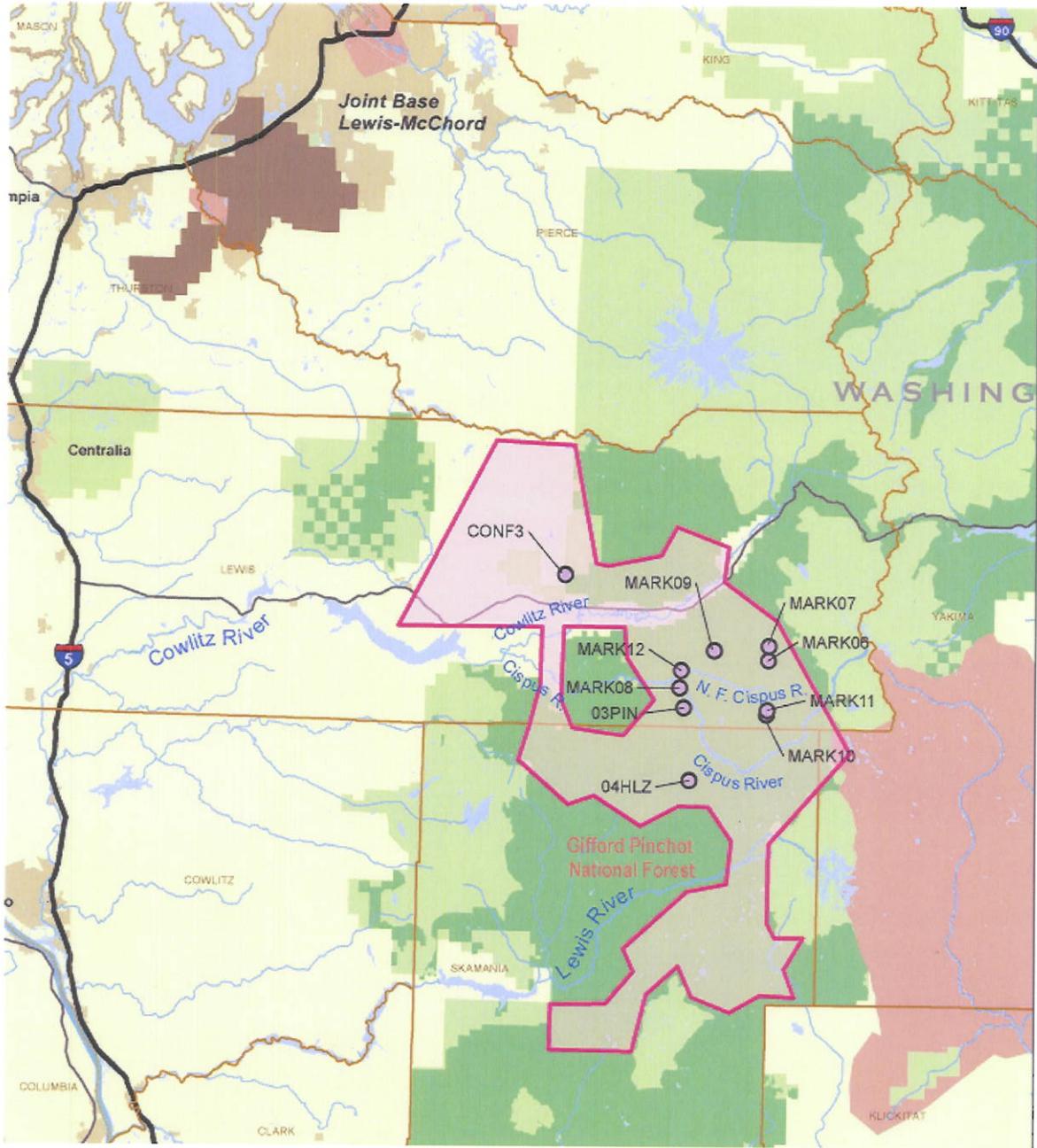


Figure 3. Proposed Low Level Training Area

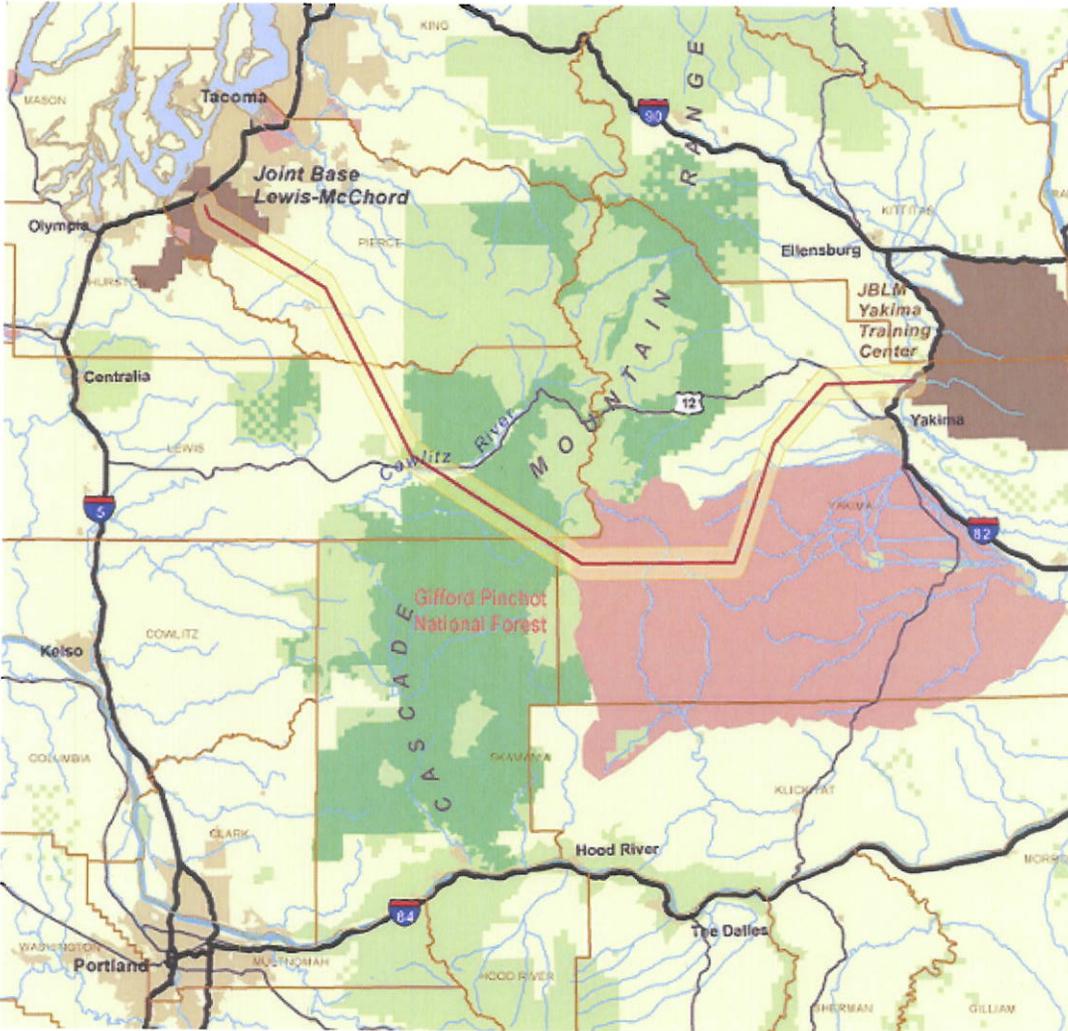


Figure 4. Proposed Terrain-Following/Multi-Mode Radar Route

The proposed frequency of use is 50 times per year for each refueling route, with each training period lasting a maximum of three hours. Fuel transfer would take place during a 30-minute time frame within the training period, and the remainder of the time would be used for dry contacts and disconnects to gain proficiency. A typical training mission would involve completion of four tasks while flying along the refueling route; link-up, hook-up, transfer of fuel, and disconnect. During each training mission, from two to ten aircraft would be utilized. Aircraft would typically operate at speeds ranging from 121 to 132 miles per hour. During one training session, aircraft may use the entire route or just portion of it, and could complete one or more runs down the route and back up. Typical exercises for the three proposed new routes would entail six passes along Routes 1 and 2, twelve passes along Route 3, and five passes along existing Route AR304 with its proposed extension and existing Route AR305. Aircraft traveling to and from the proposed routes would not follow a set flight path.

Within the low level training operations area (located over 45 miles from Puget Sound and over 100 miles from the Pacific Ocean, associated bays and harbors), helicopters would perform various mission-essential tasks that involve flying at low altitudes, from the ground surface to a height of 500 feet above treetop

level. Tasks could include following the contours of the earth as low as 50 feet above the highest obstacle, formation flight, confined area approaches, hovering, low-level navigation, sling load operation, and other flight and maneuvering of helicopters. Pilots would also land at various locations within the training area to practice tasks such as confined area landings. There would be no refueling, expending of live ordnance, or actual movement of troops or equipment between helicopters and the ground within the low level training area. It is estimated that 10-20 landings would occur during each training session, which would last approximately three hours, and involve no more than two helicopters. Landings would take place at one or more of 10 identified zones that include abandoned rock quarry locations, rocky peaks, and roads. Landing zones vary in size from approximately 10,000 square feet to 5 acres and all are presently cleared of larger vegetation. It is assumed that these zones would not require any alterations or maintenance to make them usable for training purposes.

The proposed TF/MMR route is a new instrument rules route between JBLM and JBLM-Yakima Training Center (YTC). Use of this route would include flying during periods of inclement weather, and proficiency/qualification training in terrain following using multi-mode radar. During these exercises aircraft would fly at altitudes of 300 to 500 feet above treetop level and take place approximately 60 times per year. A typical exercise would be conducted by two helicopters, leaving 15 minutes apart, flying to JBLM-YTC and back. Total time in the air would be about two hours.

### **Action Area**

The proposed action would occur in western and central Washington and northwestern Oregon. The project location would include: 1) airspace along the five aerial fueling routes (three new routes, one extended route, and one existing route), see Figures 1 and 2; 2) a 496,500 acre low-level training area, see Figure 3; and 3) one new TF/MMR route, see Figure 4.

The action area is comprised of the project locations (including land and water areas underneath the airspace component of the project locations); land and water areas underneath the airspace used when flying to and from the routes and low-level training area; and, route buffers extending out 2-6 nautical miles on each side of each route's centerline. This buffer variation allows aircraft room to maneuver in response to weather, aircraft traffic, geographic constraints, turning and course reversal needs, and local ordinance buffers. The project location is very large in geographic extent, which encompasses diverse conditions that include; managed forests (private, state and federal), Native American reservations, rural and urban communities, and a wide range of water bodies.

### **Species Determination**

NMFS has determined that the range of 21 ESA-listed species, attributed to multiple evolutionarily significant units (ESUs) or distinct population segments (DPSs), overlap with the broad geography of the action area and are therefore considered for the potential effects of the action. These species and their listing status are summarized in Table 1 appended to this letter.

*ESA-listed Salmonids of the Columbia Basin and Puget Sound, Puget Sound/Georgia Basin Rockfish, Southern DPS Eulachon, and Southern DPS North American Green Sturgeon*

The southern DPS of Pacific eulachon, southern DPS of North American green sturgeon, Columbia River salmon and steelhead, and Puget Sound salmon and steelhead all occur within the action area. Eulachon generally occur in nearshore ocean water to depths of 1,000 feet and make spawning runs into their birth streams from December through February. The only known spawning population of Southern DPS North American green sturgeon occurs in the Sacramento River. Adults migrate into the river to spawn between April and July. Juveniles spend 1 to 4 years in freshwater before migrating to the ocean. During late summer and early fall, sub-adult and non-spawning adult green sturgeon can frequently be found aggregating in estuaries along the Pacific Coast, particularly in the area covered by aerial refueling route 2 (Figure 1).

Freshwater life history stages for salmonids encompass adult upstream migrants (spawning run), adult spawners, downstream migrating adults (steelhead only), rearing fry and juveniles, and downstream migrating fry and juveniles. Upon entering the marine environment, salmonids use estuaries, coastal areas, and make extensive offshore migrations for rearing before returning to their natal streams to spawn. They remain at sea for a period ranging from 2-3 months up to 6 years dependent upon race and species. Location and time of year will determine how many life stages of the above mentioned fish species will be present and potentially exposed to effects of this action.

Puget Sound/Georgia Basin bocaccio, yelloweye rockfish and canary rockfish can be found throughout the water column with larvae and juveniles remaining in open waters for several months. Juveniles and sub-adults are associated with nearshore area (less than 100 feet deep) habitats such as rocky reefs, kelp canopies, and artificial structures. Adults generally move into deeper water as they age and are very long lived, in some cases exceeding 50 years old. Location and time of year will determine how many life stages of the above mentioned fish species will be present and potentially exposed to effects of this action.

*Sea Turtles and Marine Mammals*

Four species of sea turtles, listed in Table 1, are known to occur in marine waters within the action area, including the green, leatherback, Olive Ridley, and loggerhead. These sea turtle species are generally migratory and pelagic in nature, except during egg laying and a brief period as hatchlings. For the most part, these species are uncommon and historically have not bred or nested in or near the action area. Life history stages that may be exposed to the effects of this action include juveniles, sub-adults and adults.

Seven species of marine mammals, listed in Table 1, are also known to occur in marine waters within the action area. The blue, sperm and sei whales are expected to rarely make use of the action area. Blue whales are highly migratory, their distribution is largely determined by food resources, and they are often seen adjacent to the California coast south of Monterey Bay. Populations typically move pole-ward in spring to reach areas of high zooplankton productivity, and towards the tropics in winter to breed and avoid ice entrapment. Blue whales have been observed just three times in the last 50 years off the Washington coast. Sperm whales are the most abundant of the large species and are present off the Oregon and Washington coast during all seasons except for mid-winter (December-February) months. They prefer ocean waters far from land, deeper than 2,000 feet and are uncommon in depths of 1,000 feet or less. Sperm whales feed primarily on medium to large squid, breed in the spring, and have a very low

reproductive rate (4-6 year inter-birth interval). Sei whales are most frequently found in deep water of the open ocean in temperate latitudes where food items include krill, copepods, squid, and schooling fish (anchovy, herring, etc.). Females typically give birth every 2-3 years.

Killer whales, fin whales and humpback whales can be found in the action area more frequently. Killer whales are the most widely distributed cetacean in the world with three distinct forms recognized in the eastern North Pacific; resident whales, transient whales and offshore whales. The southern resident DPS of killer whales is the only population listed as endangered and consists of three pods that reside in the inland waters of Washington and British Columbia from spring to fall. This population is found in shallower coastal and inland waters and is strongly associated with areas of high salmon abundance. From 1996 to 2001 this population has declined by nearly 20 percent and is currently estimated to consist of approximately 88 individuals. Fin whales typically utilize mixing zones between coastal and oceanic waters, which occur along the edge of the continental shelf. They are known to congregate off the coast of Oregon during the summer and acoustic signals have been detected off both the Washington and Oregon coasts. There are no resident humpback whales in Washington or Oregon but they can be seen feeding off the coasts of these states during fall and spring when migrating. In summer, this species feeds on krill and schooling fish such as mackerel, herring and cod in southern Alaskan waters. They migrate to warmer waters near the Hawaiian Islands in the fall where breeding occurs and calves are born and raised.

Steller sea lions reside year-round along the outer coast of Washington and Oregon and make use of the action area. However, no rookeries or critical habitat have been identified within the action area. This species makes use of a variety of terrestrial and marine habitats but are typically found near shore. Steller sea lions are generalist predators that eat a variety of fish, cephalopods and occasionally other marine mammals and birds.

None of the training routes pass over Puget Sound or the Strait of Georgia, where listed rockfish reside. However, SOAR helicopters could potentially pass over Puget Sound and other aquatic habitats for listed fish on their way to and from the proposed routes. Training routes are situated over locations where eulachon, sea turtles, whales, Steller sea lions and salmonids are known to occur.

### **Effects of the Action**

Potential effects of the action on ESA listed salmonids, green sturgeon, rockfish and eulachon (Table 1) includes noise disturbance, shadows from aircraft passing over streams, siltation due to rotor wash in landing zones, and accidental releases of fuel. In general, the greatest impacts could occur within the low-level training area, where low-altitude helicopter flights and landings would take place, and helicopters would be closest to fish-bearing waters. Helicopter refueling Routes 1 and 2 would pass over the Pacific Ocean adjacent to Washington where listed species of sea lion, sea turtles and whales (Table 1) occasionally occur. Potential effects of the action on these species include noise disturbance and accidental fuel spills. The NMFS has analyzed the potential impacts of the project actions and has determined that effects would be insignificant or discountable. Rationale for these determinations is provided below for each potential effect and each species evaluated.

### *Sound Effects*

Effects on listed fish species are expected to be minimal as sound transmits poorly from air to water and aircraft in the majority of the action area would be flying at altitudes of at least 500 feet or greater. In the low altitude training area, helicopters would practice landing and other low level maneuvers, likely creating greater noise levels. Of the 10 proposed landing zones, the two closest to fish bearing waters (Cispus River) are LZMark8 and LZMark12, at approximately 650 and 450 feet respectively. Dense forest exists between these two sites and the Cispus River that would further dampen noise to some degree. In consideration of this information, effects of sound on listed fish species would be discountable.

Refueling operations conducted along proposed Routes 1 and 2 would pass over the Pacific Ocean where listed species of sea turtles, whales, and Steller sea lions occasionally occur. Recent information provided by the Department of the Navy suggest that sea turtles at or near the water surface can hear sound from low-flying aircraft but behavioral reactions are based more on visual cues than auditory cues (Department of the Navy 2010). Guidance for whale watching typically requires aircraft to be at a minimum altitude of 1,000 feet to avoid disturbing whales. The Olympic Coast National Marine Sanctuary, located within the action area beneath Route 1, prohibits flying motorized aircraft less than 2,000 feet. It is possible that aircraft traveling between JBLM and the proposed refueling routes would pass over habitats utilized by Steller sea lions. But, SOAR pilots would also comply with the Olympic Coast National Marine Sanctuary regulations when traveling between JBLM and refueling routes 1 and 2. The proposed training along the above mentioned routes would occur at a minimum elevation of 2,300 feet on up to 5,000 feet. Given the high altitudes that will be maintained during refueling activities no visual disturbance is anticipated and sound effects are expected to be minimal. Also, the limited frequency of the training activity (six passes along each route, 50 times per year) will minimize impacts as well. Considering the above information, effects of sound on sea turtles, whales and Steller sea lions would be insignificant.

### *Shadow Effects*

Aircraft flying over streams could produce shadows that might be interpreted by fish as predators, causing them to seek cover. If frequent enough, this action would have energetic costs on individuals resulting in an adverse effect. It is presently unknown how much helicopters passing over streams might alter the behavior of listed fish. Over most of the action area aircraft would fly high enough (as mentioned above) that shadow effects would be unlikely. However, on the low level training route and in the low altitude training area, helicopters flying at low levels over streams could potentially create shadows over that habitat. Fish bearing waters do not occur within any of the proposed landing zones, which would be a minimum of 450-650 feet away. Because shadows will occur extremely infrequently from overhead traffic, their effect is considered insignificant.

### *Rotor Wash Effects*

Helicopter training in the low altitude training area might stir up soil through rotor wash and cause some minor sedimentation into streams where salmonids reside. The greatest risk for effects would be in those locations where loose, highly erodible soil exists. Dense forest exists between the two landing zones nearest to fish bearing water that are 450 and 650 feet away. The landing zones are not newly created and have been well established (with some vegetation) for many years. Only minor amounts of dust will be

produced by rotor wash that will not likely be transported to fish bearing waters. Therefore, effects from rotor wash will be discountable.

### *Accidental Fuel Spill Effects*

In the event of hose damage during refueling, the resulting release of fuel could affect aquatic habitats that support listed fish species or cause direct adverse health effects should fuel reach fish bearing waters in toxic concentrations. To prevent a loss of fuel, aircraft are equipped with shut-off valves that automatically stop the flow of fuel in the event that a refueling hose breaks. So, the amount of fuel released during such an event would be limited to the amount of fuel present in the hose at the time of breakage, which would be approximately 34 gallons. The amount of fuel reaching the ground would vary depending upon factors such as the altitude and speed of the tanker, as well as atmospheric conditions. Under a worst case scenario, the amount reaching the ground would range from 16 gallons under average conditions to 25 gallons on a cold day. Fuel would be dispersed over a wide area, given the height of aerial refueling would be 1,500 feet and higher. In a similar study for refueling operations at 2,000 feet (610 meters), it was predicted that the spilled fuel would be spread out over an area of 31 acres (13 hectares), or about 0.75 milliliters of fuel per square meter of land (Dial Cordy and Associates, Inc. 2006a and b). At 1,500 feet the area would be smaller depending upon conditions.

Polycyclic aromatic hydrocarbons (PAHs) in fuel are toxic to fish in high concentrations, particularly during early life history stages. Chronic exposures can also cause lethal and sub-lethal effects. It is unlikely that the small amount of fuel potentially released during a refueling mishap would be large enough to kill any fish present in exposed aquatic habitats. The small amount of fuel that may reach the ocean surface would be spread out over a large area and at that quantity will be quickly diluted, dispersed and dissipated by wind and currents. Similarly, any amount reaching surface streams or rivers would also be quickly diluted. Chronic effects are also unlikely given the very low rates of fuel spills by the 160<sup>th</sup> SOAR and the environmental degradability of PAH compounds. Since 1972 there have only been three occasions, on all its refueling routes worldwide, where damage to refueling equipment likely resulted in fuel releases. This corresponds to a rate of less than 1 event per 13,000 hours flown. Risk is further reduced given the limited frequency of the training activity (six passes along each route, 50 times per year). The 160<sup>th</sup> SOAR will notify the Washington State Habitat Conservation Division Office in Lacey, Washington of any fuel spills within eight hours of the accident. Considering the above information, effects from accidental fuel spills are considered insignificant.

### *Effects Summary*

Based on the above factors, NMFS concurs with the determination that the project “may affect, but is not likely to adversely affect” the species listed in Table 1.

### **Critical Habitat**

Critical habitat within the action area has been designated for Columbia River and Puget Sound salmon and steelhead, North American green sturgeon, killer whales, leatherback sea turtles, and is proposed for eulachon.

*Columbia River and Puget Sound Salmon and Steelhead*

The NMFS has designated critical habitat as shown for the salmon listed in Table 1. The Primary Constituent Elements (PCEs) for critical habitat in the action area are:

1. Offshore marine areas with water quality conditions and forage, including aquatic invertebrates and fishes, supporting growth and maturation.
2. Nearshore marine areas free of obstruction and excessive predation with: (i) water quality and quantity conditions and forage, including aquatic invertebrates and fishes, supporting growth and maturation; and (ii) natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, and side channels.
3. Estuarine areas free of obstruction and excessive predation with: (i) water quality, water quantity, and salinity conditions supporting juvenile and adult physiological transitions between fresh- and saltwater; (ii) natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels; and (iii) juvenile and adult forage, including aquatic invertebrates and fishes, supporting growth and maturation.
4. Freshwater spawning sites with water quantity and quality conditions and substrate supporting spawning, incubation and larval development.
5. Freshwater migration corridors free of obstruction and excessive predation with water quantity and quality conditions and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels, and undercut banks supporting juvenile and adult mobility and survival.
6. Freshwater rearing sites with: (i) water quantity and floodplain connectivity to form and maintain physical habitat conditions and support juvenile growth and mobility; (ii) water quality and forage supporting juvenile development; and (iii) natural cover such as shade, submerged and overhanging large wood, log jams and beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks.

The NMFS has analyzed the potential impacts of the project on these PCEs and determined that the potential effects will be insignificant or discountable for the following reasons. The effects of noise disturbance and shadows from aircraft passing over streams are temporary and of short duration, which would not permanently alter critical habitat. Sound transmits poorly from air to water and shadows produced by aircraft will be moving quickly in association with the low level training route. Landing zones in the low altitude training area are no closer than 450 feet to fish bearing water. Travel to and from refueling routes will also maintain elevations greater than 500 feet. Refueling routes will all occur at elevations greater than 1,500 feet. The potential for siltation associated with rotor wash in landing zones is very unlikely due to distances from fish bearing water. Accidental releases of fuel by SOAR occur at a rate of less than 1 event per 13,000 hours flown. Under a worst case scenario, the amount reaching the ground would range from 16 gallons under average conditions to 25 gallons on a cold day. Fuel would be dispersed over a wide area, given the height of aerial refueling. Risk is further reduced given the limited frequency of the training activity (six passes along each route, 50 times per year). Therefore, NMFS

concurs with your determination that the project “may affect, but is not likely to adversely affect” designated critical habitat of the salmonid species listed in Table 1.

*Southern Distinct Population Segment North American Green Sturgeon*

The primary constituent elements essential for the conservation of the Southern DPS of green sturgeon in the action area are:

For freshwater riverine systems:

1. Abundant prey items for larval, juvenile, subadult, and adult life stages.
2. Substrates suitable for egg deposition and development (e.g. bedrock sills and shelves, cobble and gravel, or hard clean sand, with interstices or irregular surfaces to “collect” eggs and provide protection from predators, and free of excessive silt and debris that could smother eggs during incubation), larval development (e.g. substrates with interstices or voids providing refuge from predators and from high flow conditions), and subadults and adults (e.g. substrates for holding and spawning).
3. A flow regime (i.e. the magnitude, frequency, duration, seasonality, and rate-of-change of fresh water discharge over time) necessary for normal behavior, growth, and survival of all life stages.
4. Water quality, including temperature, salinity, oxygen content, and other chemical characteristics, necessary for normal behavior, growth, and viability of all life stages.
5. A migratory pathway necessary for the safe and timely passage of Southern DPS fish within riverine habitats and between riverine and estuarine habitats (e.g. an unobstructed river or dammed river that still allows for safe and timely passage).
6. Deep ( $\geq 5$  m) holding pools for both upstream and downstream holding of adult or subadult fish, with adequate water quality and flow to maintain the physiological needs of the holding adult or subadult fish.
7. Sediment quality (i.e. chemical characteristics) necessary for normal behavior, growth, and viability of all life stages

For estuarine habitats:

1. Abundant prey items within estuarine habitats and substrates for juvenile, subadult, and adult life stages.
2. Water quality, including temperature, salinity, oxygen content, and other chemical characteristics, necessary for normal behavior, growth, and viability of all life stages.
3. A migratory pathway necessary for the safe and timely passage of Southern DPS fish within estuarine habitats and between estuarine and riverine or marine habitats.

4. A diversity of depths necessary for shelter, foraging, and migration of juvenile, subadult, and adult life stages.
5. Sediment quality (i.e. chemical characteristics) necessary for normal behavior, growth, and viability of all life stages.
6. A migratory pathway necessary for the safe and timely passage of Southern DPS fish within marine and between estuarine and marine habitats.

For nearshore coastal marine areas:

1. Nearshore marine waters with adequate dissolved oxygen levels and acceptably low levels of contaminants (e.g. pesticides, organochlorines, elevated levels of heavy metals) that may disrupt the normal behavior, growth, and viability of subadult and adult green sturgeon.
2. Abundant prey items for subadults and adults, which may include benthic invertebrates and fishes.

The NMFS has analyzed the potential impacts of the project on the above features and determined that effects on them will be insignificant or discountable for the same reasons as those listed above for salmon and steelhead. Therefore, NMFS concurs with your determination that the project “may affect, but is not likely to adversely affect” proposed critical habitat of the southern DPS North American green sturgeon.

#### *Southern Distinct Population Segment Pacific Eulachon*

The NMFS proposed critical habitat for eulachon on January 5, 2011 (76 FR 515), which identified those physical or biological features essential to the conservation of the species that require special management considerations or protection. The essential features for freshwater critical habitat in the action area are:

1. Freshwater spawning and incubation sites with water flow, quality and temperature conditions and substrate supporting spawning and incubation.
2. Freshwater migration corridors free of obstruction and with water flow, quality and temperature conditions supporting larval and adult mobility, and with abundant prey items supporting larval feeding after the yolk sac is depleted.

The NMFS has analyzed the potential impacts of the project on the above features and determined that effects on them will be insignificant or discountable for the same reasons as those listed above for salmon and steelhead. Therefore, NMFS concurs with your determination that the project “may affect, but is not likely to adversely affect” proposed critical habitat of the southern DPS Pacific eulachon.

#### *Southern Resident Killer Whale*

The NMFS designated critical habitat for killer whales on November 29, 2006 (71 FR 229), which identified those physical and biological features essential to the conservation of the species and they are:

1. Water quality to support growth of the whale population and development of individual whales.
2. Prey species of sufficient quantity, quality and availability to support individual growth, reproduction and development, as well as overall population growth.
3. Passage conditions to allow for migration, resting, and foraging.

The NMFS has analyzed the potential impacts of the project on the above features and determined that effects on them will be insignificant or discountable for the following reasons. Only aircraft traveling between JBLM and Routes 1 and 2 would potentially fly over critical habitat for killer whales. A minimum 2,300 foot elevation has been established that will be maintained when flying between those points. This will preclude the occurrence of any potential sound effects. None of the training routes for refueling are located over critical habitat for killer whales, so there is no risk of accidental spills. Therefore, NMFS concurs with your determination that the project “may affect, but is not likely to adversely affect” designated critical habitat of the southern resident killer whale.

#### *Leatherback Sea Turtle*

The NMFS designated critical habitat for leatherback sea turtles on January 26, 2012 (77 FR 4170), which identified those physical and biological features essential to the conservation of the species. The primary constituent element essential for the conservation of the leatherback sea turtle in the action area is: The occurrence of prey species, primarily scyphomedusae of the order Semaestomeae (e.g., *Chrysaora*, *Aurelia*, *Phacellophora*, and *Cyanea*), of sufficient condition, distribution, diversity, abundance and density necessary to support individual as well as population growth, reproduction, and development of leatherbacks.

The NMFS has analyzed impacts of the project on this PCE and determined that the potential effects will be insignificant for the following reasons. The effects of noise disturbance and shadows from aircraft passing overhead would be temporary and of short duration, which would not permanently alter critical habitat. Accidental releases of fuel by SOAR occur at a rate of less than 1 event per 13,000 hours flown. Under a worst case scenario, the amount reaching the ground would range from 16 gallons under average conditions to 25 gallons on a cold day. Fuel would be dispersed over a wide area, given the height of aerial refueling. Risk is further reduced given the limited frequency of the training activity (six passes along each route, 50 times per year). Therefore, NMFS concurs with your determination that the project “may affect, but is not likely to adversely affect” designated critical habitat for leatherback sea turtles.

This concludes informal consultation pursuant to the regulations implementing the ESA, 50 CFR 402.13. The DOA must reinitiate this ESA consultation if: (1) new information reveals effects of the action that may have affected listed species in a way not previously considered; or (2) the action is subsequently modified in a manner that caused an effect to the listed species or critical habitat that was not previously considered, or (3) a new species is listed or critical habitat for another species is designated that may be affected by this project. In addition, if the proposed action continues more than 10 years from the date of this LOC, it will be necessary to reinitiate consultation. The effects analysis in this LOC is based on the best information currently available. After 10 years of the proposed action, NMFS does not expect that information to be reliably current. Accordingly, this LOC covers the proposed action only to the extent that it occurs within 10 years of the signature date.

The NMFS appreciates your efforts to comply with requirements under the ESA. If you have questions, please contact Tim Rymer at the Washington State Habitat Office, (360) 753-4126), or email [Tim.Rymer@noaa.gov](mailto:Tim.Rymer@noaa.gov).

Sincerely,



 William W. Stelle, Jr.  
Regional Administrator

**Table 1.** Federal Register notices for final rules that list threatened and endangered species, designate critical habitats, or apply protective regulations to listed species considered in this consultation.

Species	ESU or DPS	Original Listing Notice	Listing Status Reaffirmed	Critical Habitat	Protective Regulations
Chinook salmon ( <i>Oncorhynchus tshawytscha</i> )	Lower Columbia River	3/24/99 64 FR 14308 Threatened	8/15/1176 FR 50448 Threatened	9/02/05 70 FR 52630	6/28/05 70 FR 37160
	Upper Willamette River spring-run	3/24/99 64 FR 14308 Threatened	8/15/1176 FR 50448 Threatened	9/02/05 70 FR 52630	6/28/05 70 FR 37160
	Upper Columbia River spring-run	E 3/24/99 64 FR 14308 Endangered	8/15/1176 FR 50448 Endangered	9/02/05 70 FR 52630	ESA section 9 applies
	Snake River spring/summer run	4/22/92 57 FR 14653 Threatened	8/15/1176 FR 50448 Threatened	10/25/99 64 FR 57399	6/28/05 70 FR 37160
	Snake River fall-run	4/22/92 57 FR 14653 Threatened	8/15/1176 FR 50448 Threatened	12/28/93 58 FR 68543	6/28/05 70 FR 37160
	Puget Sound	3/24/99 64 FR 14308 Threatened	8/15/11 76 FR 50448 Threatened	9/02/05 70 FR 52630	6/28/05 70 FR 37160
Chum salmon ( <i>O. keta</i> )	Columbia River	3/25/99 64 FR 14507 Threatened	8/15/1176 FR 50448 Threatened	9/02/05 70 FR 52630	6/28/05 70 FR 37160
Coho salmon ( <i>O. kisutch</i> )	Lower Columbia River	6/28/05 70 FR 37160 Threatened	8/15/1176 FR 50448 Threatened	In development	6/28/05 70 FR 37160
Sockeye salmon ( <i>O. nerka</i> )	Snake River	11/20/91 56 FR 58619 Endangered	8/15/1176 FR 50448 Endangered	12/28/93 58 FR 68543	ESA section 9 applies
Steelhead ( <i>O. mykiss</i> )	Lower Columbia River	3/19/98 63 FR 13347 Threatened	8/15/1176 FR 50448 Threatened	9/02/05 70 FR 52630	6/28/05 70 FR 37160
	Upper Willamette River	3/25/98 64 FR 14517 Threatened	8/15/1176 FR 50448 Threatened	9/02/05 70 FR 52630	6/28/05 70 FR 37160
	Middle Columbia River	3/25/98 64 FR 14517 Threatened	8/15/1176 FR 50448 Threatened	9/02/05 70 FR 52630	6/28/05 70 FR 37160
	Upper Columbia River	8/18/97 62 FR 43937 Endangered	8/15/1176 FR 50448 Endangered	9/02/05 70 FR 52630	6/28/05 70 FR 37160
	Snake River Basin	8/18/97 62 FR 43937 Threatened	8/15/1176 FR 50448 Threatened	9/02/05 70 FR 52630	6/28/05 70 FR 37160
	Puget Sound	5/11/07 72 FR 26722 Threatened	8/15/11 76 FR 50448 Threatened	In development	9/25/08 73 FR 55451
Pacific eulachon ( <i>Thaleichthys pacificus</i> )	Southern DPS	3/12/10 75 FR 13012 Threatened	Not applicable	10/20/11 76 FR 65324	In development
North American Green Sturgeon ( <i>Acipenser medirostris</i> )	Southern DPS	04/07/06 71 FR 17757 Threatened	Not applicable	10/09/09 74 FR 52300	06/02/2010 74 FR 30714 Proposed
Yelloweye rockfish ( <i>Sebastes ruberrimus</i> )	Puget Sound/ Georgia Basin	4/28/2010 75 FR 22276 Threatened	Not applicable	In development	In development
Canary rockfish ( <i>S. pinniger</i> )	Puget Sound/ Georgia Basin	4/28/2010 75 FR 22276 Threatened	Not applicable	In development	In development

Species	ESU or DPS	Original Listing Notice	Listing Status Reaffirmed	Critical Habitat	Protective Regulations
Bocaccio ( <i>S. paucispinis</i> )	Puget Sound/ Georgia Basin	4/28/2010 75 FR 22276 Threatened	Not applicable	In development	In development
Leatherback Sea Turtle ( <i>Dermochelys coriacea</i> )	All Populations	6/2/1970 35 FR 8491 Endangered	Not applicable	9/26/1978 43 FR 43688	ESA section 9 applies
				3/23/1979 44 FR 17710	ESA section 9 applies
				1/26/2012 77 FR 4170	ESA section 9 applies
Green Sea Turtle ( <i>Chelonia mydas</i> )	All other Populations	7/28/1978 43 FR 32800 Threatened	Not applicable	9/2/98 63 FR 46693	7/28/1978 43 FR 32800
Olive Ridley Sea Turtle ( <i>Lepidochelys olivacea</i> )	Mexican Pacific coast breeding populations	7/28/1978 43 FR 32800 Endangered	Not applicable	Not applicable	ESA section 9 applies
	All other populations	7/28/1978 43 FR 32800 Threatened	Not applicable	Not applicable	7/28/1978 43 FR 32800
Loggerhead Sea Turtle ( <i>Caretta caretta</i> )	Northeast Atlantic Ocean, Mediterranean Sea, North Indian Ocean, North Pacific Ocean, and South Pacific Ocean	9/22/2011 76 FR 58868 Endangered	Not applicable	Not applicable	ESA section 9 applies
	Northwest Atlantic Ocean, South Atlantic Ocean, Southeast Indo-Pacific Ocean, and Southwest Indian Ocean	9/22/2011 76 FR 58868 Threatened	Not applicable	Not applicable	7/28/1978 43 FR 32800
Killer Whale ( <i>Orcinus orca</i> )	Southern Resident	11/18/2005 70 FR 69903 Endangered	3/17/11 5-year status review summary and evaluation	11/29/2006 71 FR 69054	3/22/2007 72 FR 13464 Proposed
Blue Whale ( <i>Balaenoptera musculus</i> )	All Populations	12/2/1970 35 FR 18319 Endangered	Not applicable	Not applicable	ESA section 9 applies
Fin Whale ( <i>Balaenoptera physalus</i> )	All Populations	12/2/1970 35 FR 18319 Endangered	Not applicable	Not applicable	ESA section 9 applies
Sei Whale ( <i>Balaenoptera borealis</i> )	All Populations	12/2/1970 35 FR 18319 Endangered	Not applicable	Not applicable	ESA section 9 applies
Sperm Whale ( <i>Physeter macrocephalus</i> )	All Populations	12/2/1970 35 FR 18319 Endangered	Not applicable	Not applicable	ESA section 9 applies
Humpback Whale ( <i>Megaptera novaeangliae</i> )	All Populations	12/2/1970 35 FR 18319 Endangered	Not applicable	Not applicable	ESA section 9 applies
Steller Sea Lion ( <i>Eumetopias jubatus</i> )	Eastern	11/26/1990 55 FR 49204 Threatened	Not applicable	8/27/1993 58 FR 45269	ESA section 9 applies

## REFERENCES

- Department of the Navy, 2010. Final Environmental Impact Statement/Overseas Environmental Impact Statement, Northwest Training Range complex. Silverdale, Washington.
- Dial Cordy and Associates, Inc.. 2006a. Final Environmental Assessment for Aerial Refueling Training Routes, 160<sup>th</sup> Special Operations Aviation Regiment, Fort Campbell, Kentucky. Prepared for U.S. Army Special Operations Command and U.S. Army Corps of Engineers, Savannah District. Wilmington, North Carolina.
- Dial Cordy and Associates, Inc.. 2006b. Final Environmental Assessment for Aerial Refueling Training Routes, 160<sup>th</sup> Special Operations Aviation Regiment, Hunter Army Airfield, Georgia. Prepared for U.S. Army Special Operations Command and U.S. Army Corps of Engineers, Savannah District. Wilmington, North Carolina.



# United States Department of the Interior



FISH AND WILDLIFE SERVICE

Washington Fish and Wildlife Office  
510 Desmond Dr. SE, Suite 102  
Lacey, Washington 98503

RECEIVED  
21 Feb 12

*[Handwritten signature]*

FEB 16 2012

In Reply Refer To:  
13410-2011-I-0365

Bill Van Hoesen  
Department of the U.S. Army  
Directorate of Public Works  
Building 2012, Room 302 Liggett Avenue  
Box 339500, MS 17  
Joint Base Lewis-McChord, Washington 98433-9500

Dear Mr. Van Hoesen:

Subject: Northwest Aviation Operations, 160<sup>th</sup> Special Operations Aviation Regiment

This letter responds to your request for informal consultation under section 7(a)(2) of the Endangered Species Act of 1973, (Act) as amended (16 U.S.C. 1531 *et seq.*) on the proposed Northwest Aviation Operations, 160th Special Operations Aviation Regiment. Your Biological Assessment (BA; U.S. Army 2011), dated July, 2011, was received in the Washington Fish and Wildlife Office of the U.S. Fish and Wildlife Service (Service) on July 13, 2010.

In your letter, you requested our concurrence with your determinations that the project "may affect, is not likely to adversely affect" endangered Bradshaw's desert-parsley (*Lomatium bradshawii*), threatened golden paintbrush (*Castilleja levisecta*), threatened Kincaid's lupine (*Lupinus sulphureus*), threatened Nelson's checker-mallow (*Sidalcea nelsoniana*), threatened Ute's ladies' tresses (*Spiranthes diluvalis*), threatened water howelia (*Howellia aquatilis*), endangered Willamette daisy (*Erigeron decumbens* var. *decumbens*), endangered Fender's blue butterfly (*Icaricia icarioides*) and its critical habitat, threatened Oregon silverspot butterfly (*Speyeria zerene hippolyta*) and its critical habitat, threatened bull trout (*Salvelinus confluentus*) and its critical habitat, threatened northern spotted owl (*Strix occidentalis caurina*) (spotted owl) and its critical habitat, threatened marbled murrelet (*Brachyramphus marmoratus*) and its critical habitat, threatened western snowy plover (*Charadrius alexandrinus nivosus*) (snowy plover) and its critical habitat, threatened Canada lynx (*Lynx canadensis*), and endangered gray wolf (*Canis lupus*). Here we concur with your effect determinations. Activities described in the BA as having "no effect" to listed species or their critical habitats do not require our concurrence and are not addressed here.

Kent Livezey, of my staff, requested via an email message of July 21, 2011, and during phone conversations with you, whether two Conservation Measures (CMs) could be required rather than recommended. These CMs (the last CMs in Sections 4.14.5 and 4.15.5) deal with seasonal and altitudinal restrictions of flights over habitats of spotted owls and marbled murrelets. You agreed to these revisions, and in your email message of August 30, 2011, sent revisions of the pages in question including these revised CMs (Van Hoesen, pers. comm. 2011). We are grateful that you agreed to these revisions. On September 8, 2011, Kent requested your review of the project description and conservation measures, and you responded with comments on October 7. On October 11, you asked that we allow you to get "final buyoff" of the draft letter from your customers, and we agreed to wait. On December 5, Kent emailed you a reminder that we were waiting on your final approval of the letter. On January 27, 2012, we received your approval of the October 11 version of the letter. On February 6, Kent asked for and received from you the data supporting the 92-dB distances for the Chinook 47D. On February 8, 2012, you sent to Kent clarifications on the applicability of those data.

### Summary of the Proposed Action

This project will establish three new helicopter aerial refueling routes, extend one existing aerial refueling route, establish a new low-level flight training area, and establish a new Terrain Following/Multi-Mode Radar (TF/MMR) training route. The routes and training area would support training operations of the 160th Special Operations Aviation Regiment (SOAR), a unit that provides aviation support to U.S. Army Special Forces.

To minimize the chance that fuel would be spilled during operations, Army Regulation 385-95 (Army Aviation Accident Prevention Program) will be followed; this regulation is included as an appendix in the BA and as a requirement in CM 4.1.5. The BA (p. 4-2) provides an estimate of the amount of fuel that may be released in the unlikely case of a spill during refueling, as follows.

"To prevent a loss of fuel, aircraft are equipped with shut-off valves that automatically stop the flow of fuel in the event that a refueling hose breaks. Therefore, the amount of fuel released during such an event would be limited to the amount of fuel present in the hose at the time of breakage, which would be approximately 34 gallons. The amount of fuel reaching the ground would vary depending on numerous factors, such as the altitude and speed of the tanker, as well as atmospheric conditions, but under a worst-case scenario the amount reaching the ground would range from 16 gallons (61 liters) under average conditions to 25 gallons (95 liters) on a cold day. . . This quantity of fuel would be dispersed over a wide area, given the height of aerial refueling (1,000 feet [305 meters] AGL [above ground level] and higher). In a similar study for aerial refueling operations at 2,000 feet (610 meters), it was predicted that the spilled fuel would be spread out over an area of 31 acres. . . or about 0.75 milliliter of fuel per square meter of land. At 1,000 feet (305 meters), the area would presumably be smaller, depending on the conditions. . . . The 160th SOAR very rarely experiences fuel spills during refueling training. Since 1972, the 160th SOAR has experienced damage to refueling equipment that likely resulted in fuel releases on only three occasions on all of its refueling routes worldwide. These three incidents correspond to a rate of less than 1 event per 13,000 hours flown."

The refueling routes, flight route, and training area will be located in central and western Washington and northwestern Oregon (Figures 1–9 from the BA, included below).

At this time, the Service uses 92 dB as the harassment threshold for spotted owls, marbled murrelets, and, in this case, snowy plovers. Army personnel tested the decibel level of Chinook 47 helicopters at various distances. Of the 13 passes they sampled, one was pertinent for the flight speeds the helicopters would be flying over spotted owl, marbled murrelet, and snowy plover habitats (110 to 120 knots). In that sample, sound level was 86.3 dB at 400 feet, 88.4 dB at 315 feet, 90.5 dB at 250 feet, and 92.5 dB at 200 feet (Van Hoesen in litt. 2/8/2012, 2/10/2012).

#### Effects to Listed Plants

Bradshaw's desert-parsley, golden paintbrush, Kincaid's lupine, Nelson's checker-mallow, and water howelia occur in or near the project area. Ute's ladies' tresses is not known to occur in the project area, but it might. Nelson's checker-mallow is not known to occur near proposed landing sites, but it does occur beneath one of the aerial refueling routes. No other listed plants are known to occur near proposed landing sites or beneath aerial refueling routes or training areas. The only possible effect from the proposed action to these plants would be accidental release of fuel in the event of a mishap during refueling activities. The chance of such a spill affecting a listed plant is so low as to be discountable.

#### Effects to Bull Trout and Its Critical Habitat

The only possible effect from the proposed action to bull trout and its critical habitat would be accidental release of fuel in the event of a mishap during refueling activities. The chance of such affecting bull trout or bull trout critical habitat is so low as to be discountable.

#### Effects to Northern Spotted Owl and Its Critical Habitat

Helicopter flight paths pass over suitable spotted owl habitat and critical habitat in some areas (U.S. Army 2011, p. 4-59; Figures 6, 8). As stated in the BA (U.S. Army 2011, pp. 4-60 and 4-61) as amended (Van Hoesen pers. comm. 2011), the following CMs will be employed to minimize effects to spotted owls.

- One pilot would stay focused outside the aircraft when in flight to help avoid bird strikes.
- Where feasible, SOAR pilots would follow guidance in Federal Aviation Administration (FAA) Advisory Circular 91-36D, which recommends that pilots maintain a minimum altitude of 2,000 feet (610 meters) AGL when flying over noise sensitive areas, such as National Parks, National Wildlife Refuges, Wilderness Areas, and other areas where a quiet setting is a generally recognized feature or attribute of the land.
- To prevent damage to the refueling hose during fuel transfer, and other accidents, the 160th SOAR would follow the procedures discussed in Section 4.1.5.

- Between March 1st and July 31st, SOAR helicopters would fly at a minimum altitude of 400 feet (122 meters) above treetop level in the vicinity of northern spotted owl nests [above all suitable spotted owl habitat per page 4-59]. These restrictions apply to the TF/MMR route and much of the low-level training area, including travel to and from the proposed landing zones. Northern spotted owl centers would be clearly labeled on pilots' maps to ensure that these areas are avoided.

In addition to the above CMs, the BA states that aircraft will fly at least (1) 500 feet above ground when flying to and from proposed routes (U.S. Army 2001, p. 2-7), (2) 500 feet above ground between Joint Base Lewis-McChord and the training routes/areas (U.S. Army 2011, p. 4-59), and (3) 1,000 feet above ground along aerial refueling routes (U.S. Army 2011, p. 4-59). Based on data provided in the BA (U.S. Army 2001, p. 4-52) and subsequent clarifications (Van Hoesen in litt. 2/8/2012, 2/10/2012) as explained above, keeping the Chinook 47D helicopters at least 400 feet above ground would ensure they do not produce sound levels of 92 dBA or more at the level of spotted owl nests. Consequently, effects from project-generated noise to spotted owls are considered to be insignificant. Spotted owls are not known to fly above treetop levels, so the chance that one would be hit by a helicopter is discountable. The only other possible effect from the proposed action to the spotted owl and its critical habitat would be accidental release of fuel in the event of a mishap during refueling activities. The chance of such a spill affecting a spotted owl or its critical habitat is so low as to be discountable.

#### Effects to Marbled Murrelet and Its Critical Habitat

Only one of the proposed landing zones (CONF3) is located within 55 miles of the coast (Puget Sound). However, flight paths pass over marbled murrelet habitat and critical habitat (Figures 6, 7). As stated in the BA (U.S. Army 2011, p. 4-55) as amended (Van Hoesen pers. comm. 2011), the following CMs will be employed to minimize effects to marbled murrelets.

- One pilot would stay focused outside the aircraft when in flight to help avoid bird strikes.
- Where feasible, SOAR pilots would follow guidance in FAA Advisory Circular 91-36D, which recommends that pilots maintain a minimum altitude of 2,000 feet (610 meters) AGL when flying over noise sensitive areas, such as National Parks, National Wildlife Refuges, Wilderness Areas, and other areas where a quiet setting is a generally recognized feature or attribute of the land.
- To prevent damage to the refueling hose during fuel transfer, and other accidents, the 160th SOAR would follow the procedures discussed in Section 4.1.5.
- Between April 1st and September 15th, SOAR helicopters would fly at a minimum altitude of 400 feet (122 meters) above treetop level within the area of potential marbled murrelet presence (through Zone 2 on Figure 7, within 55 miles [89 kilometers] of the nearest marine habitat). These restrictions apply to the applicable portions of the TF/MMR route and low-level training area, including landing zone CONF3.

In addition to the above CMs, the BA states that aircraft will fly at least (1) 500 feet above ground when flying to and from proposed routes (U.S. Army 2001, p. 2-7), (2) 500 feet above ground between Joint Base Lewis-McChord and the training routes/areas (U.S. Army 2011, p. 4-

59), and (3) 1,000 feet above ground along aerial refueling routes (U.S. Army 2011, p. 4-59). Based on data provided in the BA (U.S. Army 2001, p. 4-55) and subsequent clarifications (Van Hoesen in litt. 2/8/2012, 2/10/2012) as explained above, keeping the Chinook 47D helicopters at least 400 feet above ground would ensure they do not produce sound levels of 92 dBA or more at the level of marbled murrelet nests. Consequently, effects from project-generated noise to marbled murrelets are considered to be insignificant. According to the BA (U.S. Army 2011, p. 4-53), the FAA has no reports of any aircraft/bird strikes in Washington or Oregon between 1990 and the beginning of 2011; consequently, we consider the chance of a helicopter hitting a marbled murrelet to be discountable. The only other possible effect from the proposed action to the marbled murrelets and its critical habitat would be accidental release of fuel in the event of a mishap during refueling activities. The chance of such a spill affecting a marbled murrelet or its critical habitat is so low as to be discountable.

#### Effects to Western Snowy Plover and Its Critical Habitat

Two proposed helicopter routes pass over the coast (Figure 9). All of the identified breeding and wintering habitat for snowy plovers in Washington is south of helicopter Route 1 (U.S. Army 2011, Figure 9). However, critical habitat units at Damon Point in Grays Harbor and at Midway Beach south of Grays Harbor are beneath proposed Route 2 (U.S. Army 2011, Figure 9). As stated in the BA (U.S. Army 2011, pp. 4-67), the following CMs will be employed to minimize effects to snowy plovers.

- One pilot would stay focused outside the aircraft when in flight to help avoid bird strikes.
- Where feasible, SOAR pilots would follow guidance in FAA Advisory Circular 91-36D, which recommends that pilots maintain a minimum altitude of 2,000 feet (610 meters) AGL when flying over noise-sensitive areas such as Grays Harbor and Willapa National Wildlife Refuges near western snowy plover breeding and wintering habitat.
- To prevent damage to the refueling hose during fuel transfer, and other accidents, the 160th SOAR would follow the procedures discussed in Section 4.1.5.

In addition to the above CMs, the BA states that aircraft will fly (1) at least 500 feet above ground when flying to and from proposed routes (U.S. Army 2001, p. 2-7), (2) at least 500 feet above ground between Joint Base Lewis-McChord and the training routes/areas (U.S. Army 2011, p. 4-59), (3) at least 1,000 feet above ground along aerial refueling routes (U.S. Army 2011, p. 4-59), and (4) 2,300 to 5,000 feet above ground during refueling along Route 2 (U.S. Army 2001, p. 4-66). Minimum flight levels required by the CMs and these descriptions of the proposed action ensure sound levels will be well below 92 dBA at ground level in the locations where snowy plovers may be nesting. Consequently, effects from project-generated noise to snowy plovers are considered to be insignificant. According to the BA (U.S. Army 2011, p. 4-66), the FAA does not report any aircraft/bird strikes in Washington or Oregon between 1990 and the beginning of 2011; consequently, we consider the chance of a helicopter hitting a snowy plover to be discountable. The only other possible effect from the proposed action to the snowy plover and its critical habitat would be accidental release of fuel in the event of a mishap during refueling activities. The chance of such a spill affecting a snowy plover or its critical habitat is so low as to be discountable.

Effects to Canada Lynx

The project area does not overlap with any Canada lynx breeding habitat or critical habitat, and there has been no confirmed evidence of Canada lynx in the project area in recent years (U.S. Army 2011, p. 4-69). The only possible effect from the proposed action to Canada lynx would be accidental release of fuel in the event of a mishap during refueling activities. The chance of such a spill affecting a Canada lynx is so low as to be discountable.

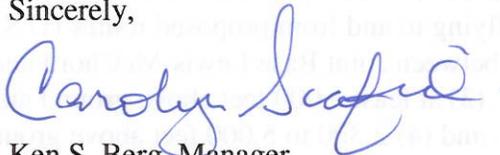
Effects to Gray Wolf

The project area does not overlap with any predicted gray wolf breeding habitats (WDFW and UW 2007 in U.S. Army 2011, p. 4-74). There have been three sightings of gray wolves in the proposed low-level training area, two of which also were beneath a proposed route (WDFW 2010 in U.S. Army 2011, p. 4-74). Therefore, there is a slight possibility that gray wolves could be present in the project area during operations. The only possible effect from the proposed action to the gray wolf would be accidental release of fuel in the event of a mishap during refueling activities. The chance of such a spill affecting a gray wolf is so low as to be discountable.

This concludes informal consultation pursuant to the regulations implementing the Act (50 CFR 402.13). This action should be re-analyzed if new information reveals effects of the action that may affect listed species or designated critical habitat in a manner or to an extent not considered in this consultation; if the action is subsequently modified in a manner that causes an effect to a listed species or designated critical habitat that was not considered in this consultation; and/or, if a new species or critical habitat is designated that may be affected by this project.

The Service appreciates your efforts to protect listed species and the habitats on which they depend while meeting your land management needs. If you have any questions regarding this letter or your responsibilities under the Act, please contact Kent Livezey (360.753.4372) or Carolyn Scafidi (360.753.4068) of this office.

Sincerely,



for

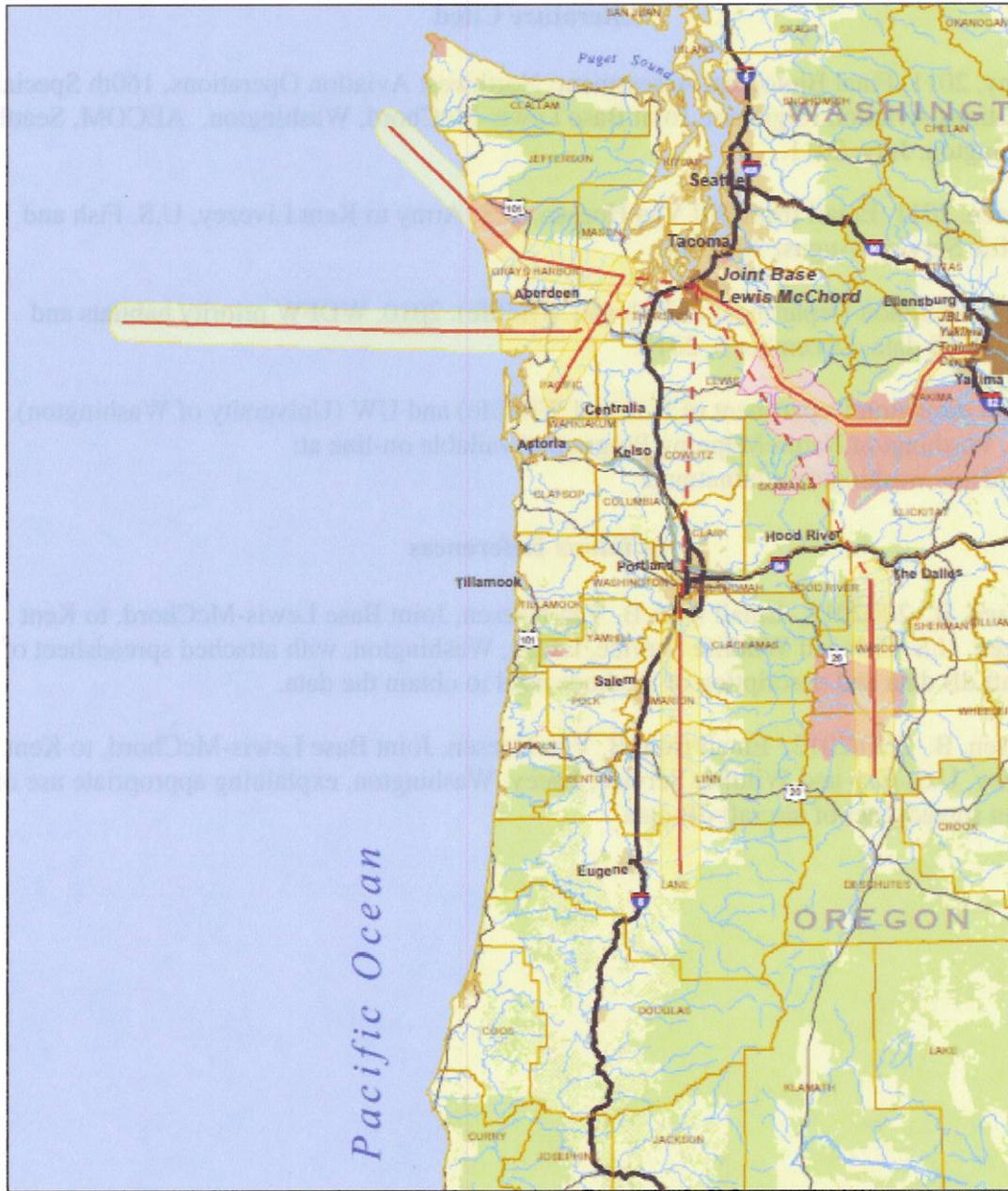
Ken S. Berg, Manager  
Washington Fish and Wildlife Office

**Literature Cited**

- U.S. Army. 2011. Final Biological Assessment: Northwest Aviation Operations, 160th Special Operations Aviation Regiment, Joint Base Lewis-McChord, Washington. AECOM, Seattle, Washington. July, 2011.
- Van Hoesen. 2011. Email from Bill Van Hoesen, U.S. Army to Kent Livezey, U.S. Fish and Wildlife Service. August 30, 2011.
- WDFW (Washington Department of Fish and Wildlife). 2010. WDFW priority habitats and species GIS data. December 6, 2010.
- WDFW (Washington Department of Fish and Wildlife) and UW (University of Washington). 2007. Washington NatureMapping Program. Available on-line at: <http://depts.washington.edu/natmap/>.

***In litteris* References**

- Van Hoesen, B. 2/8/2012. Email from B. Van Hoesen, Joint Base Lewis-McChord, to Kent Livezey, U.S. Fish and Wildlife Service, Lacey, Washington, with attached spreadsheet of aircraft dB data and description of methods used to obtain the data.
- Van Hoesen, B. 2/10/2012. Email from B. Van Hoesen, Joint Base Lewis-McChord, to Kent Livezey, U.S. Fish and Wildlife Service, Lacey, Washington, explaining appropriate use of data in spreadsheet of aircraft dB data.



**Figure 1. Project Location**

Possible Route Approaches	Counties	Interstate Highways
Existing and Proposed Training Routes	Populated Areas	U.S. Highways
Route Buffers/Airspace	Public Lands	Rivers & Streams
Proposed Low-Level Training Area	Tribal Lands	

**DRAFT**

0 20 40 60 80 Kilometers  
0 20 40 60 Miles

FILE: I:\a\wa1b0011\data\Projects\000005100400\_02\000\Projectmof\figure\0A\_Figure2A\_Fig\_1\_Project\_Location.mxd DATE: 6/30/2011



Figure 2. Proposed Aerial Refueling Routes 1, 2, and 3

- Possible Route Approaches
- Proposed Aerial Refueling Routes
- Route Buffers
- Counties
- Populated Areas
- Public Lands
- Tribal Lands
- Interstate Highways
- U.S. Highways
- Rivers & Streams

DRAFT



FILE: I:\sw\1011\New\Projects\0006\100400\_ID\0210\Project\02\lg\sw\DA\_Figures\DA\_Fig\_2\_Proposed\_New\_Aerial\_Routes.mxd

DATE: 6/16/2011

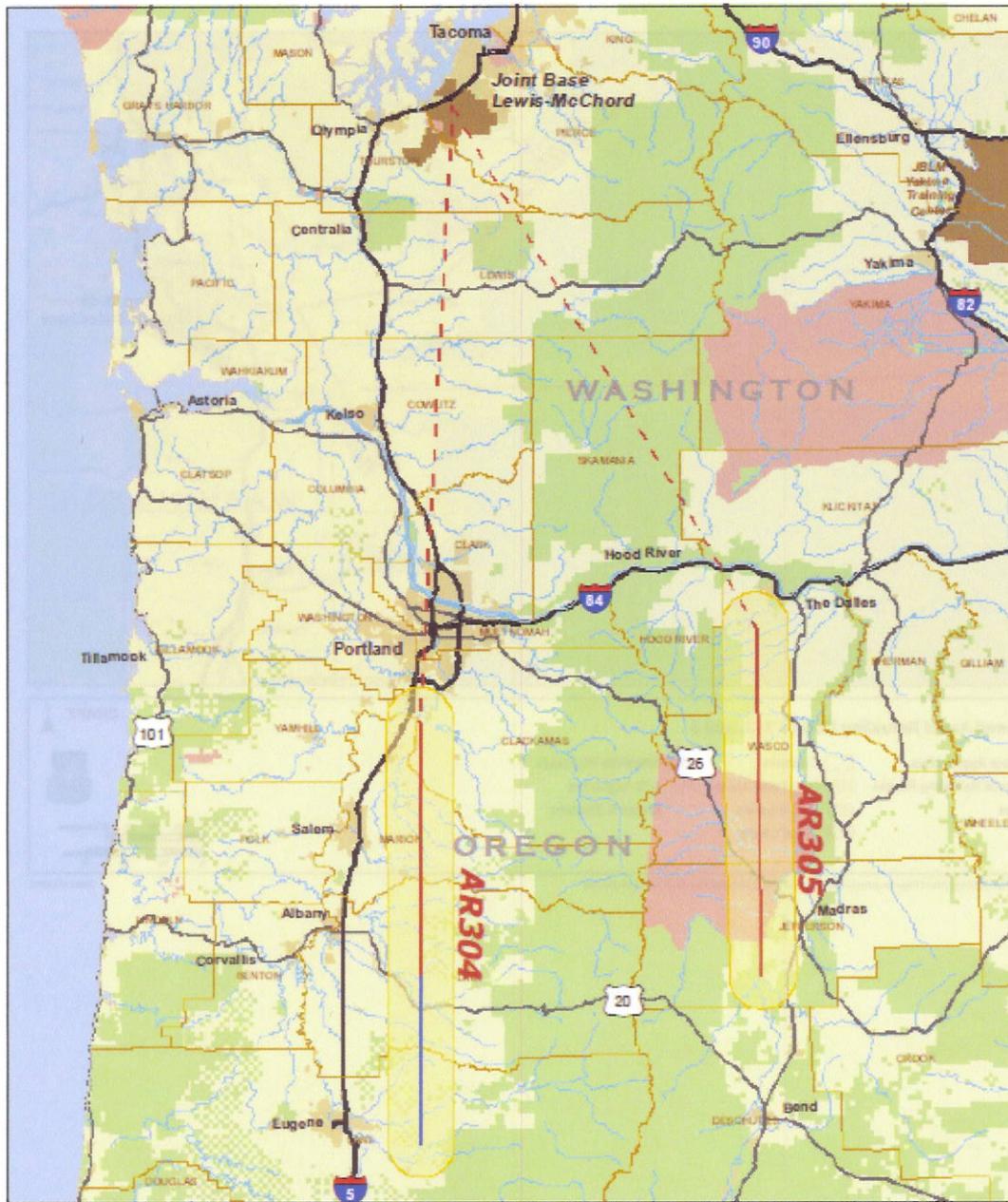
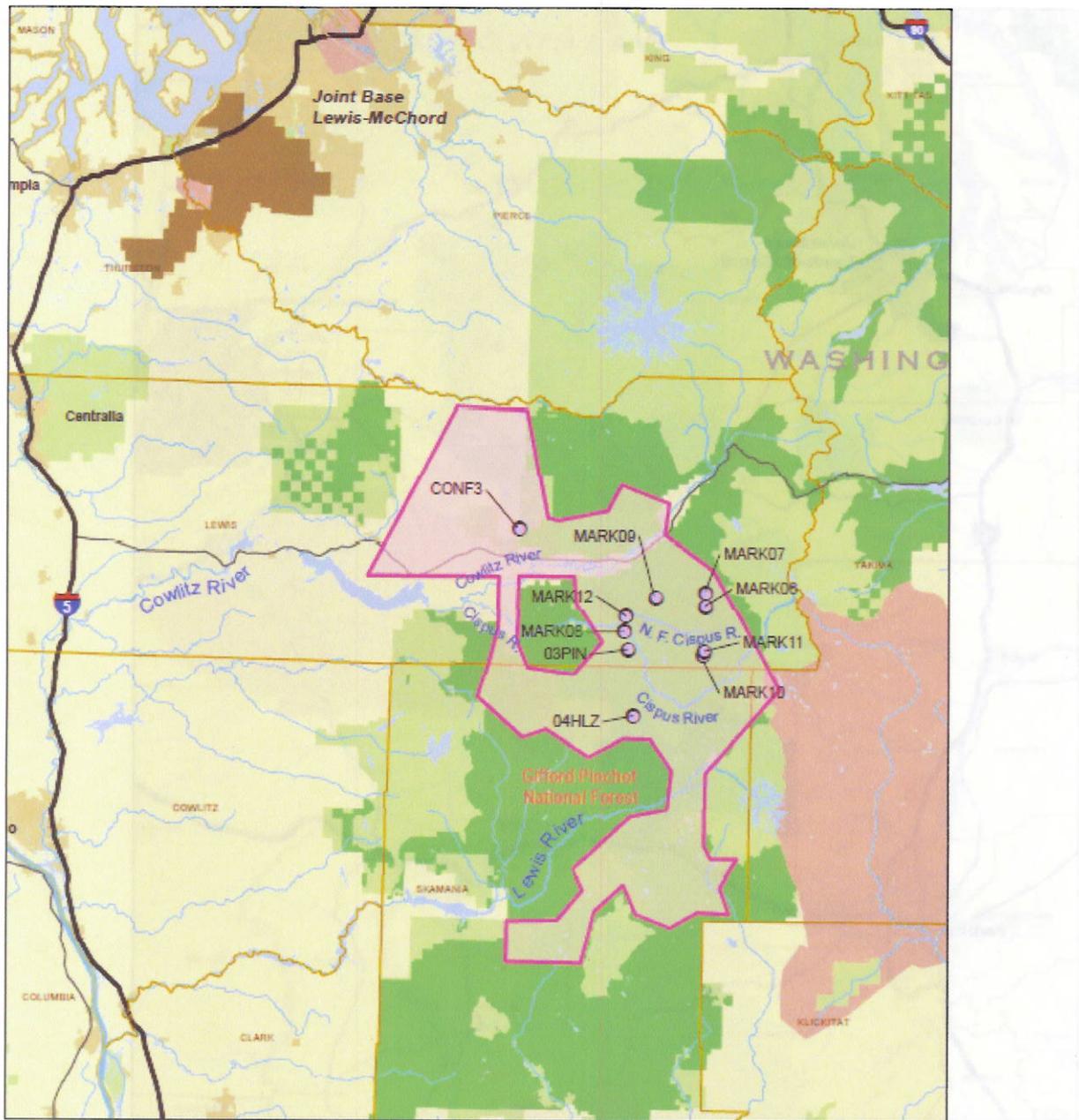


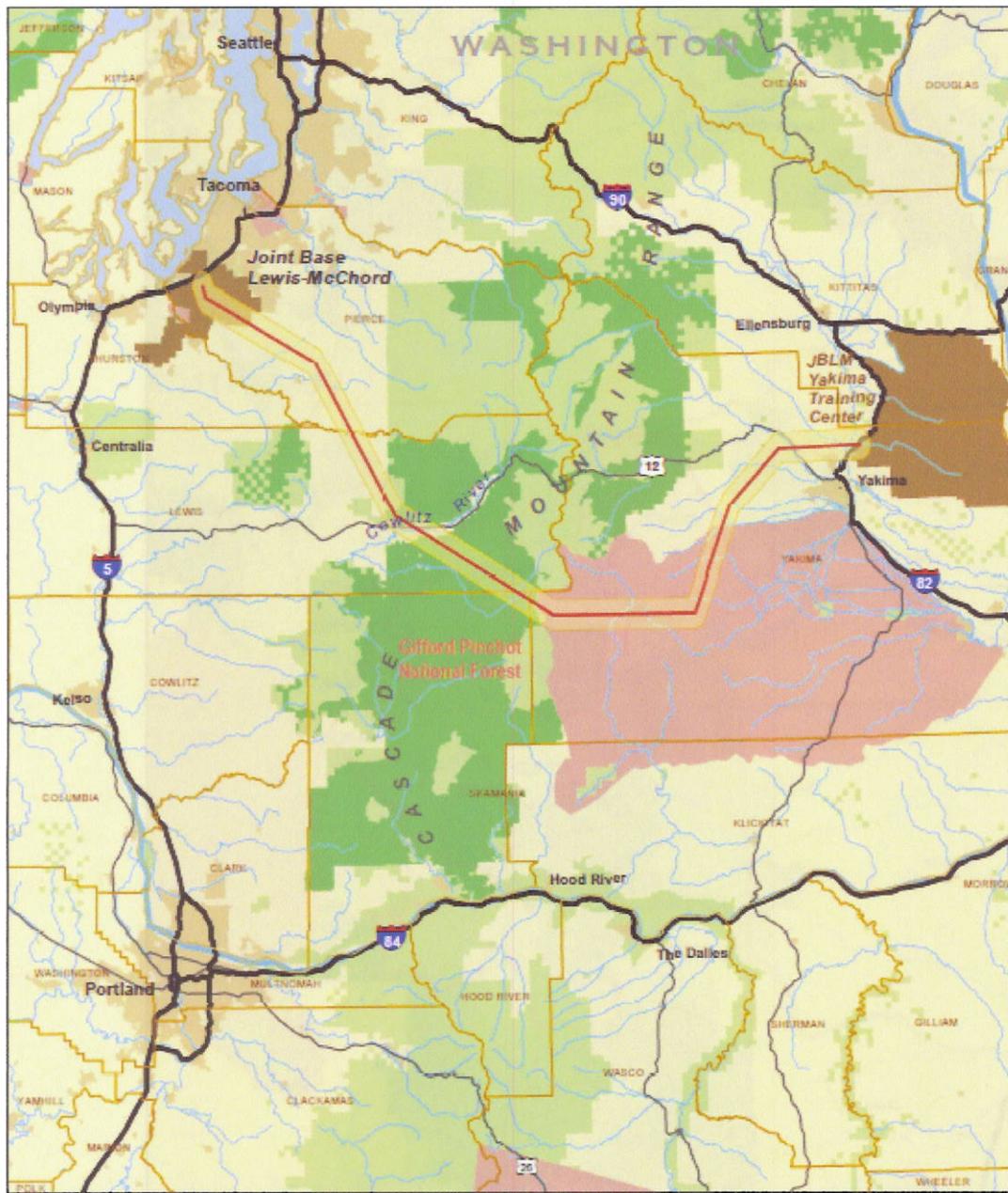
Figure 3. Proposed Aerial Refueling Routes AR304 and AR305

DRAFT

- Possible Route Approaches
- Existing Refueling Routes
- Proposed Refuel Routes
- Route Buffers
- Counties
- Populated Areas
- Public Lands
- Tribal Lands
- Interstate Highways
- U.S. Highways
- Rivers & Streams







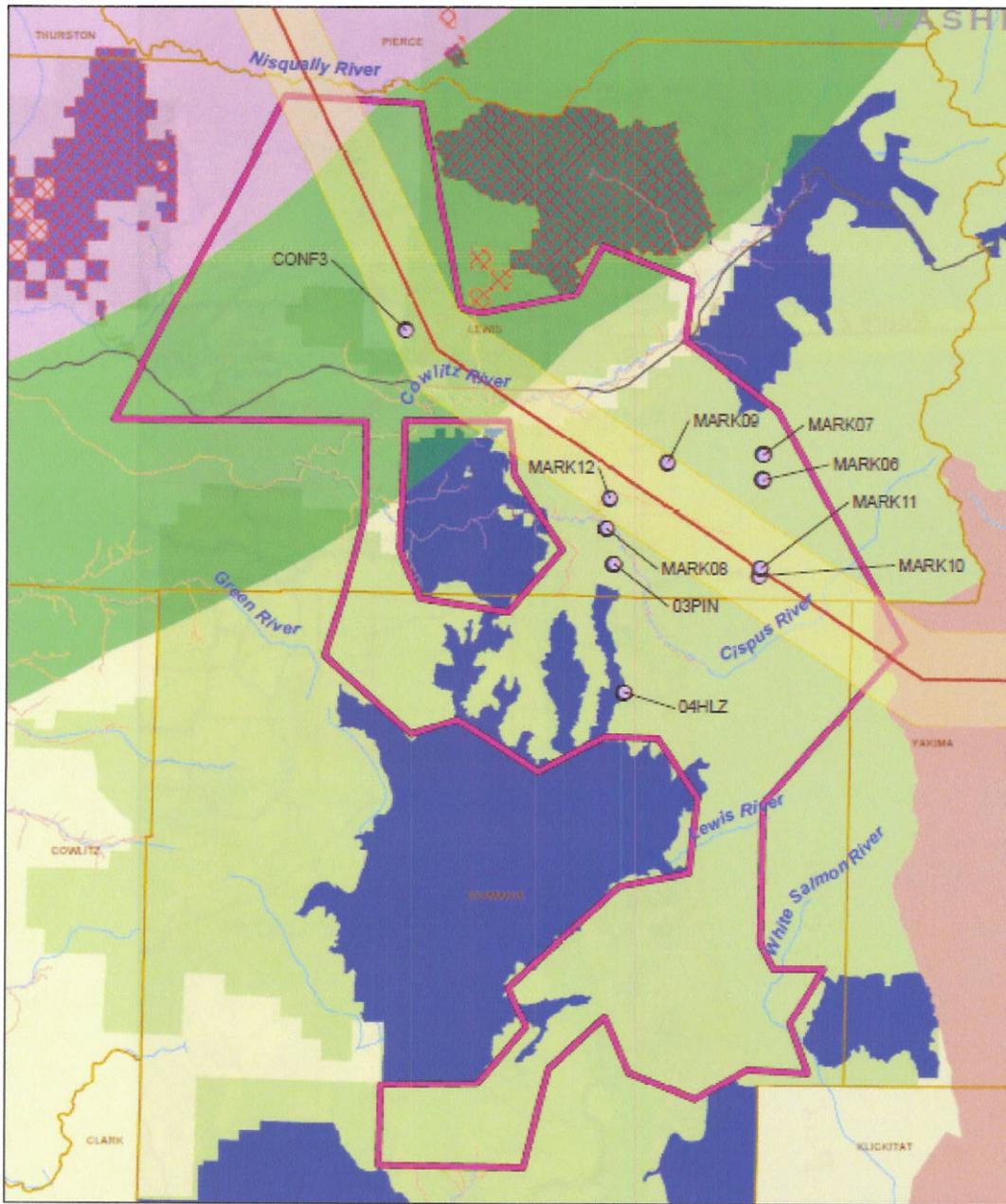
**Figure 5. Proposed Terrain-Following/Multi-Mode Radar Route**

Proposed Terrain-Following/MMR Route	Route Buffer	Counties	Populated Areas	Public Lands	National Forests	Tribal Lands	Interstate Highways	U.S. Highways	Rivers & Streams
--------------------------------------	--------------	----------	-----------------	--------------	------------------	--------------	---------------------	---------------	------------------

**DRAFT**

0 10 20 30 40 Kilometers  
0 10 20 30 Miles

FILE: \\ussas1p001\Dev\Projects\2006\0109400\_12\GIS\Project\mxd\Figure5\Figure5A\_Fig\_5\_Proposed\_Terrain\_Following.mxd DATE: 6/30/2011

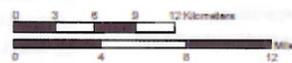


**Figure 6. Designated Critical Habitat in the Proposed Low-Level Training Area**

<ul style="list-style-type: none"> <li><span style="border: 2px solid pink; display: inline-block; width: 15px; height: 10px; margin-right: 5px;"></span> Proposed Low-Level Training Area</li> <li><span style="border: 1px solid blue; border-radius: 50%; width: 10px; height: 10px; margin-right: 5px;"></span> Helicopter Landing Zones</li> <li><span style="background-color: blue; width: 15px; height: 10px; margin-right: 5px;"></span> Northern Spotted Owl Designated Critical Habitat***</li> <li><span style="border: 1px dashed red; width: 15px; height: 10px; margin-right: 5px;"></span> Marbled Murrelet Designated Critical Habitat*</li> <li><b>Marbled Murrelet Zone of Occurrence**</b></li> <li><span style="background-color: lightblue; width: 15px; height: 10px; margin-right: 5px;"></span> Zone 1</li> <li><span style="background-color: lightgreen; width: 15px; height: 10px; margin-right: 5px;"></span> Zone 2</li> </ul>	<ul style="list-style-type: none"> <li><span style="border-bottom: 1px solid blue; width: 20px; display: inline-block; margin-right: 5px;"></span> Listed Salmonid Designated Critical Habitat</li> <li><span style="border-bottom: 2px solid red; width: 20px; display: inline-block; margin-right: 5px;"></span> Proposed Terrain-Following/MMR Route</li> <li><span style="border: 1px solid yellow; width: 15px; height: 10px; margin-right: 5px;"></span> Counties</li> <li><span style="background-color: yellow; width: 15px; height: 10px; margin-right: 5px;"></span> Populated Areas</li> <li><span style="background-color: lightgreen; width: 15px; height: 10px; margin-right: 5px;"></span> Public Lands</li> <li><span style="background-color: lightorange; width: 15px; height: 10px; margin-right: 5px;"></span> Tribal Lands</li> </ul>	<ul style="list-style-type: none"> <li><span style="border-bottom: 2px solid black; width: 20px; display: inline-block; margin-right: 5px;"></span> Interstate Highways</li> <li><span style="border-bottom: 1px solid black; width: 20px; display: inline-block; margin-right: 5px;"></span> U.S. Highways</li> <li><span style="color: blue; font-size: 1.2em;">~</span> Rivers &amp; Streams</li> </ul>
--	--	--

Data Sources: USFWS 1996, \*\*2004, \*\*\*2008c

**DRAFT**



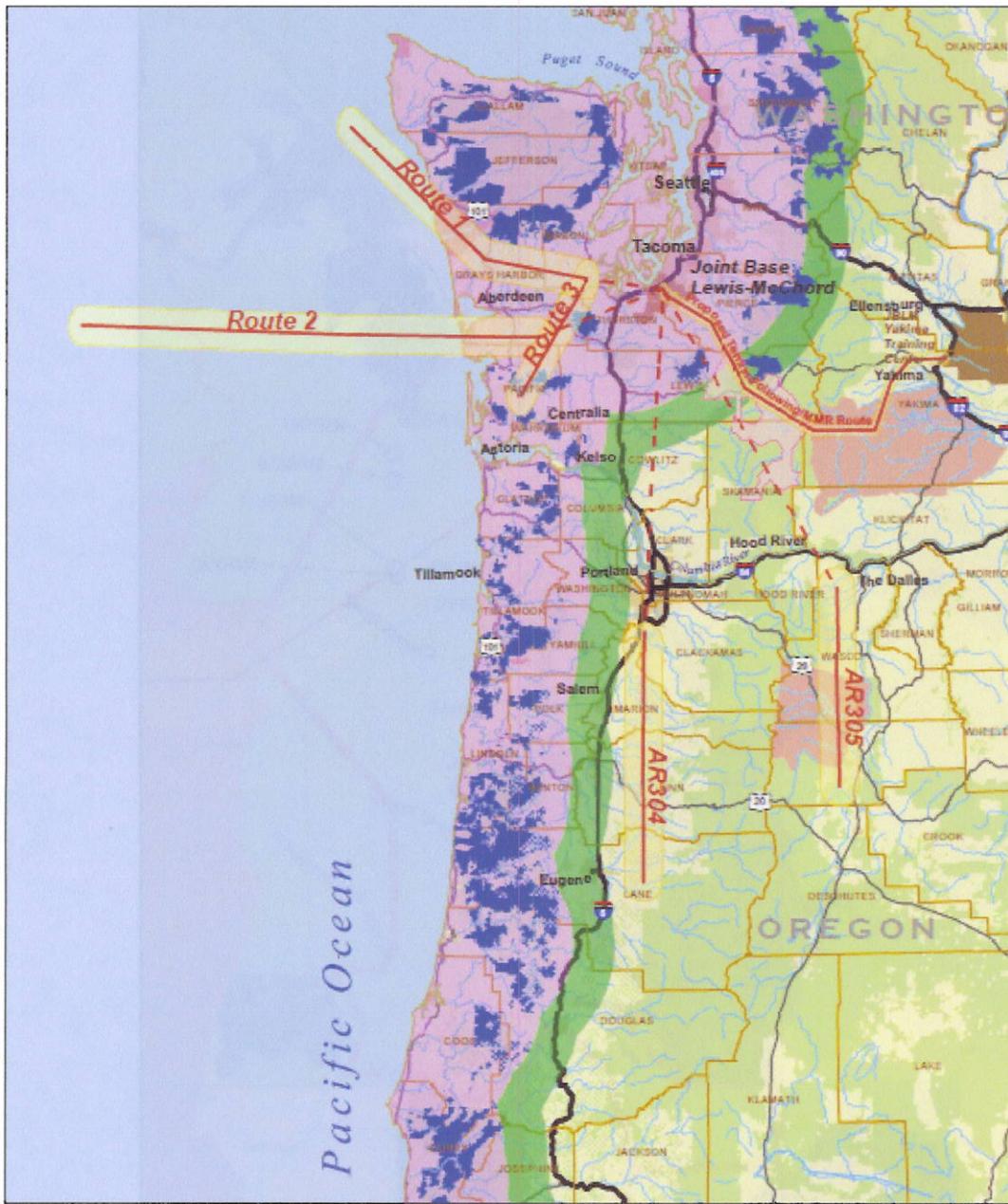
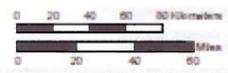


Figure 7. Marbled Murrelet Designated Critical Habitat

- Marbled Murrelet Designated Critical Habitat\*
- Route Buffers/Airspace
- Proposed Low-Level Training Area
- Zone 1
- Zone 2
- Possible Route Approaches
- Existing and Proposed Training Routes
- Counties
- Populated Areas
- Public Lands
- Tribal Lands
- Interstate Highways
- U.S. Highways
- Rivers & Streams

Data Sources:  
 \*USFWS 1995  
 \*\*USFWS 2004



**DRAFT**



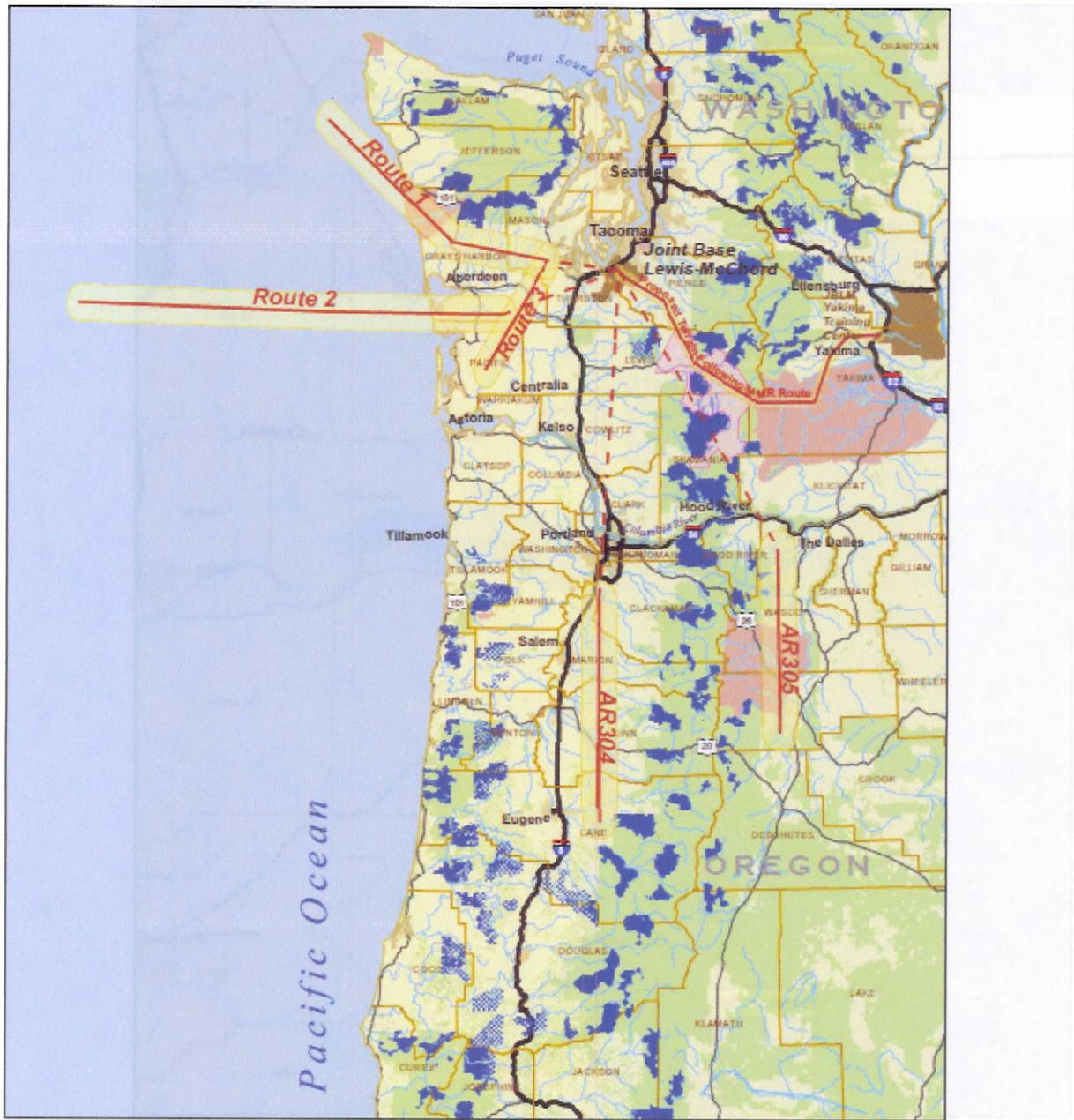


Figure 8. Northern Spotted Owl Designated Critical Habitat

- Northern Spotted Owl Designated Critical Habitat\*
  - Possible Route Approaches
  - Existing and Proposed Training Routes
  - Route Buffers/Airspace
  - Proposed Low-Level Training Area
  - Counties
  - Populated Areas
  - Public Lands
  - Tribal Lands
- Data Source: \*USFWS 2006c

**DRAFT**

- Interstate Highways
- U.S. Highways
- Rivers & Streams



Figure 9. Western Snowy Plover Designated Critical Habitat

- Western Snowy Plover Designated Critical Habitat\*
- Possible Route Approaches
- Existing and Proposed Training Routes
- Route Buffers/Airspace
- Counties
- Populated Areas
- Public Lands
- Tribal Lands
- Interstate Highways
- U.S. Highways
- Rivers & Streams

Data Source: \*USFWS 2005

DRAFT





## **Appendix B**

# **Coastal Zone Management Act Coordination**





REPLY TO  
ATTENTION OF:

**DEPARTMENT OF THE ARMY**  
JOINT BASE GARRISON  
BOX 339500, MAIL STOP 17  
JOINT BASE LEWIS-MCCHORD, WA 98433-9500

Public Works

Ms. Loree Randall  
Coastal Zone Management Program – Federal Consistency  
Washington Department of Ecology  
P.O. Box 47600  
Olympia, WA 98504-7600

Dear. Ms. Randall:

This letter serves as the Army's Consistency Determination for your review and concurrence, for an Army action proposed to occur in Washington and Oregon. This letter provides information required under the Washington Coastal Zone Management Program, and 15 Code of Federal Regulations 930.39, Content of a Consistency Determination. The Army will undertake the proposed action in a manner consistent to the maximum extent practicable with the enforceable policies of the Washington Coastal Zone Management Program.

The 160<sup>th</sup> Special Operations Aviation Regiment (SOAR) proposes to establish three new helicopter aerial refueling routes; assume administrative control of two existing aerial refueling routes and extend one of these routes; establish a new low-level flight training area; and establish a new multi-mode training route. The routes and the training area would support training operations based out of Joint Base Lewis-McChord (JBLM), Washington, but would be located off-post, in western and central Washington and northwestern and central Oregon (Figure 1). Training operations would be conducted by the 160<sup>th</sup> SOAR, with MH-60 Blackhawk helicopters and MH-47 Chinook helicopters. Aerial refueling operations would also involve Air Force or Marine Corps C-130 Hercules tankers. The 4<sup>th</sup> Battalion of the 160<sup>th</sup> SOAR (4/160<sup>th</sup> SOAR) is expected to begin training in the proposed locations as soon as the appropriate approvals are granted. Additionally, 160<sup>th</sup> SOAR units from other installations would use the training routes/area. The proposed routes would range from 30 to 143 nautical miles (nm)<sup>1</sup> in length, and each route would include an area of airspace extending out 2 to 6 nm from each side of the center line. The routes and training area would be available for use 24 hours a day, 365 days a year, with some restrictions on weekend and holiday use during the summer.

Aerial refueling is the process of transferring fuel from one aircraft to another to extend flight times. This technique is an important component of military operations. The Army has identified four reasons for implementing the proposed training.

**1. Insufficient number of published training routes.** Aerial refueling capability and proficiency are critical to the long-range mission capability of the 160<sup>th</sup> SOAR. After completion of initial qualification training, aircrews require regular post-qualification training to remain proficient in aerial refueling operations. The 160<sup>th</sup> SOAR currently lacks a sufficient number of published training routes (routes published in the Department of Defense Flight Information Publication AP/1B) to accomplish its training

---

<sup>1</sup> 100 nautical miles equals 115.1 miles.

requirements. The Army does not have its own tankers, and consequently must rely on the U.S. Marine Corps and U.S. Air Force to supply fuel and tankers for training exercises. The U.S. Marine Corps, which is the 160<sup>th</sup> SOAR's primary aerial refueling asset, has recently adopted a policy of only supplying fuel to published corridors. Available published refueling routes are currently limited to two existing routes over the Pacific Ocean and two existing routes over land in Oregon. To meet training requirements, the 160<sup>th</sup> SOAR would need to use all four routes. However, because of their distance from JBLM (more than 75 nm), the two routes over the Pacific Ocean are too costly to use in terms of fuel consumed per training mission. In addition, the existing routes over land in Oregon require an excessive number of turns to complete all of the tasks required for training evaluations (link-up, hook-up, transfer of fuel, and disconnect). The 160<sup>th</sup> SOAR would like to extend one of these routes so that it is more suitable for meeting training requirements.

**2. Scheduling conflicts and route closures.** Given the number of personnel and aircraft associated with the 160<sup>th</sup> SOAR, and that training routes are used in both directions, multiple routes are needed to avoid scheduling conflicts and provide a sufficient number of training opportunities. Additional routes would allow individual battalions and training units exclusive use of individual routes to avoid scheduling conflicts.

Refueling routes are sometimes closed under adverse weather conditions, further limiting training opportunities. Establishing multiple, geographically diverse routes would allow continued training when one or more routes are closed due to weather.

**3. New terrain-following multi-mode radar route leg.** There is not a suitable published instrument rules (IR) route available to the 160<sup>th</sup> SOAR for conducting training that involves use of radar to maintain a fixed altitude above the ground (Terrain-Following Flight utilizing Multi Mode Radar; TF/MMR). Because proficiency in this technique is a combat need for the 160<sup>th</sup> SOAR, a suitable approved IR route is needed. Furthermore, there is no IR route connecting JBLM to Yakima Training Center (JBLM-YTC). In the absence of such a route, the 160<sup>th</sup> SOAR could be required to cancel missions involving flight to JBLM-YTC under certain weather conditions. The new training route would allow aircraft to fly to and from JBLM-YTC in inclement weather.

**4. Off-post low-level training area.** Opportunities for low-level training by the 160<sup>th</sup> SOAR are limited by available space on JBLM. This type of training conflicts with training activities by other aviation units, which may have priority of usage. An approved low-level training area off JBLM would eliminate training land use conflicts between the 160<sup>th</sup> SOAR and other units training at JBLM.

Table 1 summarizes the locations, by county, of the proposed routes and low-level training area that the 160<sup>th</sup> SOAR would utilize under the Proposed Action. Routes include a 2- to 6-nm buffer on each side of the center line to allow aircraft room to maneuver in response to situations such as weather issues, aircraft deconfliction, turns, and course reversal. These buffers do not apply to the low-level training area. Counties that aircraft could potentially pass through on their way to the identified routes from JBLM are also listed. Only refueling operations would occur along the Washington coast; they are described in detail below.

### **Refueling Operations**

Refueling operations would occur along three new published routes (Routes 1, 2, and 3<sup>2</sup>; Figure 2) and two extended routes (Routes AR304 and AR305; Figure 3). All three new routes would originate over land west of JBLM, and two of them would end over the Pacific Ocean. The existing and extended routes

---

<sup>2</sup> Routes 1, 2, and 3 as referenced in this document refer to routes AR370V, ARX371V, and ARX372V, respectively.

would end over inland areas in Oregon. Only the routes within Washington’s coastal zone are discussed below.

**Refuel Route 1** (AR370V) would begin northeast of Olympia, Washington and head west, turning to the northwest when it reaches Highway 101 north of Aberdeen, Washington, and eventually ending over the Pacific Ocean. The length of the route would be 91 nm. Aircraft flying over this route would maintain elevations of 2,500 to 5,000 feet mean sea level (MSL), with a minimum flight altitude of 1,000 feet above ground level (AGL). This route is located approximately 24 nm west of JBLM.

**Refuel Route 2** (ARX371V) would begin in Grays Harbor County, east of Highway 101 and southeast of Aberdeen, Washington and head west, ending over the Pacific Ocean. The length of the route would be 143 nm. Aircraft flying along this route would maintain elevations of 2,300 to 5,000 feet MSL, with a minimum flight altitude of 1,000 feet AGL. This route is approximately 41 nm southwest of JBLM.

**Table 1**  
**Counties<sup>1</sup> Underlying the Proposed Routes and Low-Level Training Area**

	<b>Washington</b>	<b>Oregon</b>
<b>Proposed Refuel Route #1</b>	Grays Harbor, Jefferson, Mason, Thurston (Pierce)	--
<b>Proposed Refuel Route #2</b>	Grays Harbor, Pacific, (Pierce, Thurston)	--
<b>Proposed Refuel Route #3</b>	Grays Harbor, Lewis, Mason, Pacific, Thurston (Pierce)	--
<b>Refuel Route AR304</b>	(Clark, Cowlitz, Lewis, Pierce, Thurston)	Clackamas, Lane, Linn, Marion, Washington, Yamhill, (Columbia, Multnomah)
<b>Refuel Route AR305</b>	(Klickitat, Lewis, Pierce, Skamania, Thurston)	Deschutes, Jefferson, Wasco, (Hood River, Wasco)
<b>TF/MMR Route</b>	Lewis, Pierce, Skamania, Yakima	--
<b>Low-Level Training Area</b>	Lewis, Skamania, Yakima (Cowlitz, Klickitat, Pierce, Thurston, Yakima)	--
<sup>1</sup> For training routes, counties underlying the most direct flight path from JBLM to the route are shown in parentheses. For the low-level training area, all counties that aircraft might realistically pass through on their way to the training area have been included in parentheses.		

**Refuel Route 3** (ARX372V) would begin northwest of Olympia, Washington and head southwest into Pacific County for a distance of 42 nm. Aircraft flying along this route would maintain elevations of 4,000 to 6,000 feet MSL, with a minimum flight altitude of 1,000 feet AGL. The route is approximately 110 nm south of JBLM.

The Army is preparing an Environmental Assessment (EA) and a Biological Assessment to assess the impacts to humans and the natural environment from the proposed action. We have provided a copy of these documents with this letter. The Army requests that the EA be adopted (WAC 197-11-610) by the Department of Ecology to satisfy State Environmental Policy Act (SEPA) requirements. This will also allow the Army to meet the SEPA requirements of the Washington Coastal Zone Management Program.

Refueling operations would comply with the enforceable policies within the six laws identified in the

Washington Coastal Zone Management Program. The proposed project would comply with the Shoreline Management Act (including local shoreline master programs), SEPA (through adoption of the EA), the Clean Water Act, the Clean Air Act, and the Ocean Resource Management Act. The proposed refueling would not be governed by policies of the Energy Facility Site Evaluation Council.

The proposed training would have no impact on existing or proposed land uses in areas regulated under the Shoreline Management Act. Refueling activities in coastal areas would occur at a minimum 1,000 feet AGL, and no aircraft would land during refueling exercises. Use of proposed training routes would be coordinated with appropriate Air Route Traffic Control Centers to avoid airspace use conflicts. The proposed aviation operations would entail safety risks, which include accidents, accidental releases of fuel, and bird aircraft strikes. These risks would be minimized by adhering to safety protocols detailed in Army Regulation 385-95 and avoiding areas of severe bird strike risk. However, refueling operations could create short-duration noise that could annoy noise-sensitive receptors under proposed flight routes.

Use of helicopters and C-130 tankers in the proposed training would generate noise at decibel levels that are likely to cause some annoyance to populations in areas beneath or near routes. Where possible, pilots would “fly friendly” to avoid populated areas. Aircraft noise would also potentially annoy people in non-populated areas that are used for recreation.

The greatest potential noise impacts along aerial refueling routes would be noise generated by C-130 tankers. At altitudes of 1,000 feet AGL, which is the lowest altitude at which refueling would occur, C-130s would generate maximum noise levels of 85 A-weighted decibels (dBA). At this altitude, helicopters would generate maximum noise levels of up to 83 dBA. The noise levels would be highly disturbing to about 20 percent of the population. However, helicopters and C-130 aircraft would pass quickly over potential noise receptors, so impacts from noise would occur for only a short duration.

The proposed training activity would have a negligible impact on water and air quality as regulated under the Clean Water and Clean Air acts. Although wetlands and surface water bodies (including the Pacific Ocean) lie beneath the proposed training routes, most of the proposed activities would have no effect on these resources, since they would take place in the air at altitudes of 1,000 feet and above. An accidental release of fuel during fuel transfer is possible, though unlikely, along refueling routes. Such an occurrence has only happened three times since 1972 on all SOAR routes worldwide, and the maximum amount of fuel that could reach water resources would be less than 1 milliliter of fuel per square meter of surface area (land or water). Therefore, significant effects to water quality are not anticipated.

Since the total number of aircraft flight hours would not change from baseline levels, air quality impacts would be limited to redistribution of some annual aircraft emissions from JBLM to the proposed routes in the project area. Emission increases in off-post areas would not exceed conformity thresholds. Additionally, use of fuel would not increase from baseline levels.

The potential for releases of fuel spills during training would present minimal risks to vegetation, aquatic habitats and species, and wildlife within the project area. Based on the SOAR’s history of spills and the small quantity of fuel that would reach the ground or habitats used by wildlife, significant impacts are not anticipated. Other potential effects to biological resources would include noise disturbances to wildlife and possibly fish. Based on the infrequency of the training and the limited duration of the aircraft noise, these effects would not be significant, provided mitigation for protecting listed species was implemented.

Wildlife listed under the Endangered Species Act that potentially occur in coastal and marine areas beneath refueling routes or approaches include birds, reptiles, and marine mammals. A Biological Assessment prepared for the Proposed Action determined that the proposed project may affect, but is

unlikely to adversely affect listed sea turtles, whales, marbled murrelets, western snowy plovers, or Steller sea lions. Minor effects to these species are possible, primarily noise disturbance from aircraft overflights.

Flights would avoid state and federal wildlife refuges and other areas where large numbers of wildlife concentrate, including seabird colonies in coastal National Wildlife Refuges/Sanctuaries, and seal, otter, and sea turtle haul-out and resting areas.

Impacts to aesthetics would be limited to visual intrusions of aircraft, which would be most noticeable in back-country areas with scenic views. These impacts would be infrequent and of short duration, and would not entail any permanent alteration of the visual environment. Light and glare impacts are not anticipated.

Aircraft noise would not be loud enough to cause structural damage to historic structures, and at the proposed frequency of training would not alter the setting, feeling, or historic association of historic properties. The Army would continue to consult with the tribes to ensure that the Proposed Action would not significantly affect traditional cultural properties. Since minority and low income populations, and sites frequently occupied by children, do not occur disproportionately beneath training routes and/or approaches, and no substantial environmental or health impacts would be associated with the Proposed Action, disproportionate adverse effects to these populations would not occur.

To minimize potential impacts from proposed refueling activities, the Army would implement the following Best Management Practices and mitigation:

- To prevent damage to the refueling hose during fuel transfer, and other accidents, follow procedures outlined in Army Regulation 385-95, which identifies steps and processes to identify training hazards and prevent them from occurring.
- Wherever possible, follow guidance in FAA Advisory Circular 91-36D, which recommends that pilots maintain a minimum altitude of 2,000 feet AGL when flying over noise sensitive areas, such as National Wildlife Refuges and other areas where a quiet setting is a generally recognized feature or attribute of the land.
- Follow Olympic Coast National Marine Sanctuary regulations, which restrict motorized aircraft flights below 2,000 feet within 1 nm of Flattery Rocks, Quillayute Needles, or Copalis National Wildlife Refuges, or within 1 nm seaward from the coastal boundary of the sanctuary.
- Follow FAA provisions to schedule and coordinate all training flights with the appropriate Air Route Traffic Control Center.
- Have one pilot stay focused outside of the aircraft at all times, which will help avoid bird strikes.
- When approaching refueling routes, avoid areas associated with National Wildlife Refuges where the bird strike risk has been classified as severe.
- Continue to consult with tribes that have expressed concerns about the potential impacts of the proposed training on traditional cultural properties.
- Follow the Fly Friendly Program, which entails flying to and from training routes at a minimum elevation of 500 feet AGL, and avoiding populated areas and other noise sensitive receptors.

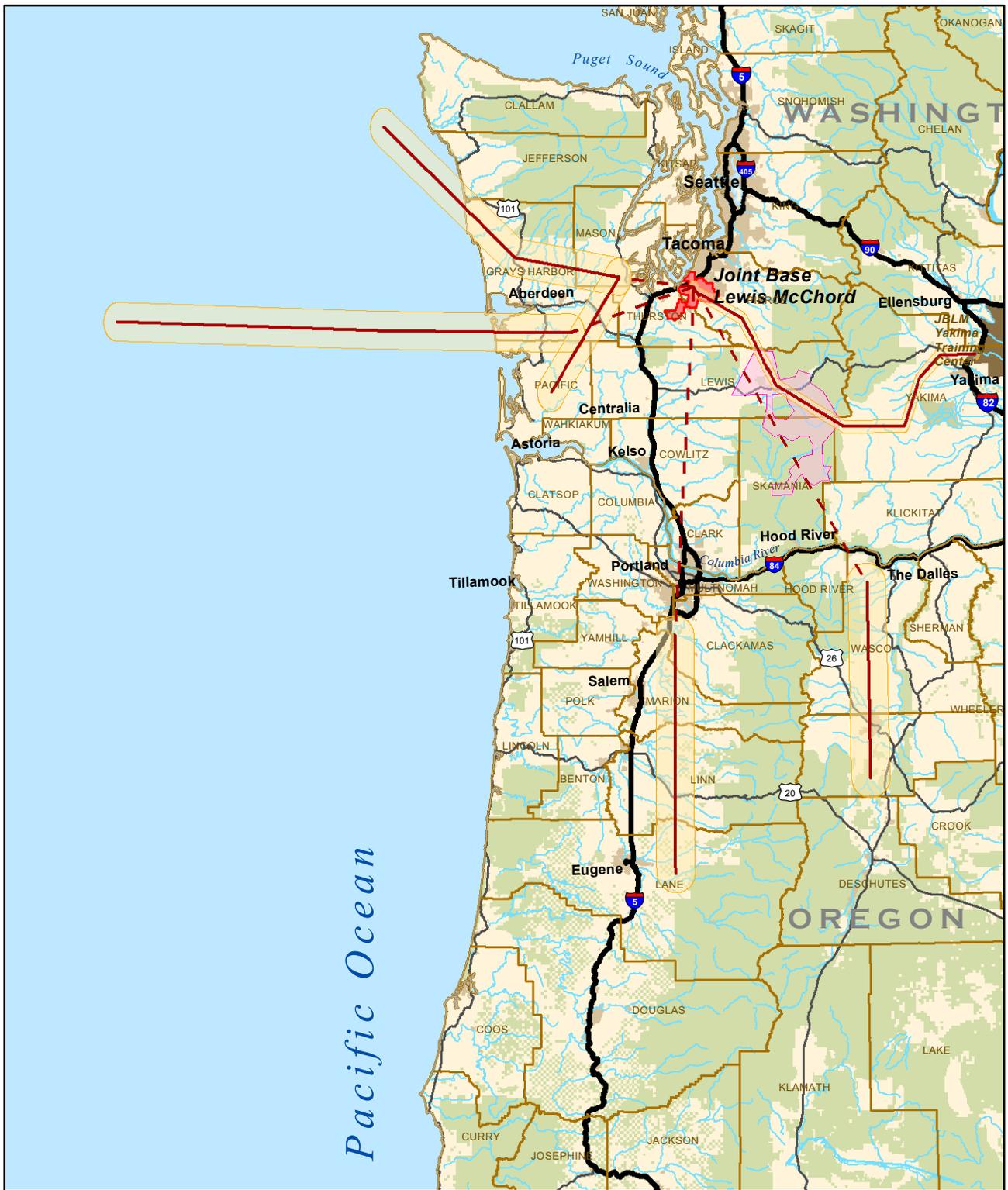
Based on a review of the policies and goals established by the Coastal Zone Management Program, the proposed activities are determined to be consistent with the program. We request your concurrence with this determination in order that the proposed Army project may proceed. If you have any questions, please contact Mr. Bill Van Hoesen, JBLM NEPA Program Manager, at (253) 966-1780 or [bill.vanhoesen@us.army.mil](mailto:bill.vanhoesen@us.army.mil). Thank you for your assistance in this matter.

Sincerely,

Paul T. Steucke, Jr.  
Chief, Environmental Division

#### LIST OF ACRONYMS

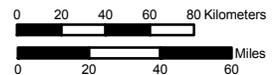
AGL	Above Ground Level
dBA	A-weighted decibels
EA	Environmental Assessment
IR	Instrument Rules
JBLM	Joint Base Lewis-McChord
JBLM-YTC	Yakima Training Center
MSL	Mean Sea Level
nm	nautical miles
SEPA	State Environmental Policy Act
SOAR	Special Operations Aviation Regiment
TF/MMR	Terrain-Following Flight using Multi-Mode Radar

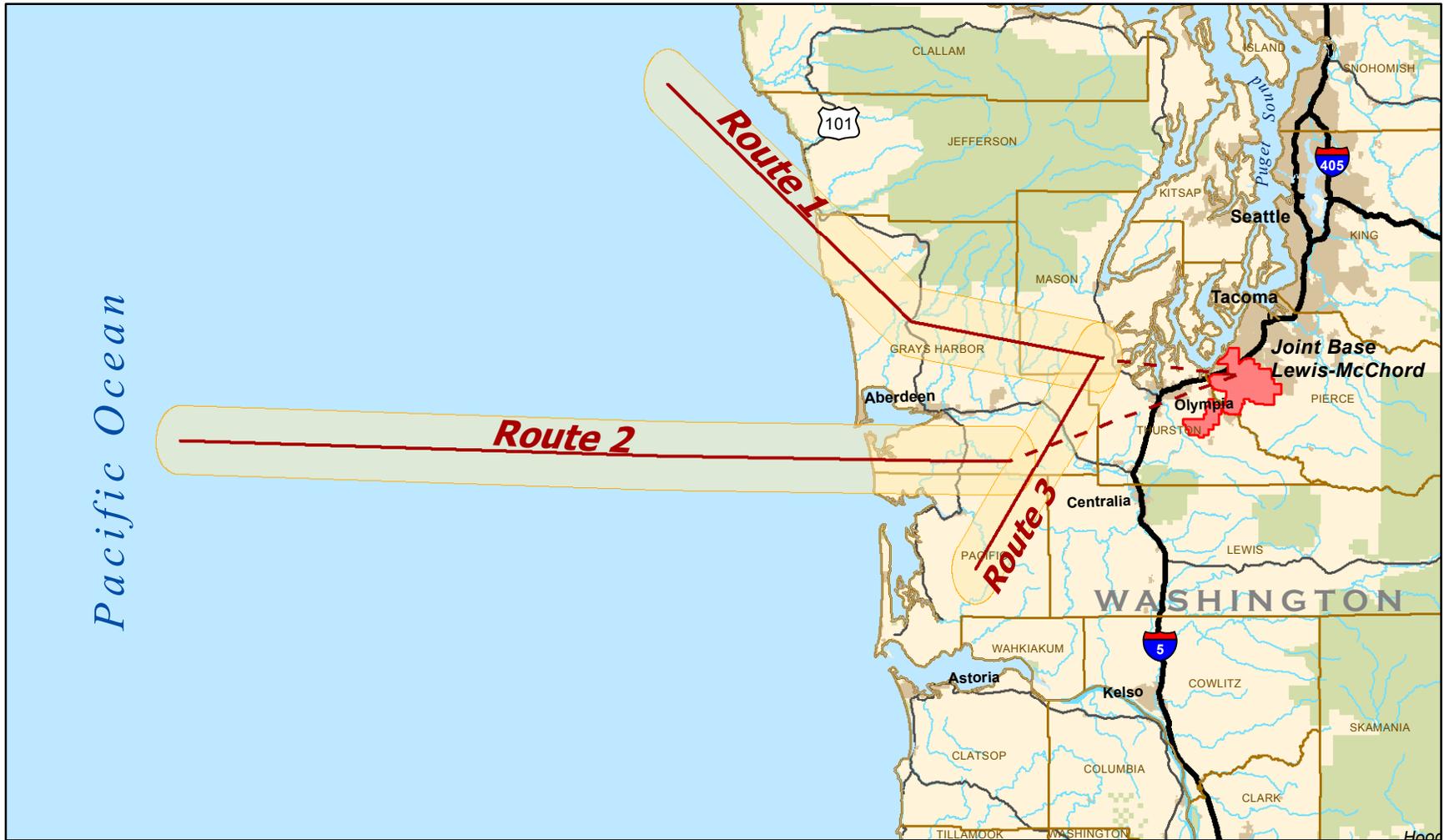


**Figure 1. Project Location**

- |   |   |   |
|---|---|---|
|  Possible Route Approaches             |  Counties        |  Interstate Highways |
|  Existing and Proposed Training Routes |  Populated Areas |  U.S. Highways       |
|  Route Buffers/Airspace                |  Public Lands    |  Rivers & Streams    |
|  Proposed Low-Level Training Area      |   |   |

**DRAFT**



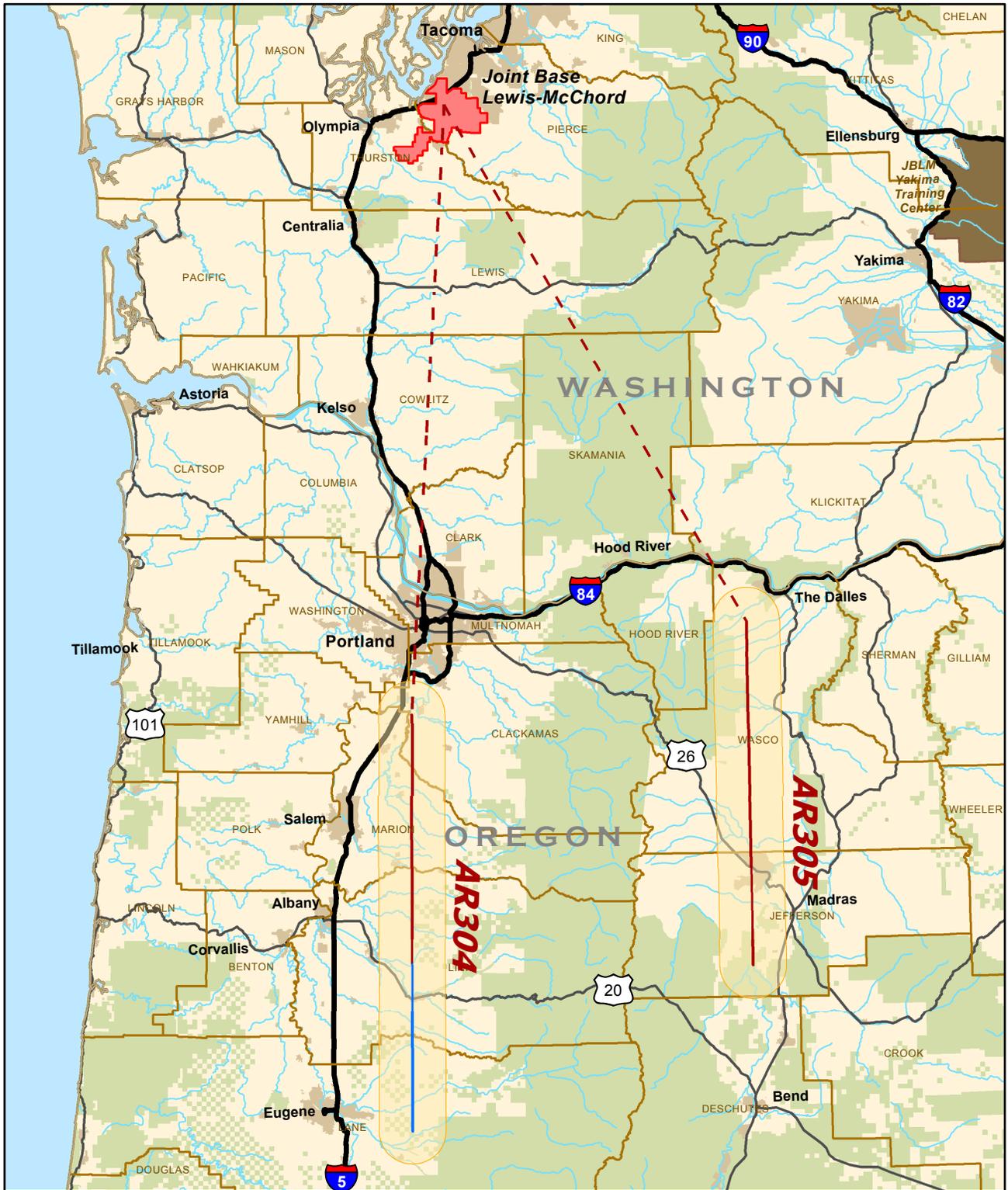


**Figure 2. Proposed Aerial Refueling Routes 1, 2, and 3**

- |   |                                  |   |                 |   |                     |
|---|----------------------------------|---|-----------------|---|---------------------|
|  | Possible Route Approaches        |  | Counties        |  | Interstate Highways |
|  | Proposed Aerial Refueling Routes |  | Public Lands    |  | U.S. Highways       |
|  | Route Buffers                    |  | Populated Areas |  | Rivers & Streams    |

**DRAFT**





**Figure 3. Proposed Aerial Refueling Routes AR304 and AR305**

- |  |                           |  |                 |  |                     |
|--|---------------------------|--|-----------------|--|---------------------|
|  | Possible Route Approaches |  | Counties        |  | Interstate Highways |
|  | Existing Refueling Routes |  | Public Lands    |  | U.S. Highways       |
|  | Proposed Route Extensions |  | Populated Areas |  | Rivers & Streams    |
|  | Route Buffers             |  |                 |  |                     |

**DRAFT**





## **Appendix C**

### **Historic and Tribal Consultation**



*Final Report*

**Section 106 Review of Proposed  
Northwest Aviation Operations for the  
160th Special Operations Aviation Regiment  
Joint Base Lewis-McChord, Washington**

Submitted to

United States Army,  
Joint Base Lewis-McChord Public Works  
Joint Base Lewis McChord

Prepared by



Historical Research Associates, Inc.  
Portland, Oregon

and



Seattle, WA

November 2011

Contract No. W912DW-07-D-1007-0003  
Package No. 584

## Executive Summary

The Department of the Army at Joint Base Lewis-McChord (JBLM), Washington, proposes to establish three new helicopter aerial refueling routes; extend one existing aerial refueling route; establish a new low-level flight training area; and establish a new multi-mode radar training route. The military training routes (MTRs) would support MTRs based out of JBLM, but would be located off-post in western Washington and northwestern Oregon. MTRs would be conducted by the 160th Special Operations Aviation Regiment (SOAR), with MH-60 Blackhawk helicopters, MH-47 Chinook helicopters, and C-130 Hercules tankers. Pursuant to the National Environmental Policy Act (NEPA), the Army prepared an Environmental Assessment (EA) to analyze the potential environmental effects of a No Action Alternative where off-post training would not occur (Alternative A), a Proposed Action to publish and use new routes and extend an existing route (Alternative B), and an action to use only existing (previously published) off-post training routes (Alternative C) (USDOA 2010).

Scoping efforts for the environmental assessment determined that potential increases in the decibel level, frequency, and duration of noise from the proposed MTRs had the potential to affect characteristics of historic districts and traditional cultural properties listed in or eligible for listing in the National Register of Historic Places, and/or National Historic Landmarks. Historical Research Associates, Inc. (HRA) analyzed Alternatives B and C for potential impacts to historic properties pursuant to regulations implementing Section 106 of the National Historic Preservation Act (NHPA). An area of potential effects (APE) pursuant to 36 CFR 800.3 was determined based on a 70 decibel A-weighting (dB[A], the filter commonly used to correspond to the human ear) noise threshold for aircraft that would be operated under 2,000 ft above ground level (AGL). Five historic properties were identified in vicinity of proposed MTRs: Cape Disappointment Historic District, Chinook Point National Historic Landmark, Five Oaks Farm Historic Farmstead, Fort Simcoe Historic District, and Weyerhaeuser South Bay Log Dump Rural Historic District. Native American traditional cultural properties were not inventoried; however, HRA identified 11 potentially affected Indian tribes with whom the Army will consult to identify potential effects to such resources. Scoping determined that noise and vibration from military rotary-blade aircraft do not have the potential to cause structural effects to historic buildings.

HRA recommends a finding of No Historic Properties Affected for Alternatives B and C.

## Table of Contents

<b>Executive Summary .....</b>	<b>i</b>
<b>Introduction and Regulatory Authority .....</b>	<b>1</b>
<b>Description of Undertaking.....</b>	<b>1</b>
Alternative B: Publish New Routes/Extend Existing Routes (Proposed Action) .....	1
Refueling Training Routes .....	1
Low-Level Training Area.....	3
Terrain-Following/Multi-Mode Radar Operations (TF/MMR).....	3
Alternative C: Use Existing Routes .....	4
TF/MMR and Low-Level Training .....	4
<b>Study Methods.....</b>	<b>5</b>
Area of Potential Effects .....	5
Identification of Historic Properties and Assessment of Effect .....	6
Cape Disappointment Historic District .....	8
Chinook Point National Historic Landmark.....	9
DuPont Village Historic District .....	9
Five Oaks Farm Historic Farmstead.....	9
Fort Simcoe Historic District.....	10
Weyerhaeuser South Bay Log Dump Rural Historic Landscape .....	10
Native American Traditional Cultural Properties.....	11
Summary .....	13
<b>Recommended Findings of Effect.....</b>	<b>13</b>
Alternative B.....	13
Alternative C.....	13
<b>References Cited.....</b>	<b>14</b>

## Appendix A: Maps of Proposed Training Routes

## Appendix B: Historic Property Documentation

## List of Figures

<b>Figure 1.</b> Historic districts, sites, and NHLs in vicinity of proposed MTRs.....	7
--	---

## List of Tables

<b>Table 1.</b> Comparison of decibel levels of various rotary-blade military aircraft relative to flight altitude. The approximate altitude at which 70 dB(A) levels would be reached is 2,000 ft AGL. ....	6
<b>Table 2.</b> Historic districts, sites, and NHLs in the vicinity of MTRs (Alternatives B and C).....	8
<b>Table 3.</b> Tribes with some portion of their reservation or traditional lands in the vicinity of training routes .....	11
<b>Table 4.</b> Summary of informal discussions with potentially affected tribes. ....	12

## Introduction and Regulatory Authority

The Department of the Army at Joint Base Lewis-McChord (JBLM), Washington, proposes to establish three new helicopter aerial refueling routes; extend one existing aerial refueling route; establish a new low-level training area; and establish a new multi-mode radar training route. The military training routes (MTRs) would support MTRs based out of JBLM, but would be located off-post in western Washington and northwestern Oregon. MTRs would be conducted by the 160th Special Operations Aviation Regiment (SOAR), with MH-60 Blackhawk helicopters, MH-47 Chinook helicopters, and C-130 Hercules tankers.

Pursuant to the National Environmental Policy Act (NEPA), the Army prepared an Environmental Assessment (EA) for the proposed MTRs (USDOA 2010). Historical Research Associates, Inc. (HRA) analyzed potential impacts to cultural resources. Scoping efforts for the EA determined that potential adverse effects would be limited to potential increases in the decibel level, frequency, and duration of noise and/or visual intrusions from aircraft during take-offs, landings, and route approaches. Such potential adverse effects should be limited to historic districts located in rural settings, historic landscapes, National Historic Landmarks, and traditional cultural properties important to the ongoing cultural practices of a Native American tribe or community; these are likely to be the only resource types for which integrity of setting, feeling, or association could be adversely affected by increased temporary noise or visual intrusions. Pursuant to regulations implementing Section 106 of the National Historic Preservation Act (NHPA) (36 CFR 800), the following report is intended to assist the Army with their Section 106 compliance responsibilities by providing specific information about potential noise and visual effects from the proposed MTRs.

Scoping determined that that noise and vibration from military rotary-blade aircraft do not have the potential to cause structural effects to historic buildings such as window breakage, plaster deformation, or other structural compromise. Such effects are manifested primarily when noise levels reach 137 decibels (dB) or higher, causing "excitation of the structural component" of a building (NRC/NAS 1977; USAED 2006:A-15).

## Description of Undertaking

The Northwest Aviation Operations EA addressed a No Action Alternative under which off-post training would not occur (Alternative A), a Proposed Action to publish and use new routes and extend existing routes (Alternative B), and an action to use only existing (previously published) off-post training routes (Alternative C) (USDOA 2010). Descriptions of Alternatives B and C are summarized below. Maps of the proposed and existing MTRs for Alternatives B and C are provided in Appendix A.

### **Alternative B: Publish New Routes/Extend Existing Routes (Proposed Action)**

#### **Refueling Training Routes**

Refueling operations training would occur along three newly established (published) routes (Routes 1, 2, and 3), one extended route (Route AR304), and one existing route (Route AR305).

All three new routes would originate over land west of JBLM, and two of them would end over the Pacific Ocean (Routes 1 and 2). The existing route and the extended route would begin and end over land in Oregon. Under the Fly Friendly Program, pilots flying to and from MTRs maintain a minimum elevation of 500 feet above ground level (AGL) and higher and avoid anything on the landscape that might produce any sort of noise complaint. Therefore, during “friendly flying,” homes and other noise-sensitive receptors are avoided.

The proposed frequency of use is 50 times per year for each refueling route, with each training period lasting a maximum of 3 hours. Aircraft taking part in training missions would consist of MH-60 Blackhawk and MH-47 Chinook helicopters, along with one C-130 tanker. These routes would be available for activation 24 hours a day, 7 days a week, 365 days a year. It is expected that 75 percent of training would occur at night, and that use of routes would be well-spaced throughout the year, rather than clustered together.

During each training mission, from two to ten aircraft would be utilized. Helicopters could be all of one type or varying combinations of aircraft. During one training session aircraft may use the entire route or just portions of it, and could complete one or more runs down the route and back up. Typical exercises for the proposed routes would entail six passes along Routes 1 and 2, twelve passes along route 3, and five passes along routes AR304 and AR305. Route descriptions are as follows.

***Refuel Route 1 (AR307V)*** would begin northwest of Olympia, Washington, and head west, turning to the northwest when it reaches Highway 101 north of Aberdeen, Washington, and eventually ending over the Pacific Ocean. The length of the route would be 91 nautical miles (nm). Aircraft flying over this route would maintain elevations of 2,500 to 5,000 feet above mean sea level (aMSL). This route is located approximately 24 nm west of JBLM.

***Refuel Route 2 (ARX371V)*** would begin in Grays Harbor County, east of Highway 101 and southeast of Aberdeen, Washington, and head west, ending over the Pacific Ocean. The length of the route would be 143 nm. Aircraft flying along this route would maintain elevations of 2,300 to 5,000 feet aMSL. This route is approximately 41 nm west of JBLM.

***Refuel Route 3 (ARX372)*** would begin northwest of Olympia, Washington, and head southwest into Pacific County for a distance of 42 nm. Aircraft flying along this route would maintain elevations of 4,000 to 6,000 feet aMSL. This route is approximately 24 nm west of JBLM.

***Refuel Route AR304***, an extension of a current published route, would begin south of Portland, Oregon and head south, ending east of Eugene, Oregon. This route would be 75 nm in length, which is 30 nm longer than the current AR304. Aircraft flying along this route would maintain elevations of 3,100 to 5,000 feet aMSL. This route is approximately 110 nm south of JBLM.

***Refuel Route AR305***, a currently published route, begins south of Madras, Oregon, and heads north to The Dalles, Oregon. This route is 62 nm long. Aircraft flying along this route would maintain elevations of 1,500 to 6,000 feet aMSL. This route is approximately 108 nm southeast of JBLM. Aircraft would typically enter the route at its ending point, which is the closest point to JBLM.

## Low-Level Training Area

A low-level training area would be located in Washington, southeast of JBLM, mostly above the Gifford Pinchot National Forest. The area would be an irregularly-shaped polygon with a total area of approximately 496,500 acres. Helicopters could approach this area from any direction, under the guidelines of the Fly Friendly Program. Within the training area, helicopters would perform various mission-essential tasks that involve flying at low altitudes, from the ground surface to a height of 500 feet above treetop level. Tasks could include following the contours of the earth as low as 50 feet above the highest obstacle (nap-of-the-earth flying), formation flight, confined area approaches, hovering, low-level navigation, sling load operation (carrying cargo externally in a sling), and other flight and maneuvering of helicopters. Pilots would also land at various locations within the training area to practice tasks such as confined area landings. The training activities would be used to simulate mission activities.

It is estimated that 10 to 20 landings would occur during each training session. Landings would take place at one or more of ten identified landing zones (shown in Figure 2.3, Appendix A). Pilots would land helicopters and then take off again. In some cases, only a portion of the helicopter, such as one wheel, would touch down on the ground. These landing zones are relatively open areas that have been identified by the 160<sup>th</sup> SOAR as suitable for training needs. They include abandoned quarry locations, rocky peaks, roads, and other open areas. The proposed landing zones vary in size, ranging from approximately 10,000 square feet (0.2 acres) for the smaller sites to 5 acres for the largest sites. All of the identified landing zones are presently cleared of vegetation and it is assumed they would not require any alterations or ongoing maintenance to make them usable for training purposes.

Each training period would be approximately 3 hours in duration, and would involve no more than two helicopters (any combination of MH-60 Blackhawks and MH-47 Chinooks). Training events would occur approximately 60 times per year. The low-level training area and landing zones would be available for use 24 hours a day, 7 days a week, 365 days a year, with the exception of weekends and federal holidays from Memorial Day through Labor Day. Use of the low-level training area and landing zones would occur throughout the year, as weather permits.

## Terrain-Following/Multi-Mode Radar Operations (TF/MMR)

The proposed TF/MMR route is a new IR route (routes flown using instrument flight rules) between JBLM and JBLM Yakima Training Center (YTC). The route heads roughly southeast from JBLM over the Cascade Range and Gifford Pinchot National Forest, making two bends before it heads east in Yakima County and then turns to the northeast toward JBLM-YTC. The total length of the route is 122 nm.

Uses of this route would include flying to JBLM-YTC during inclement weather, and proficiency/qualification training in terrain-following using multi-mode radar. During terrain-following training, pilots would use on-board radar that sweeps the terrain to maintain a fixed distance above the ground under conditions of limited visibility. During terrain-following exercises, aircraft would fly at altitudes of 300 to 500 feet above treetop level.

Terrain-following exercises would take place approximately 60 times per year. A typical exercise would be conducted by two helicopters (any combination of Blackhawks or Chinooks) leaving Gray Army Airfield 10 or 15 minutes apart. Helicopters would fly to JBLM-YTC and

back, for a total time in the air of approximately 2 hours. Once exiting the route, helicopters would “fly friendly” to Yakima Air Terminal–McAllister Field, located in Yakima, Washington, using visual flight rules outside of an established MTR. Aircraft could then return along the route to JBLM or continue on to JBLM-YTC.

The TF/MMR route would be available for use 24 hours a day, 7 days a week, 365 days a year, with the exception of weekends and federal holidays from Memorial Day through Labor Day. Use of the TF/MMR route would occur throughout the year, as weather permits.

## **Alternative C: Use Existing Routes**

Under this alternative, the 160th SOAR would use existing published routes in the vicinity of JBLM for aerial refueling with U.S. Marine tankers, and the U.S. Air Force would continue to provide tankers on a limited basis for training missions along random unpublished routes. The 160th SOAR would use two existing published routes (AR626 and AR628) over the ocean and the two routes over land in Oregon (AR304 and AR305) for all MTRs.

AR304 and AR305 over Washington and Oregon are as described under Alternative B, without the proposed extension to AR304. Refuel Routes AR304 and AR305 would each be used 60 times per year. Each training period would last a maximum of 3 hours. The refueling activities and aircraft used for these existing training routes would be similar to those under Alternative B.

Existing Refuel Routes AR626 and AR628 would each be used 20 to 25 times per year. Each training period would last a maximum of 3 hours. The number and type of aircraft taking part in training missions and refueling activities would be similar to those described for other refueling routes. There is no established path for approaching routes AR626 and AR628 from JBLM, so it must be assumed that any available path could be taken. Aircraft would fly to and from the existing routes at elevations of 500 ft AGL and higher, avoiding bad weather and populated areas, and following friendly flying protocols. Routes would be available for activation 24 hours per day, 7 days a week, 365 days a year, with the exception of federal holidays.

The two existing routes over the Pacific Ocean would be used for aerial refueling during the day, and the two routes over land in Oregon would be used for aerial refueling at night. Use of routes would be well-spaced throughout the year, rather than clustered together.

## **TF/MMR and Low-Level Training**

Under Alternative C, the 160th SOAR would not conduct TF/MMR training flights in the vicinity of JBLM. A new IR leg across the Cascade Range would not be established, and a suitable flight route for such training would be unavailable. In addition, aircraft from the 160th SOAR would not fly between JBLM and JBLM-YTC in inclement weather. A low-level training area would not be established off-post under this alternative. Low-level training activities would occur on JBLM, as allowed by space and scheduling constraints.

## Study Methods

### Area of Potential Effects

Section 106 regulations require the federal agency to determine an area of potential effects (APE), in consultation with the State Historic Preservation Office (SHPO), within which an undertaking may directly or indirectly cause alterations to the character or use of a historic property that qualifies the property for listing in the National Register of Historic Places (NRHP, 36 CFR Part 800.4). The APE is determined by the scale and nature of the undertaking and may be different for different kinds of actions.

During scoping it was determined that potential adverse effects to historic properties from military aircraft training exercises are limited to the introduction of audible and/or visual intrusions from aircraft during take-offs, landings, and flyovers. For the purpose of assessing potential effects, the types of properties potentially impacted were identified as (1) historic districts located away from urban centers where the setting is likely to be a critical aspect of their NRHP eligibility, (2) traditional cultural properties, (3) historic landscapes, and (4) National Historic Landmarks. Integrity of setting, feeling and association are likely important aspects of integrity of all four of these property types; thus, they could be adversely affected by increased temporary noise and visual intrusions. Conversely, increased temporary noise or visual intrusions are not likely to adversely affect archaeological sites, individual buildings, structures, objects, and historic districts in urban settings because their integrity of setting, feeling, and association in regard to temporary noise and visual intrusions are likely not integral to their historic significance.

HRA reviewed existing studies and environmental assessments of potential noise impacts to determine an appropriate threshold at which noise could begin to be considered an intrusive element in the setting, feeling or association of a rural historic district or traditional cultural property. A study on human response to aircraft noise by Rylander et al. (1974:399-406) cited in the 2006 Fort Campbell 160<sup>th</sup> SOAR environmental assessment of impacts to cultural resources (Cordy and Associates 2006) was found to provide an appropriate basis for assessing whether a person might find aircraft noise incompatible with the types of properties being assessed. The study analyzed data from previous studies concerning human response to high exposures of aircraft noise (greater than 50 overflights in a 24-hour period) in terms of the percentage of a population who expressed annoyance at speech/conversation interference. The authors suggest a strong correlation between exposure to aircraft noise and annoyance beginning at the 70 dB (weighting A, the filter commonly used to correspond to the human ear) measured in peak value (Rylander et al. 1974:404).

The study suggests that the noise level at which an appreciable number of people in high-exposure areas (greater than 50 overflights/24 hours) would become annoyed by speech/conversation interference is approximately 70 dB(A). HRA compiled a table of noise metrics for the various aircraft that would be used for the proposed MTRs from data in the Fort Campbell 106<sup>th</sup> SOAR EA and concluded that 70 dB(A) correlates roughly to an altitude of about 2,000 ft AGL (Table 1).

**Table 1.** Comparison of decibel levels of various rotary-blade military aircraft relative to flight altitude. The approximate altitude at which 70 dB(A) levels would be reached is 2,000 ft AGL.

Altitude AGL (ft)	Military Rotary-blade Aircraft noise levels in dB(A)					
	AH-1	AH-64	CH-47D	OH-58D	UH-1	UH-60
200	93	94	98	90	91	91
500	85	86	89	81	83	83
1,000	79	79	83	75	76	76
2,000	72	72	77	68	70	69
5,000	61	61	67	57	60	58
10,000	52	52	59	48	52	48

Based on this information, HRA recommends that the APE for Alternatives B and C be defined as **any location along the proposed MTRs where aircraft may be operated at 2,000 ft AGL or less**. Aircraft are not anticipated to fly below this elevation on the refueling routes, but it is uncertain if approaches to these routes will occasionally be flown lower than this elevation. With this caveat, the recommended APE includes:

Possible approaches for:

- Routes 1, 2, and 3
- Routes AR626 and AR628
- Routes AR304 and AR305

And all of the training routes plus possible approaches for:

- Low-level Training Area(s)
- TFF/MMR

HRA's review of other studies support a 70 dB(A) threshold. The Department of Defense (DOD) and most federal agencies utilize a noise level threshold of 65 dB(A), measured in terms of DNL value,<sup>1</sup> for identifying potentially significant noise impacts in residential areas. Federal Aviation Administration (FAA) guidelines established by the Federal Interagency Committee on Urban Noise (FICUN) state that DNL above 65 dB is not compatible with residential land use (USAED 2006:A-8).

## Identification of Historic Properties and Assessment of Effect

HRA identified historic districts and National Historic Landmarks (NHLs) in Washington and Oregon near proposed MTRs for Alternatives B and C whose setting, feeling, or association are defining characteristics of their NRHP eligibility. These are listed in Table 2, and discussed below along with an assessment of effect based on potential noise levels defined for the APE. Resource locations are mapped in Figure 1. Appendix B contains copies of NRHP or

---

<sup>1</sup> DNL stands for *average daily noise level*, a time-averaged noise metric that takes into account both the noise levels of all individual events which occur during a 24-hour period and the number of times the events occurs.

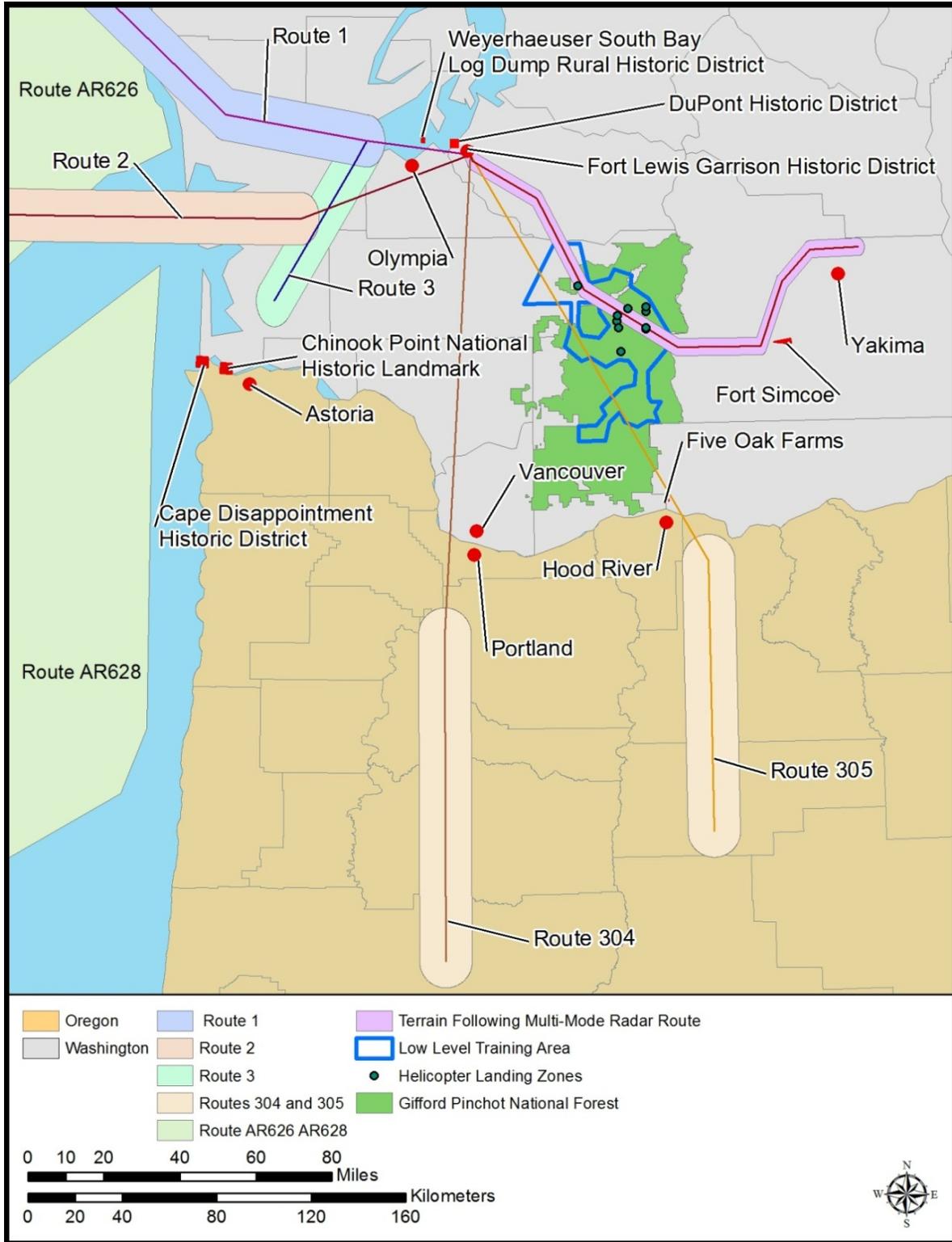


Figure 1. Historic districts, sites, and NHLs in vicinity of proposed MTRs.

Washington SHPO (also known as the Washington Department of Archaeology and Historic Preservation, or DAHP) historic property inventory forms for each resource.

Cape Disappointment Historic District and Chinook Point National Historic Landmark are located on the coast of Washington between JBLM and the off-shore AR628 training route (Alternative C). Their relation to the approach to AR628 is not known; however, it is unlikely that aircraft approaching AR628 from JBLM would fly near these resources at altitudes less than 2,000 ft AGL.

**Table 2.** Historic districts, sites, and NHLs in the vicinity of MTRs (Alternatives B and C).

Resource	Location	Alt B Route(s) <sup>1</sup>	Alt C Route(2) <sup>1</sup>
Fort Lewis Garrison Historic District	JBLM, WA	Routes 1-3, AR304, AR305, AR626, AR628 LLT, TF-MMR	AR304, AR305, AR626, AR628
DuPont Village Historic District	DuPont, WA	Routes 1-3, AR626, AR628, LLT, TF/MRR	AR626, AR628
Weyerhaeuser South Bay Log Dump Rural Historic District	Woodard Bay, WA	Route 1	
Five Oaks Farm	Underwood, WA	AR305	AR305
Cape Disappointment Historic District	Ilwaco, WA	AR628	AR628
Chinook Point Nat'l Historic Landmark	Chinook, WA	AR628	AR628
Fort Simcoe State Park	Southwest of Yakima, WA	TF/MMR	
<sup>1</sup> Possible approach from JBLM to AR626 and AR628 not determined. "Fly friendly" avoidance will be implemented where feasible for all approaches.			

## Cape Disappointment Historic District

Cape Disappointment National Historic Landmark is located within Cape Disappointment State Park, one of 12 park sites along the Washington and Oregon coasts that comprise the Lewis and Clark National Historic Park. Cape Disappointment State Park, at the mouth of the Columbia River, encompasses the site of the 1805 winter camp of the Lewis and Clark Corps of Discovery Expedition at Chinook Point (an NRHP-eligible site and NHL), and a series of military installations dating from 1862 through World War II. The government established Fort Canby at Cape Disappointment in 1875. The district also contains the nation's oldest functioning lighthouse, built in 1856 to warn sailors of the "Graveyard of the Pacific," as the Columbia River bar was known. It was listed in the NRHP in 1975 for its association with military operations, and contains archaeological features and artifacts, buildings, and structures. Cape Disappointment Historic District is significant for its association with military operations through World War II and retains its integrity of association and setting.

**Assessment of Effect:** The district's setting is largely unchanged from its historical period of significance. Under Alternative C, aircraft flying between JBLM and Route AR628 (10-20 nm west of the coast) could potentially pass over or near the Cape Disappointment Historic District at less than 2,000 ft AGL. To avoid potential effects to the integrity of the district's historical setting, the resource should be avoided, particularly at altitudes of less than 2,000 ft AGL. (Note: military aircraft are exempt from FAA-recommended flight altitudes over national parks stated in the National Parks Overflights Act of 1997.)

## Chinook Point National Historic Landmark

Chinook Point was granted national landmark status in 1961 for its association with Capt. Robert Grey's discovery of the Columbia River in May 1792. It was the base camp for the Lewis and Clark Corps of Discovery Expedition during their exploration of Cape Disappointment in the winter of 1805. The site is within the Fort Columbia State Historical Park adjacent to US Highway 101 in Chinook, Washington, and is part of the larger Lewis and Clark National Historic Park system. Chinook Point was listed in the NRHP in 1966 for its association with exploration and settlement of the Pacific Northwest from 1765-1846.

**Assessment of Effect:** The historical setting of Chinook Point has been compromised by the presence of US Highway 101; however, National Historic Landmarks are afforded special consideration under the NHPA (36 CFR 800.10). Under Alternative C, aircraft flying between JBLM and Route AR628 (10-20 nm west of the coast) could potentially pass over or near Chinook Point at less than 2,000 ft AGL. To avoid potential effects, the resource should be avoided, particularly at altitudes of less than 2,000 ft AGL. (Note: military aircraft are exempt from FAA-recommended flight altitudes over national parks stated in the National Parks Overflights Act of 1997.)

## DuPont Village Historic District

DuPont Village Historic District in Dupont, Washington, is a collection of buildings and structures on 43 acres west of JBLM. The historic district comprises the remains of the company town established between 1906 and 1915 by E.I. DuPont de Nemours and Company for employees of the DuPont dynamite powder works. According to the NRHP nomination form, filed with the DAHP in 1987, the district is significant for association with the industrial development of Pierce County and for being among the best preserved examples of a company town in Washington State (see Appendix B). The district was listed in the NRHP in 1987.

**Assessment of Effect:** The district is situated east of JBLM in an urban setting. Based on the definition of the APE, the district would not be considered a rural historic district or landscape subject to adverse impacts from increased noise associated with use of the proposed MTRs. Under Alternatives B and C, it is possible that aircraft approaching the proposed MTRs may fly in the vicinity of the district at altitudes less than 2,000 ft AGL; however, under the Fly Friendly Program, pilots would avoid anything on the landscape that might produce a noise complaint. HRA recommends that the district will not be adversely affected by noise or visual intrusions.

## Five Oaks Farm Historic Farmstead

Five Oaks Farms is a historic farmstead located in the community of Underwood, approximately one mile west of the White Salmon River in the Columbia River Gorge National Scenic Area, Skamania County, Washington. The farmstead was settled ca. 1893 by Edward and Isabella Underwood, and is significant for its association with early twentieth century agriculture and settlement, and persons important in the broad history of settlement in the Washington Territory. It is one of the few remaining examples of intact historic farmsteads in Washington State (Donovan and Howard 2007). The Underwood family, for whom the town is named, were key early residents of Skamania County. Once the Oregon Railway & Navigation Company railroad was established on the south side of the Columbia River in 1908, the family opened a post office and a hotel, and established a ferry service to the town of Hood River. Isabella

Underwood was the granddaughter of Chief Welawa, who lived in what is now Hood River. The NRHP-eligible portion of the farmstead contains five contributing and three noncontributing buildings and structures on five acres of the original 19-acre plot, and its period of significance is 1893-1935. The site is situated on a country road in a rural area surrounded by newer and historic residential development.

**Assessment of Effect:** Five Oaks Farms Historic Farmstead is located in a relatively rural, undeveloped setting in Washington adjacent to Route 305 (Alternative B and C), and is the legacy of the Underwood family who were important in Skamania County development and agricultural history. The NRHP-eligible portion of the farmstead is significant only for its research potential with regard to the layout and preservation of the farm complex buildings and structures (NRHP Criterion D) (Donovan and Howard 2007). The setting of the farmstead is not a critical element of the characteristics that make it eligible for the NRHP. HRA recommends that the Five Oaks Farm will not be adversely affected by noise or visual intrusions.

### Fort Simcoe Historic District

Fort Simcoe Historic District is a 200-acre interpretive Washington State heritage park on the Yakama Indian Nation Reservation southwest of Yakima, near Toppenish. Fort Simcoe is significant for its association with Native American involvement in government military operations from 1856 to 1859. The fort was turned over to the Department of Indian Affairs in 1859, and remained an Indian agency until 1923. The Fort Simcoe Historic District was listed in the NRHP in 1974 for its military association. While the district retains integrity of association, the buildings and structures within it have been altered and/or moved.

**Assessment of Effect:** Fort Simcoe Historic District is associated with Native American history and may contain elements of a traditional cultural property of the Confederated Tribes of the Yakama Indian Nation. The TF/MMR Route (Alternative B) will avoid the district (which is located south of the route); however, potential effects from noise and/or visual intrusions should be determined through consultation with the tribe (see discussion below on Native American Traditional Cultural Properties [TCPs]).

### Weyerhaeuser South Bay Log Dump Rural Historic Landscape

The Weyerhaeuser South Bay Log Dump Rural Historic District includes the remains of a 1926 Weyerhaeuser Corporation log sorting and transport site on Woodard Bay, approximately 7 miles from the city of Olympia. The district was listed on the NRHP in 1991 for its association with the early logging industry, and was designated a rural historic landscape under the theme of "Industry/Processing/Extraction - Processing Sites." Lumber from logging camps being brought to the bay via railroad were loaded onto tugboats for transport to local saw mills. The remains of a railroad trestle and pilings are visible above the surface of the bay. The district also includes four historical houses and a prehistoric archaeological component. The district is now a 4,502-acre Nature Conservancy wetland rehabilitation property known as the Woodard Bay National Resources Conservation Area, and features an interpretive walking trail. Ten acres of the district's submerged lands are presently the site of a Nature Conservancy oyster restoration project.

**Assessment of Effect:** It is HRA's opinion that the Weyerhaeuser South Bay Log Dump Rural Historic Landscape appears to no longer retain integrity of historic setting due to the

inundation of its historic components and its conversion to a wetlands conservation area. Possible approaches to Routes 1, 2 and 3 will be located south of the resource. HRA recommends that the resource will not be adversely affected by noise or visual intrusions.

### Native American Traditional Cultural Properties

Unlike other types of historic properties, Native American traditional cultural properties (TCPs) are typically not recorded with the SHPO, and are known only to Tribal Historic Preservation Offices, elders, and tribal cultural resource specialists. TCPs are often sensitive in nature and may include natural resources such as plant gathering or fishing sites that are used in religious or cultural practices to mark important events. They are typically, but not always, located away from urban centers, and often do not have specific geographic boundaries that can be drawn on a map (NPS 2008). Because TCPs are expressly linked to their surrounding environment, characteristics such as setting, feeling, and association are important aspects of their integrity.

While HRA did not participate in identification efforts regarding traditional cultural properties, it is our understanding that no TCPs listed in or eligible for listing in the NRHP were identified in the APE for this study.

Whether noise or visual effects from proposed MTRs under Alternatives B or C would significantly affect the setting, feeling, or association of Native American TCPs, should they exist, can only be determined through consultation with the affected tribes. HRA identified 11 tribes with some portion of their reservation or traditional lands under training routes or areas (Table 3).

**Table 3.** Tribes with some portion of their reservation or traditional lands in the vicinity of training routes

Tribe	State	Alt B Route(s) <sup>1</sup>	Alt C Route(s) <sup>1</sup>
Confederated Tribes and Bands of the Yakama Indian Reservation	WA	AR305, LLT, TF/MMR	--
Confederated Tribes of Siletz Indians	OR	AR304	AR304
Confederated Tribes of Grand Ronde	OR	AR304	AR304
Confederated Tribes of Warm Springs	OR	AR305	AR305
Cowlitz Indian Tribe	WA	AR304, LLT	AR304
Nisqually Indian Tribe	WA	Routes 1-3, AR304, AR305, AR626, AR628, LLT, TF/MMR	AR304, AR305, AR626, AR628,
Puyallup Tribe of Indians	WA	Routes 1-3, AR304, AR305, AR626, AR628, LLT, TF/MMR	AR304, AR305, AR626, AR628,
Quinault Indian Nation	WA	Route 1, AR626	AR626
Shoalwater Bay Indian Tribe	WA	AR626, AR628	AR626, AR628
Squaxin Island Tribe	WA	Routes 1-3, AR304, AR305, AR626, AR628, LLT, TF/MMR	AR304, AR305, AR626, AR628,
Wanapum Band	WA	AR305, LLT, TF/MMR	--

<sup>1</sup> "Fly friendly" avoidance will be implemented when traveling between JBLM and the training routes/area, where feasible.

**Assessment of Effect:** To identify potential effects to Native American traditional cultural properties, the Army should conduct formal, government-to-government consultation with potentially affected tribes. As part of Section 106 scoping efforts, the Army sent a letter describing the proposed undertaking to the tribes listed in Table 3. The resulting informal discussions (via email and telephone) with four tribal representatives revealed some concerns. The discussions are summarized in Table 4.

Under Alternative B, helicopters engaged in refueling training operations would fly over portions of the reservations of the Nisqually, Yakama, Quinalt, and Squaxin Island tribes, as well as the traditional territories of several other tribes in Washington and Oregon.

Consultation with cultural resources staff of the Gifford Pinchot National Forest confirmed that proposed low-level training activities under Alternative B, including use of helicopter landing sites, would not impact historic properties or traditional cultural properties, to the extent that such resources are known to forest staff (R. McClure, personal communication, May 2011). HRA's review of records maintained in the Washington Information System for Architectural and Archaeological Records Data (WISAARD) determined that there are no archaeological sites within 0.5 mi of any of the proposed helicopter landing zones in the Low-Level Training Area or TF/MRR routes.

Under Alternative C, helicopters flying between JBLM and refueling routes could potentially fly over the reservation of the Nisqually Tribe. Additionally, AR305 passes over the reservation of the Confederated Tribes of Warm Springs. Aircraft flying between JBLM and AR626 and AR628 could potentially fly over the reservations of the Squaxin Island, Quinalt, and/or Shoalwater Bay tribes.

**Table 4.** Summary of informal discussions with potentially affected tribes.

Date	Tribe	Summary of discussion
February 28, 2008	Confederated Tribes of Grand Ronde	In an email, Eirik Thorsgard, Cultural Protection Coordinator for the Confederated Tribes of Grand Ronde, commented that Route AR304 appeared to traverse certain areas sensitive to the tribe, particularly in the vicinity of Mount Angel, Oregon, and the Willamette River falls at Oregon City, Oregon.
February 29, 2008	Confederated Tribes of Siletz	In an email, Robert Kennta, Cultural Resources Director of the Confederated Tribes of Siletz, expressed concerns over areas in the vicinity of Route 304, as well as with potential spillage and/or crashes that could result in damage to numerous archaeological sites and other resources important to the tribe.
March 10, 2008	Cowlitz Tribe	In an email, Ed Arthur, Cultural Resources contact for the Cowlitz Tribe, stated that he did not believe that the project would affect any resources important to the tribe, but wished to be notified of any inadvertent discoveries that may arise from the project.
March 12, 2008	Shoalwater Bay Tribe	Earl Davis, Cultural Resources contact for the Shoalwater Bay Tribe, called Bradley Bowden of HRA and stated that the project should not affect any resources important to the Shoalwater Bay Tribe. Mr. Davis further stated should noise from the project become an annoyance to the tribe, they would want to discuss options for minimizing the disturbance with the U.S. Army.

## Summary

When the noise analysis criteria discussed above were applied to the historic properties listed in Table 2, no significant impacts were identified. Low-altitude training along the TF/MMR route would avoid the Fort Simcoe Historic District, and no noise impacts are anticipated unless identified through consultation with the Yakama tribe. The Fort Lewis Garrison and DuPont Village historic districts are situated in urban settings and would not be adversely impacted by noise under Alternatives B or C. It is assumed that the Army will implement its “fly friendly” policy, as feasible, when flying between JBLM and Routes AR626 and AR628 (Alternative C), which will avoid noise impacts to Chinook Point National Historic Landmark and Cape Disappointment Historic District.

Consultation with cultural resources staff of the Gifford Pinchot National Forest confirmed that proposed low-level training activities under Alternative B, including use of helicopter landing sites, would not impact historic properties or traditional cultural properties, to the extent that such resources are known to forest staff (R. McClure, personal communication, May 2011).

The Oregon SHPO has concurred that the proposed training exercise under Alternatives B and C would not impact historic properties, and the Washington SHPO has offered preliminary concurrence but has requested additional consultation regarding the location of helicopter landing zones (Alternative B). The Army will continue to consult with the Washington SHPO regarding potential effects to historic properties.

## Recommended Findings of Effect

### Alternative B

With the exception of any potential effects to Native American traditional cultural properties yet to be identified through consultation, a finding of *No Historic Properties Affected* is recommended for Alternative B.

### Alternative C

Assuming that any potential noise effects to Cape Disappointment Historic District and Chinook Point National Historic Landmark are avoided by avoiding these properties and with the exception of any potential effects to Native American traditional cultural properties yet to be identified through consultation, a finding of *No Historic Properties Affected* is recommended for Alternative C.

## References Cited

Cordy and Associates, Inc.

2006 *Final Environmental Assessment for Aerial Refueling Training Routes, 160th Special Operations Aviation Regiment, Fort Campbell, Kentucky*. Prepared for U.S. Army Special Operations Command and U.S. Army Corps of Engineers, Savannah District. Wilmington, North Carolina.

Donovan, S., and B. Howard

2007 National Register of Historic Places Registration Form for Underwood/Five Oaks Farm Historic Farmstead. National Park Service. Electronic document, <http://www.nr.nps.gov/>, accessed April 28, 2008.

King, Thomas F.

2003 *Places That Count: Traditional Cultural Properties in Cultural Resources Management*. Altamira Press, Walnut Creek, California.

National Park Service (NPS)

2008 National Register Bulletin No. 38, *Guidelines for Evaluating and Documenting Traditional Cultural Properties*. National Park Service. Electronic document, <http://www2.ccr.nps.gov/tribal/bull3803.html>, accessed January 30, 2008.

National Research Council/National Academy of Sciences (NRC/NAS)

1977 *Guidelines for Preparing Environmental Impact Statements on Noise*. Committee on Hearing, Bioacoustics, and Biomechanics.

Rylander, R., S. Sorenson, and K. Berglund

1974 Re-Analysis of Aircraft Noise Annoyance Data Against the dBA Peak Concept. *Journal of Sound and Vibration* 36:399-406.

U.S. Army Engineer District, Savannah, GA (USAED)

2006 Environmental Assessment, Base Closure and Realignment A/OA-10 Beddown, Moody Air Force Base (AFB), Georgia. Prepared by U.S. Department of the Air Force, Headquarters Air Combat Command.

U.S. Army Center for Health Promotion and Preventative Medicine (USACHPPM)

Environmental Noise Management, an Orientation Handbook for Army Facilities. Environmental Noise Program, Directorate of Environmental Health Engineering. Aberdeen Proving Ground, Maryland.

U.S. Department of the Army (USDOA)

2010 *Draft Environmental Assessment, Off-Post Aviation Operations, 160th Special Operations Aviation Regiment, JBLM, Washington*. Environmental Assessment report prepared by the U.S. Department of the Army, JBLM, Washington.



## Appendix A

Maps of Proposed and Existing  
Training Routes

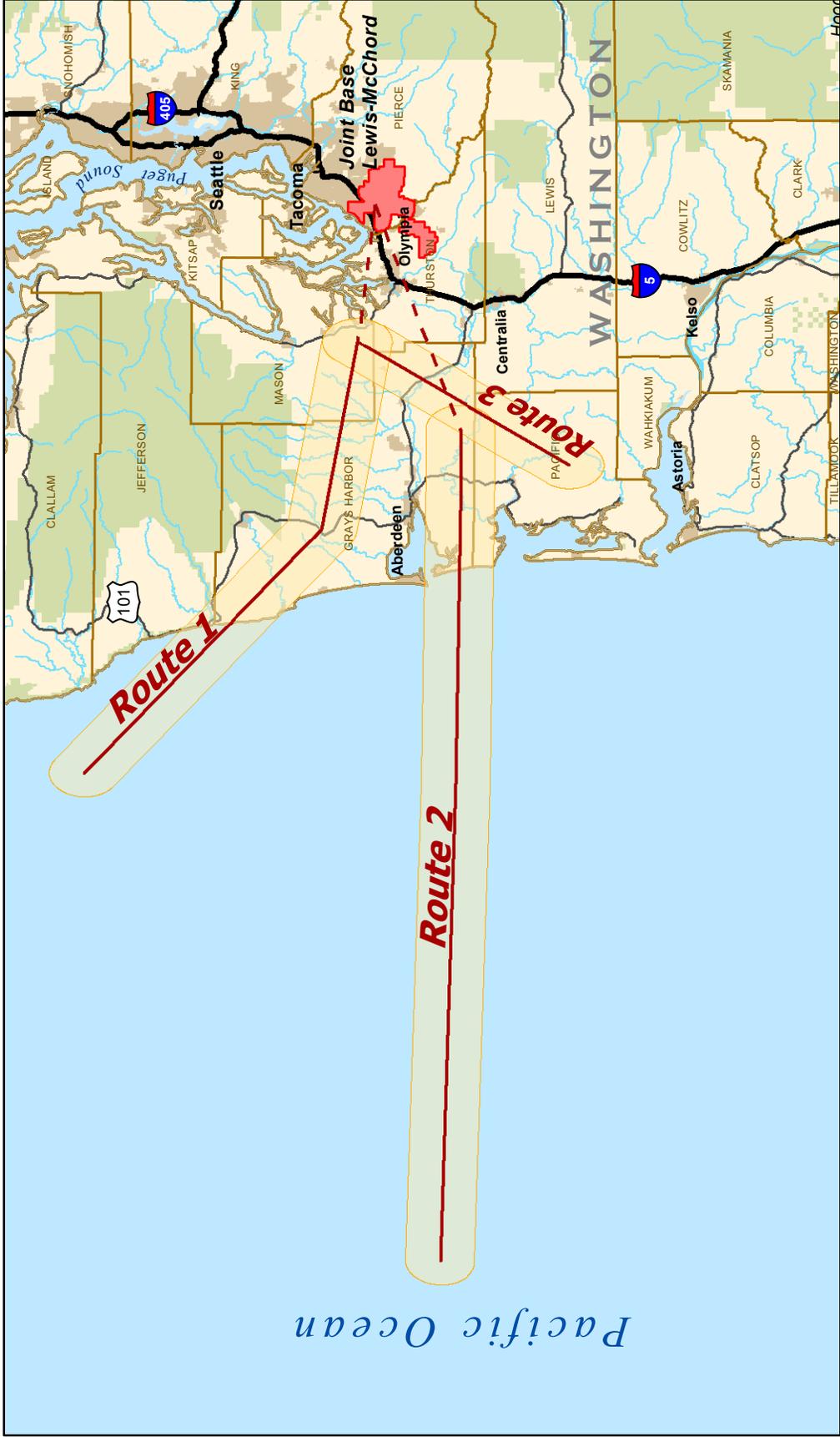
---



## **Appendix A**

**Maps of Proposed and Existing  
Training Routes**

---



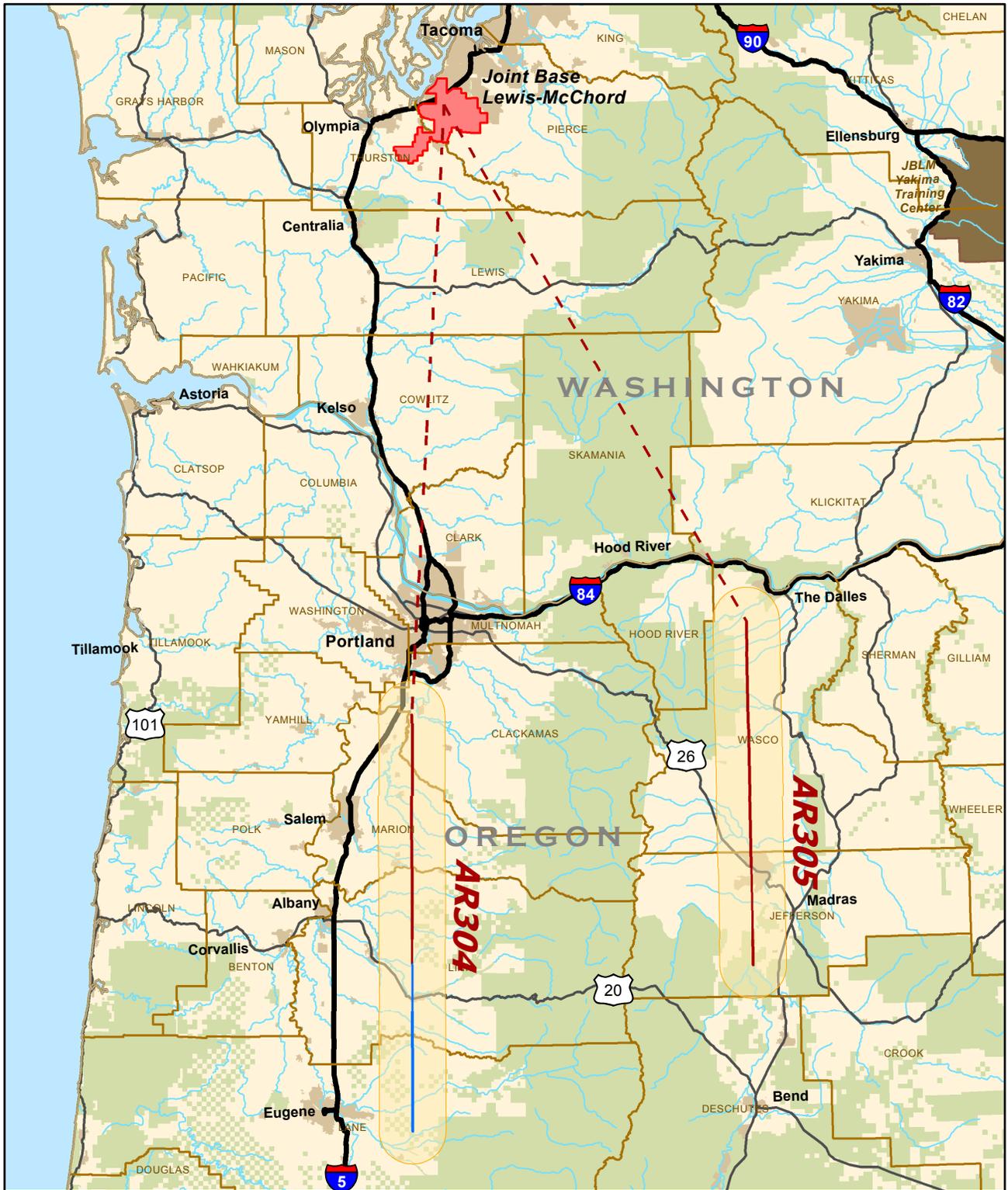
**Figure 2-1. Proposed Aerial Refueling Routes 1, 2, and 3**

- Possible Route Approaches
- Proposed Aerial Refueling Routes
- Route Buffers
- Counties
- Public Lands
- Populated Areas
- Interstate Highways
- U.S. Highways
- Rivers & Streams

**DRAFT**

0 10 20 30 40 Kilometers  
0 10 20 30 Miles

P:\200808100400\_02\GIS\Project\mxd\Fig\_2\_1\_Proposed\_New\_Aerial\_Refuel\_Routes.mxd

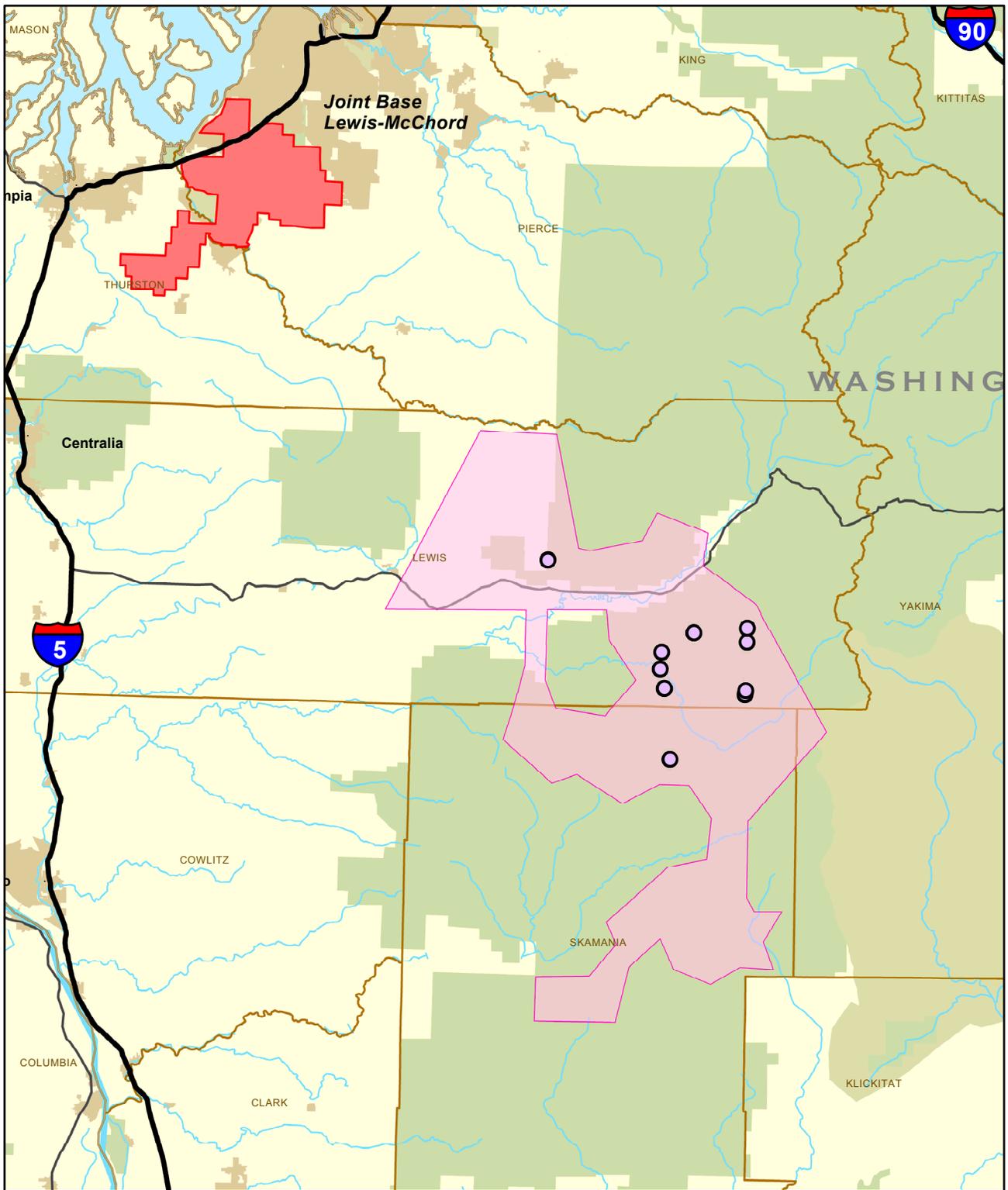


**Figure 2-2. Existing and Proposed Aerial Refueling Routes AR304 and AR305**

**DRAFT** 

- |   |   |   |
|---|---|---|
|  Possible Route Approaches |  Counties        |  Interstate Highways |
|  Existing Refueling Routes |  Public Lands    |  U.S. Highways       |
|  Proposed Route Extensions |  Populated Areas |  Rivers & Streams    |
|  Route Buffers             |   |   |



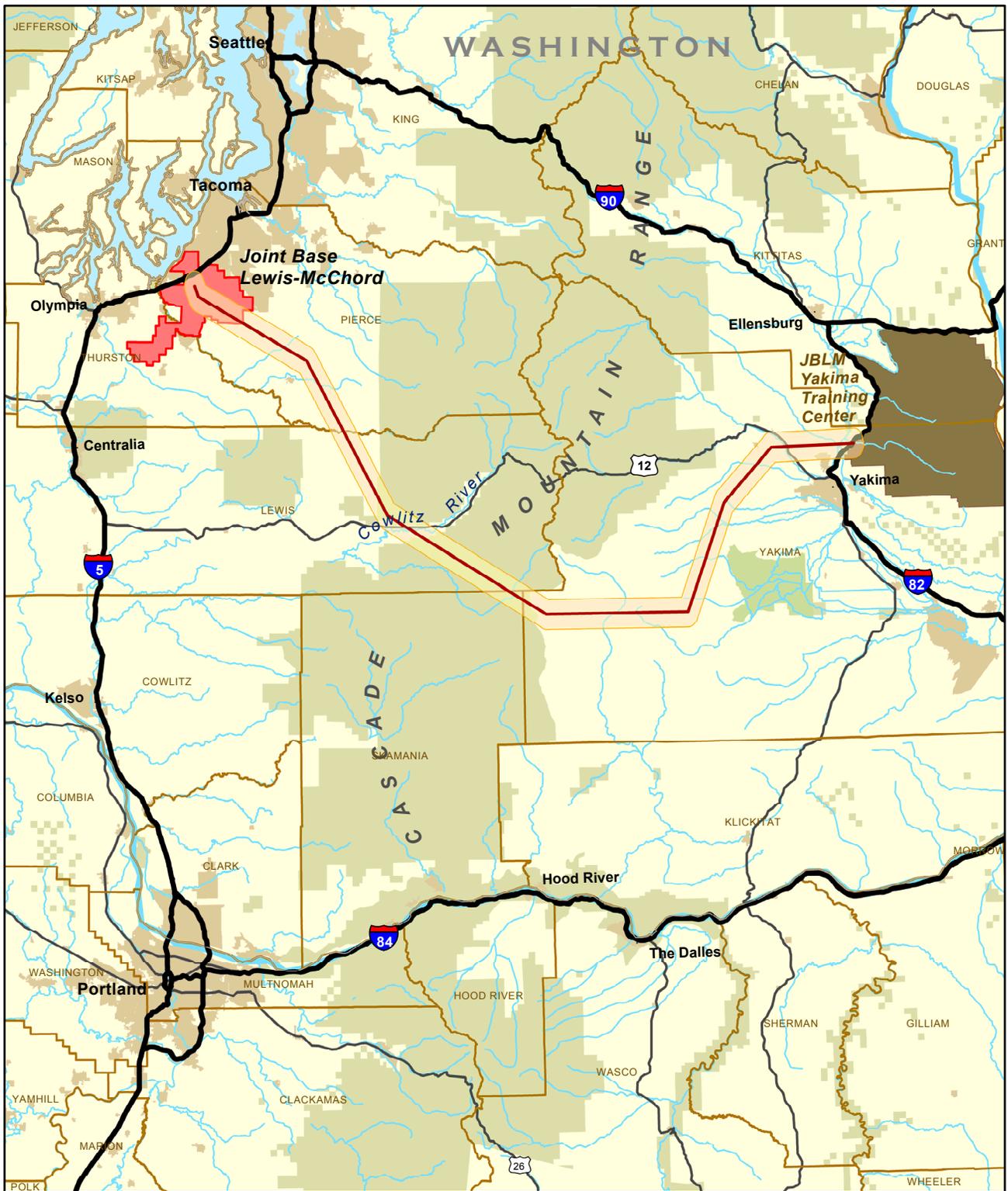


**Figure 2-3. Proposed Low-Level Training Area**

- Low-Level Training Area
- Helicopter Landing Zones
- Counties
- Public Lands
- Populated Areas
- Interstate Highways
- U.S. Highways
- Rivers & Streams

**DRAFT**





**Figure 2-4. Proposed Terrain-Following/Multi-Mode Radar Route**

**DRAFT** 

- |  |   |   |
|--|---|---|
|  Proposed Terrain Following/MMR Route |  Counties        |  Interstate Highways |
|  Route Buffer                         |  Public Lands    |  U.S. Highways       |
|  |  Populated Areas |  Rivers & Streams    |







**DEPARTMENT OF THE ARMY**  
**INSTALLATION MANAGEMENT COMMAND**  
**HEADQUARTERS, UNITED STATES ARMY GARRISON**  
**BOX 339500, MAIL STOP 17**  
**FORT LEWIS WASHINGTON 98433-9500**

April 8, 2008

Public Works

Charlene Nelson, Tribal Chair  
Shoalwater Bay Tribe  
P.O. Box 130  
Tokeland, WA 98590

RE: U.S. Army Proposed Helicopter Training Routes -  
Western Washington and Northwestern Oregon

Dear Ms. Nelson,

The U.S. Army is conducting an Environmental Assessment (EA) in compliance with the National Environmental Policy Act to examine the potential impacts of establishing helicopter training routes and conducting subsequent training in parts of Washington and Oregon. Cultural resources studies required under Section 106 of the National Historic Preservation Act are being conducted concurrently with the EA, and the results will be integrated into the EA. This letter and associated map are being sent to solicit your opinion as to whether any traditional cultural properties (TCPs) or other historic properties would be affected by the proposed project.

The cultural resources study will examine the potential effects the project could have on historic properties. Historic properties are defined as cultural resources (structures, buildings, sites, objects, districts) that are on, or eligible for listing on, the National Register of Historic Places. Helicopter training and refueling exercises such as those proposed have the potential to affect historic properties via vibration and the introduction of visual and audible elements that challenge the properties' integrity of setting and feeling. Several similar studies have been conducted by the Air Force and other federal agencies nationwide, and an appropriate area of potential effects (APE) for such exercises is approximately six nautical miles (nm), three on either side of the route; however, the area affected by a single pass by an aircraft would likely be much narrower.

The proposed action includes aerial refueling training, terrain following/multi-mode radar (TF/MMR) training, and low-elevation training in southwestern Washington and northwestern Oregon. Five refueling routes (three new and two revised), one altered TF/MMR route, and one low-level training area would be established. All routes would start at Gray Army Airfield, Fort Lewis. Each of these actions has a different potential to affect historic properties. Aircraft taking part in training missions would consist of MH-60 Blackhawk and MH-47 Chinook helicopters, along with one C-130 tanker (used in refueling exercises only).

**Aerial Refueling**

Aerial refueling exercises would be conducted approximately 50 times per year and would range in elevation from approximately 2500 to 6000 feet mean sea level (MSL). Refuel Route 1

would begin northeast of Olympia, Washington and head west, turning to the northwest when it reaches Highway 101 north of Aberdeen, Washington, and eventually ending over the Pacific Ocean. Aircraft flying over this route would maintain elevations of 2,500 to 5,000 feet mean sea level. Refuel Route 2 would begin near Highway 101 south of Aberdeen, Washington, and head west, ending over the Pacific Ocean. Aircraft flying along this route would maintain elevations of 2,300 to 5,000 feet MSL. To reach this route from Fort Lewis, aircraft would head southwest a distance of 47 nm. Refuel Route 3 would begin northeast of Olympia, Washington, and head roughly southwest, passing west of Centralia, and ending over Pacific County near Naselle, Washington. Aircraft flying along this route would maintain elevations of 4,000 to 6,000 feet MSL. Proposed Refuel Route AR304, a 30-nm extension of an existing route published in the Department of Defense (DoD) Military Flight Information Publications, would begin south of Portland, Oregon, and head south, ending east of Eugene, Oregon. Aircraft flying along this route would maintain elevations of 3,100 to 5,000 feet MSL. To reach this route from Fort Lewis, aircraft would head south a distance of 110 nm, flying at an altitude of at least 500 feet above ground level (AGL). Proposed Refuel Route AR305, an extension of an existing route published in the DoD Military Flight Information Publications would begin north of Bend, Oregon, and head north to The Dalles, Oregon. This route would be 76 nm long, which is 14 nm longer than the current AR305. Aircraft flying along this route would maintain elevations of 6,000 to 8,000 feet MSL. To reach this route from Fort Lewis, aircraft would fly southeast a distance of 108 nm, flying at an altitude of at least 500 feet AGL. Aircraft would typically enter the route at its ending point, which is the closest point to Fort Lewis.

### **Low-Level Training**

Low-level exercises would be conducted approximately 60 times per year. Low-level training operations would take place in and near the Gifford Pinchot National Forest in Washington State. The boundaries of the low-level training area would form a five-sided polygon with a total area of approximately 396,000 acres. Helicopters could approach this area from any direction, flying along approved routes at altitudes of 500 feet AGL and above. Within the area, helicopters would perform various mission-essential tasks that involve flying at low altitudes, from the ground surface to a height of 500 feet AGL. Tasks could include following the contours of the earth as low as 50 feet above the highest obstacle (nap-of-the-earth flying), formation flight, confined area approaches, hovering, low-level navigation, sling load operation (carrying cargo externally in a sling), and other flight and maneuvering of helicopters. Refueling and expending of live ordnance would not occur. Pilots would also land at various locations within the training area to practice tasks such as confined area landings. It is anticipated that up to 10 landing areas would be required within the low-level training area. Once airspace is approved, landing sites would be identified, evaluated for their environmental impacts in subsequent analysis, and then approved by the decision-maker.

### **Terrain-Following/Multi-mode Radar**

Terrain-following exercises would be conducted approximately 60 times per year. The proposed terrain-following/multi-mode radar route would use part of an existing VR route (a route flown using visual flight rules) and two IR routes (routes flown using instrument flight rules), with the addition of a new IR route leg, 42 nm long, to provide a complete route from Fort

Lewis to YTC. The route would head south from Fort Lewis, turning roughly east just past Highway 12. Just before the Cascade Range, the route would bend to the southeast, and then back to the east over the Cascade Range. The route would link up with an existing route published in the DoD Military Flight Information Publications east of the Cascades, and head north, ending southwest of Yakima, Washington. The total length of the route would be 106 nm. Uses of this route would include flying to YTC during inclement weather and proficiency/qualification training in terrain-following using multi-mode radar. During terrain-following training, pilots would use on-board radar that sweeps the terrain to maintain a fixed distance above the ground under conditions of limited visibility. During terrain-following exercises, aircraft would fly at altitudes of 300 to 500 feet AGL.

If you need any additional information or more detailed maps of any area, or if you have any concerns regarding the proposal's potential to affect TCPs or other historic properties, please let me know at your earliest convenience. We would appreciate a response by April 25, 2008, but if you need more time, please let me know. My phone number is 253 966-1785. Send responses to [bret.ruby@us.army.mil](mailto:bret.ruby@us.army.mil) or to the address below. Thank you for your time in reply to this letter.

Public Works  
IMWE-LEW-PWE MS17  
Attn: Dr. Ruby  
Box 339500  
Fort Lewis, Washington 98433-9500

Sincerely,

A handwritten signature in black ink, appearing to read 'B. Ruby', with a long horizontal flourish extending to the right.

Bret J. Ruby, PhD  
Cultural Resource Manager  
Coordinator for Native American Affairs

cc: Earl Davis, Cultural Resources  
Gary Burns, Natural Resources



**DEPARTMENT OF THE ARMY**  
**INSTALLATION MANAGEMENT COMMAND**  
**HEADQUARTERS, UNITED STATES ARMY GARRISON**  
**BOX 339500, MAIL STOP 17**  
**FORT LEWIS WASHINGTON 98433-9500**

April 8, 2008

Public Works

Ralph Sampson, Chair  
Confederated Tribes and Bands of the Yakama Indian Nation  
P.O. Box 151  
Toppenish, WA 98948

RE: U.S. Army Proposed Helicopter Training Routes -  
Western Washington and Northwestern Oregon

Dear Mr. Sampson,

The U.S. Army is conducting an Environmental Assessment (EA) in compliance with the National Environmental Policy Act to examine the potential impacts of establishing helicopter training routes and conducting subsequent training in parts of Washington and Oregon. Cultural resources studies required under Section 106 of the National Historic Preservation Act are being conducted concurrently with the EA, and the results will be integrated into the EA. This letter and associated map are being sent to solicit your opinion as to whether any traditional cultural properties (TCPs) or other historic properties would be affected by the proposed project.

The cultural resources study will examine the potential effects the project could have on historic properties. Historic properties are defined as cultural resources (structures, buildings, sites, objects, districts) that are on, or eligible for listing on, the National Register of Historic Places. Helicopter training and refueling exercises such as those proposed have the potential to affect historic properties via vibration and the introduction of visual and audible elements that challenge the properties' integrity of setting and feeling. Several similar studies have been conducted by the Air Force and other federal agencies nationwide, and an appropriate area of potential effects (APE) for such exercises is approximately six nautical miles (nm), three on either side of the route; however, the area affected by a single pass by an aircraft would likely be much narrower.

The proposed action includes aerial refueling training, terrain following/multi-mode radar (TF/MMR) training, and low-elevation training in southwestern Washington and northwestern Oregon. Five refueling routes (three new and two revised), one altered TF/MMR route, and one low-level training area would be established. All routes would start at Gray Army Airfield, Fort Lewis. Each of these actions has a different potential to affect historic properties. Aircraft taking part in training missions would consist of MH-60 Blackhawk and MH-47 Chinook helicopters, along with one C-130 tanker (used in refueling exercises only).

**Aerial Refueling**

Aerial refueling exercises would be conducted approximately 50 times per year and would range in elevation from approximately 2500 to 6000 feet mean sea level (MSL). Refuel Route 1

would begin northeast of Olympia, Washington and head west, turning to the northwest when it reaches Highway 101 north of Aberdeen, Washington, and eventually ending over the Pacific Ocean. Aircraft flying over this route would maintain elevations of 2,500 to 5,000 feet mean sea level. Refuel Route 2 would begin near Highway 101 south of Aberdeen, Washington, and head west, ending over the Pacific Ocean. Aircraft flying along this route would maintain elevations of 2,300 to 5,000 feet MSL. To reach this route from Fort Lewis, aircraft would head southwest a distance of 47 nm. Refuel Route 3 would begin northeast of Olympia, Washington, and head roughly southwest, passing west of Centralia, and ending over Pacific County near Naselle, Washington. Aircraft flying along this route would maintain elevations of 4,000 to 6,000 feet MSL. Proposed Refuel Route AR304, a 30-nm extension of an existing route published in the Department of Defense (DoD) Military Flight Information Publications, would begin south of Portland, Oregon, and head south, ending east of Eugene, Oregon. Aircraft flying along this route would maintain elevations of 3,100 to 5,000 feet MSL. To reach this route from Fort Lewis, aircraft would head south a distance of 110 nm, flying at an altitude of at least 500 feet above ground level (AGL). Proposed Refuel Route AR305, an extension of an existing route published in the DoD Military Flight Information Publications would begin north of Bend, Oregon, and head north to The Dalles, Oregon. This route would be 76 nm long, which is 14 nm longer than the current AR305. Aircraft flying along this route would maintain elevations of 6,000 to 8,000 feet MSL. To reach this route from Fort Lewis, aircraft would fly southeast a distance of 108 nm, flying at an altitude of at least 500 feet AGL. Aircraft would typically enter the route at its ending point, which is the closest point to Fort Lewis.

### **Low-Level Training**

Low-level exercises would be conducted approximately 60 times per year. Low-level training operations would take place in and near the Gifford Pinchot National Forest in Washington State. The boundaries of the low-level training area would form a five-sided polygon with a total area of approximately 396,000 acres. Helicopters could approach this area from any direction, flying along approved routes at altitudes of 500 feet AGL and above. Within the area, helicopters would perform various mission-essential tasks that involve flying at low altitudes, from the ground surface to a height of 500 feet AGL. Tasks could include following the contours of the earth as low as 50 feet above the highest obstacle (nap-of-the-earth flying), formation flight, confined area approaches, hovering, low-level navigation, sling load operation (carrying cargo externally in a sling), and other flight and maneuvering of helicopters. Refueling and expending of live ordnance would not occur. Pilots would also land at various locations within the training area to practice tasks such as confined area landings. It is anticipated that up to 10 landing areas would be required within the low-level training area. Once airspace is approved, landing sites would be identified, evaluated for their environmental impacts in subsequent analysis, and then approved by the decision-maker.

### **Terrain-Following/Multi-mode Radar**

Terrain-following exercises would be conducted approximately 60 times per year. The proposed terrain-following/multi-mode radar route would use part of an existing VR route (a route flown using visual flight rules) and two IR routes (routes flown using instrument flight rules), with the addition of a new IR route leg, 42 nm long, to provide a complete route from Fort

Lewis to YTC. The route would head south from Fort Lewis, turning roughly east just past Highway 12. Just before the Cascade Range, the route would bend to the southeast, and then back to the east over the Cascade Range. The route would link up with an existing route published in the DoD Military Flight Information Publications east of the Cascades, and head north, ending southwest of Yakima, Washington. The total length of the route would be 106 nm. Uses of this route would include flying to YTC during inclement weather and proficiency/qualification training in terrain-following using multi-mode radar. During terrain-following training, pilots would use on-board radar that sweeps the terrain to maintain a fixed distance above the ground under conditions of limited visibility. During terrain-following exercises, aircraft would fly at altitudes of 300 to 500 feet AGL.

If you need any additional information or more detailed maps of any area, or if you have any concerns regarding the proposal's potential to affect TCPs or other historic properties, please let me know at your earliest convenience. We would appreciate a response by April 25, 2008, but if you need more time, please let me know. My phone number is 253 966-1785. Send responses to [bret.ruby@us.army.mil](mailto:bret.ruby@us.army.mil) or to the address below. Thank you for your time in reply to this letter.

Public Works  
IMWE-LEW-PWE MS17  
Attn: Dr. Ruby  
Box 339500  
Fort Lewis, Washington 98433-9500

Sincerely,

A handwritten signature in black ink, appearing to read 'Bret J. Ruby', with a long horizontal flourish extending to the right.

Bret J. Ruby, PhD  
Cultural Resource Manager  
Coordinator for Native American Affairs

cc: Kate Valdez, Tribal Historic Preservation Officer, Cultural Resources  
Johnson Meninick, Cultural Resources  
Phillip Rigdon, Natural Resources



**DEPARTMENT OF THE ARMY**  
INSTALLATION MANAGEMENT COMMAND  
HEADQUARTERS, UNITED STATES ARMY GARRISON  
BOX 339500, MAIL STOP 17  
FORT LEWIS WASHINGTON 98433-9500

April 8, 2008

Public Works

James Peters, Tribal Chair  
Squaxin Island Tribe  
SE 10 Squaxin Lane  
Shelton, WA 98584-9200

RE: U.S. Army Proposed Helicopter Training Routes -  
Western Washington and Northwestern Oregon

Dear Mr. Peters,

The U.S. Army is conducting an Environmental Assessment (EA) in compliance with the National Environmental Policy Act to examine the potential impacts of establishing helicopter training routes and conducting subsequent training in parts of Washington and Oregon. Cultural resources studies required under Section 106 of the National Historic Preservation Act are being conducted concurrently with the EA, and the results will be integrated into the EA. This letter and associated map are being sent to solicit your opinion as to whether any traditional cultural properties (TCPs) or other historic properties would be affected by the proposed project.

The cultural resources study will examine the potential effects the project could have on historic properties. Historic properties are defined as cultural resources (structures, buildings, sites, objects, districts) that are on, or eligible for listing on, the National Register of Historic Places. Helicopter training and refueling exercises such as those proposed have the potential to affect historic properties via vibration and the introduction of visual and audible elements that challenge the properties' integrity of setting and feeling. Several similar studies have been conducted by the Air Force and other federal agencies nationwide, and an appropriate area of potential effects (APE) for such exercises is approximately six nautical miles (nm), three on either side of the route; however, the area affected by a single pass by an aircraft would likely be much narrower.

The proposed action includes aerial refueling training, terrain following/multi-mode radar (TF/MMR) training, and low-elevation training in southwestern Washington and northwestern Oregon. Five refueling routes (three new and two revised), one altered TF/MMR route, and one low-level training area would be established. All routes would start at Gray Army Airfield, Fort Lewis. Each of these actions has a different potential to affect historic properties. Aircraft taking part in training missions would consist of MH-60 Blackhawk and MH-47 Chinook helicopters, along with one C-130 tanker (used in refueling exercises only).

**Aerial Refueling**

Aerial refueling exercises would be conducted approximately 50 times per year and would range in elevation from approximately 2500 to 6000 feet mean sea level (MSL). Refuel Route 1

would begin northeast of Olympia, Washington and head west, turning to the northwest when it reaches Highway 101 north of Aberdeen, Washington, and eventually ending over the Pacific Ocean. Aircraft flying over this route would maintain elevations of 2,500 to 5,000 feet mean sea level. Refuel Route 2 would begin near Highway 101 south of Aberdeen, Washington, and head west, ending over the Pacific Ocean. Aircraft flying along this route would maintain elevations of 2,300 to 5,000 feet MSL. To reach this route from Fort Lewis, aircraft would head southwest a distance of 47 nm. Refuel Route 3 would begin northeast of Olympia, Washington, and head roughly southwest, passing west of Centralia, and ending over Pacific County near Naselle, Washington. Aircraft flying along this route would maintain elevations of 4,000 to 6,000 feet MSL. Proposed Refuel Route AR304, a 30-nm extension of an existing route published in the Department of Defense (DoD) Military Flight Information Publications, would begin south of Portland, Oregon, and head south, ending east of Eugene, Oregon. Aircraft flying along this route would maintain elevations of 3,100 to 5,000 feet MSL. To reach this route from Fort Lewis, aircraft would head south a distance of 110 nm, flying at an altitude of at least 500 feet above ground level (AGL). Proposed Refuel Route AR305, an extension of an existing route published in the DoD Military Flight Information Publications would begin north of Bend, Oregon, and head north to The Dalles, Oregon. This route would be 76 nm long, which is 14 nm longer than the current AR305. Aircraft flying along this route would maintain elevations of 6,000 to 8,000 feet MSL. To reach this route from Fort Lewis, aircraft would fly southeast a distance of 108 nm, flying at an altitude of at least 500 feet AGL. Aircraft would typically enter the route at its ending point, which is the closest point to Fort Lewis.

### **Low-Level Training**

Low-level exercises would be conducted approximately 60 times per year. Low-level training operations would take place in and near the Gifford Pinchot National Forest in Washington State. The boundaries of the low-level training area would form a five-sided polygon with a total area of approximately 396,000 acres. Helicopters could approach this area from any direction, flying along approved routes at altitudes of 500 feet AGL and above. Within the area, helicopters would perform various mission-essential tasks that involve flying at low altitudes, from the ground surface to a height of 500 feet AGL. Tasks could include following the contours of the earth as low as 50 feet above the highest obstacle (nap-of-the-earth flying), formation flight, confined area approaches, hovering, low-level navigation, sling load operation (carrying cargo externally in a sling), and other flight and maneuvering of helicopters. Refueling and expending of live ordnance would not occur. Pilots would also land at various locations within the training area to practice tasks such as confined area landings. It is anticipated that up to 10 landing areas would be required within the low-level training area. Once airspace is approved, landing sites would be identified, evaluated for their environmental impacts in subsequent analysis, and then approved by the decision-maker.

### **Terrain-Following/Multi-mode Radar**

Terrain-following exercises would be conducted approximately 60 times per year. The proposed terrain-following/multi-mode radar route would use part of an existing VR route (a route flown using visual flight rules) and two IR routes (routes flown using instrument flight rules), with the addition of a new IR route leg, 42 nm long, to provide a complete route from Fort

Lewis to YTC. The route would head south from Fort Lewis, turning roughly east just past Highway 12. Just before the Cascade Range, the route would bend to the southeast, and then back to the east over the Cascade Range. The route would link up with an existing route published in the DoD Military Flight Information Publications east of the Cascades, and head north, ending southwest of Yakima, Washington. The total length of the route would be 106 nm. Uses of this route would include flying to YTC during inclement weather and proficiency/qualification training in terrain-following using multi-mode radar. During terrain-following training, pilots would use on-board radar that sweeps the terrain to maintain a fixed distance above the ground under conditions of limited visibility. During terrain-following exercises, aircraft would fly at altitudes of 300 to 500 feet AGL.

If you need any additional information or more detailed maps of any area, or if you have any concerns regarding the proposal's potential to affect TCPs or other historic properties, please let me know at your earliest convenience. We would appreciate a response by April 25, 2008, but if you need more time, please let me know. My phone number is 253 966-1785. Send responses to [bret.ruby@us.army.mil](mailto:bret.ruby@us.army.mil) or to the address below. Thank you for your time in reply to this letter.

Public Works  
IMWE-LEW-PWE MS17  
Attn: Dr. Ruby  
Box 339500  
Fort Lewis, Washington 98433-9500

Sincerely,



Bret J. Ruby, PhD  
Cultural Resource Manager  
Coordinator for Native American Affairs

cc: Rhonda Foster, Tribal Historic Preservation Officer, Cultural Resources  
Andy Whitener, Natural Resources Director



**DEPARTMENT OF THE ARMY**  
INSTALLATION MANAGEMENT COMMAND  
HEADQUARTERS, UNITED STATES ARMY GARRISON  
BOX 339500, MAIL STOP 17  
FORT LEWIS WASHINGTON 98433-9500

April 8, 2008

Public Works

Delores Pigsley, Tribal Chair  
Confederated Tribes of Siletz  
P.O. Box 549  
Siletz, OR 97380

RE: U.S. Army Proposed Helicopter Training Routes -  
Western Washington and Northwestern Oregon

Dear Ms. Pigsley,

The U.S. Army is conducting an Environmental Assessment (EA) in compliance with the National Environmental Policy Act to examine the potential impacts of establishing helicopter training routes and conducting subsequent training in parts of Washington and Oregon. Cultural resources studies required under Section 106 of the National Historic Preservation Act are being conducted concurrently with the EA, and the results will be integrated into the EA. This letter and associated map are being sent to solicit your opinion as to whether any traditional cultural properties (TCPs) or other historic properties would be affected by the proposed project.

The cultural resources study will examine the potential effects the project could have on historic properties. Historic properties are defined as cultural resources (structures, buildings, sites, objects, districts) that are on, or eligible for listing on, the National Register of Historic Places. Helicopter training and refueling exercises such as those proposed have the potential to affect historic properties via vibration and the introduction of visual and audible elements that challenge the properties' integrity of setting and feeling. Several similar studies have been conducted by the Air Force and other federal agencies nationwide, and an appropriate area of potential effects (APE) for such exercises is approximately six nautical miles (nm), three on either side of the route; however, the area affected by a single pass by an aircraft would likely be much narrower.

The proposed action includes aerial refueling training, terrain following/multi-mode radar (TF/MMR) training, and low-elevation training in southwestern Washington and northwestern Oregon. Five refueling routes (three new and two revised), one altered TF/MMR route, and one low-level training area would be established. All routes would start at Gray Army Airfield, Fort Lewis. Each of these actions has a different potential to affect historic properties. Aircraft taking part in training missions would consist of MH-60 Blackhawk and MH-47 Chinook helicopters, along with one C-130 tanker (used in refueling exercises only).

**Aerial Refueling**

Aerial refueling exercises would be conducted approximately 50 times per year and would range in elevation from approximately 2500 to 6000 feet mean sea level (MSL). Refuel Route 1

would begin northeast of Olympia, Washington and head west, turning to the northwest when it reaches Highway 101 north of Aberdeen, Washington, and eventually ending over the Pacific Ocean. Aircraft flying over this route would maintain elevations of 2,500 to 5,000 feet mean sea level. Refuel Route 2 would begin near Highway 101 south of Aberdeen, Washington, and head west, ending over the Pacific Ocean. Aircraft flying along this route would maintain elevations of 2,300 to 5,000 feet MSL. To reach this route from Fort Lewis, aircraft would head southwest a distance of 47 nm. Refuel Route 3 would begin northeast of Olympia, Washington, and head roughly southwest, passing west of Centralia, and ending over Pacific County near Naselle, Washington. Aircraft flying along this route would maintain elevations of 4,000 to 6,000 feet MSL. Proposed Refuel Route AR304, a 30-nm extension of an existing route published in the Department of Defense (DoD) Military Flight Information Publications, would begin south of Portland, Oregon, and head south, ending east of Eugene, Oregon. Aircraft flying along this route would maintain elevations of 3,100 to 5,000 feet MSL. To reach this route from Fort Lewis, aircraft would head south a distance of 110 nm, flying at an altitude of at least 500 feet above ground level (AGL). Proposed Refuel Route AR305, an extension of an existing route published in the DoD Military Flight Information Publications would begin north of Bend, Oregon, and head north to The Dalles, Oregon. This route would be 76 nm long, which is 14 nm longer than the current AR305. Aircraft flying along this route would maintain elevations of 6,000 to 8,000 feet MSL. To reach this route from Fort Lewis, aircraft would fly southeast a distance of 108 nm, flying at an altitude of at least 500 feet AGL. Aircraft would typically enter the route at its ending point, which is the closest point to Fort Lewis.

### **Low-Level Training**

Low-level exercises would be conducted approximately 60 times per year. Low-level training operations would take place in and near the Gifford Pinchot National Forest in Washington State. The boundaries of the low-level training area would form a five-sided polygon with a total area of approximately 396,000 acres. Helicopters could approach this area from any direction, flying along approved routes at altitudes of 500 feet AGL and above. Within the area, helicopters would perform various mission-essential tasks that involve flying at low altitudes, from the ground surface to a height of 500 feet AGL. Tasks could include following the contours of the earth as low as 50 feet above the highest obstacle (nap-of-the-earth flying), formation flight, confined area approaches, hovering, low-level navigation, sling load operation (carrying cargo externally in a sling), and other flight and maneuvering of helicopters. Refueling and expending of live ordnance would not occur. Pilots would also land at various locations within the training area to practice tasks such as confined area landings. It is anticipated that up to 10 landing areas would be required within the low-level training area. Once airspace is approved, landing sites would be identified, evaluated for their environmental impacts in subsequent analysis, and then approved by the decision-maker.

### **Terrain-Following/Multi-mode Radar**

Terrain-following exercises would be conducted approximately 60 times per year. The proposed terrain-following/multi-mode radar route would use part of an existing VR route (a route flown using visual flight rules) and two IR routes (routes flown using instrument flight rules), with the addition of a new IR route leg, 42 nm long, to provide a complete route from Fort

Lewis to YTC. The route would head south from Fort Lewis, turning roughly east just past Highway 12. Just before the Cascade Range, the route would bend to the southeast, and then back to the east over the Cascade Range. The route would link up with an existing route published in the DoD Military Flight Information Publications east of the Cascades, and head north, ending southwest of Yakima, Washington. The total length of the route would be 106 nm. Uses of this route would include flying to YTC during inclement weather and proficiency/qualification training in terrain-following using multi-mode radar. During terrain-following training, pilots would use on-board radar that sweeps the terrain to maintain a fixed distance above the ground under conditions of limited visibility. During terrain-following exercises, aircraft would fly at altitudes of 300 to 500 feet AGL.

If you need any additional information or more detailed maps of any area, or if you have any concerns regarding the proposal's potential to affect TCPs or other historic properties, please let me know at your earliest convenience. We would appreciate a response by April 25, 2008, but if you need more time, please let me know. My phone number is 253 966-1785. Send responses to [bret.ruby@us.army.mil](mailto:bret.ruby@us.army.mil) or to the address below. Thank you for your time in reply to this letter.

Public Works  
IMWE-LEW-PWE MS17  
Attn: Dr. Ruby  
Box 339500  
Fort Lewis, Washington 98433-9500

Sincerely,

A handwritten signature in black ink, appearing to be 'Bret J. Ruby', written in a cursive style.

Bret J. Ruby, PhD  
Cultural Resource Manager  
Coordinator for Native American Affairs

cc: Robert Kentta, Cultural Resources Director  
Mike Kennedy, Natural Resources Manager



**DEPARTMENT OF THE ARMY**  
INSTALLATION MANAGEMENT COMMAND  
HEADQUARTERS, UNITED STATES ARMY GARRISON  
BOX 339500, MAIL STOP 17  
FORT LEWIS WASHINGTON 98433-9500

April 8, 2008

Public Works

Rex Buck, Chair  
Wanapum Tribe  
15655 Wanapum Loop SW  
Beverly, WA 98321

RE: U.S. Army Proposed Helicopter Training Routes -  
Western Washington and Northwestern Oregon

Dear Mr. Buck,

The U.S. Army is conducting an Environmental Assessment (EA) in compliance with the National Environmental Policy Act to examine the potential impacts of establishing helicopter training routes and conducting subsequent training in parts of Washington and Oregon. Cultural resources studies required under Section 106 of the National Historic Preservation Act are being conducted concurrently with the EA, and the results will be integrated into the EA. This letter and associated map are being sent to solicit your opinion as to whether any traditional cultural properties (TCPs) or other historic properties would be affected by the proposed project.

The cultural resources study will examine the potential effects the project could have on historic properties. Historic properties are defined as cultural resources (structures, buildings, sites, objects, districts) that are on, or eligible for listing on, the National Register of Historic Places. Helicopter training and refueling exercises such as those proposed have the potential to affect historic properties via vibration and the introduction of visual and audible elements that challenge the properties' integrity of setting and feeling. Several similar studies have been conducted by the Air Force and other federal agencies nationwide, and an appropriate area of potential effects (APE) for such exercises is approximately six nautical miles (nm), three on either side of the route; however, the area affected by a single pass by an aircraft would likely be much narrower.

The proposed action includes aerial refueling training, terrain following/multi-mode radar (TF/MMR) training, and low-elevation training in southwestern Washington and northwestern Oregon. Five refueling routes (three new and two revised), one altered TF/MMR route, and one low-level training area would be established. All routes would start at Gray Army Airfield, Fort Lewis. Each of these actions has a different potential to affect historic properties. Aircraft taking part in training missions would consist of MH-60 Blackhawk and MH-47 Chinook helicopters, along with one C-130 tanker (used in refueling exercises only).

### **Aerial Refueling**

Aerial refueling exercises would be conducted approximately 50 times per year and would range in elevation from approximately 2500 to 6000 feet mean sea level (MSL). Refuel Route 1

would begin northeast of Olympia, Washington and head west, turning to the northwest when it reaches Highway 101 north of Aberdeen, Washington, and eventually ending over the Pacific Ocean. Aircraft flying over this route would maintain elevations of 2,500 to 5,000 feet mean sea level. Refuel Route 2 would begin near Highway 101 south of Aberdeen, Washington, and head west, ending over the Pacific Ocean. Aircraft flying along this route would maintain elevations of 2,300 to 5,000 feet MSL. To reach this route from Fort Lewis, aircraft would head southwest a distance of 47 nm. Refuel Route 3 would begin northeast of Olympia, Washington, and head roughly southwest, passing west of Centralia, and ending over Pacific County near Naselle, Washington. Aircraft flying along this route would maintain elevations of 4,000 to 6,000 feet MSL. Proposed Refuel Route AR304, a 30-nm extension of an existing route published in the Department of Defense (DoD) Military Flight Information Publications, would begin south of Portland, Oregon, and head south, ending east of Eugene, Oregon. Aircraft flying along this route would maintain elevations of 3,100 to 5,000 feet MSL. To reach this route from Fort Lewis, aircraft would head south a distance of 110 nm, flying at an altitude of at least 500 feet above ground level (AGL). Proposed Refuel Route AR305, an extension of an existing route published in the DoD Military Flight Information Publications would begin north of Bend, Oregon, and head north to The Dalles, Oregon. This route would be 76 nm long, which is 14 nm longer than the current AR305. Aircraft flying along this route would maintain elevations of 6,000 to 8,000 feet MSL. To reach this route from Fort Lewis, aircraft would fly southeast a distance of 108 nm, flying at an altitude of at least 500 feet AGL. Aircraft would typically enter the route at its ending point, which is the closest point to Fort Lewis.

### **Low-Level Training**

Low-level exercises would be conducted approximately 60 times per year. Low-level training operations would take place in and near the Gifford Pinchot National Forest in Washington State. The boundaries of the low-level training area would form a five-sided polygon with a total area of approximately 396,000 acres. Helicopters could approach this area from any direction, flying along approved routes at altitudes of 500 feet AGL and above. Within the area, helicopters would perform various mission-essential tasks that involve flying at low altitudes, from the ground surface to a height of 500 feet AGL. Tasks could include following the contours of the earth as low as 50 feet above the highest obstacle (nap-of-the-earth flying), formation flight, confined area approaches, hovering, low-level navigation, sling load operation (carrying cargo externally in a sling), and other flight and maneuvering of helicopters. Refueling and expending of live ordnance would not occur. Pilots would also land at various locations within the training area to practice tasks such as confined area landings. It is anticipated that up to 10 landing areas would be required within the low-level training area. Once airspace is approved, landing sites would be identified, evaluated for their environmental impacts in subsequent analysis, and then approved by the decision-maker.

### **Terrain-Following/Multi-mode Radar**

Terrain-following exercises would be conducted approximately 60 times per year. The proposed terrain-following/multi-mode radar route would use part of an existing VR route (a route flown using visual flight rules) and two IR routes (routes flown using instrument flight rules), with the addition of a new IR route leg, 42 nm long, to provide a complete route from Fort

Lewis to YTC. The route would head south from Fort Lewis, turning roughly east just past Highway 12. Just before the Cascade Range, the route would bend to the southeast, and then back to the east over the Cascade Range. The route would link up with an existing route published in the DoD Military Flight Information Publications east of the Cascades, and head north, ending southwest of Yakima, Washington. The total length of the route would be 106 nm. Uses of this route would include flying to YTC during inclement weather and proficiency/qualification training in terrain-following using multi-mode radar. During terrain-following training, pilots would use on-board radar that sweeps the terrain to maintain a fixed distance above the ground under conditions of limited visibility. During terrain-following exercises, aircraft would fly at altitudes of 300 to 500 feet AGL.

If you need any additional information or more detailed maps of any area, or if you have any concerns regarding the proposal's potential to affect TCPs or other historic properties, please let me know at your earliest convenience. We would appreciate a response by April 25, 2008, but if you need more time, please let me know. My phone number is 253 966-1785. Send responses to [bret.ruby@us.army.mil](mailto:bret.ruby@us.army.mil) or to the address below. Thank you for your time in reply to this letter.

Public Works  
IMWE-LEW-PWE MS17  
Attn: Dr. Ruby  
Box 339500  
Fort Lewis, Washington 98433-9500

Sincerely,

A handwritten signature in black ink, appearing to be 'Bret J. Ruby', written in a cursive style.

Bret J. Ruby, PhD  
Cultural Resource Manager  
Coordinator for Native American Affairs



**DEPARTMENT OF THE ARMY**  
INSTALLATION MANAGEMENT COMMAND  
HEADQUARTERS, UNITED STATES ARMY GARRISON  
BOX 339500, MAIL STOP 17  
FORT LEWIS WASHINGTON 98433-9500

April 8, 2008

Public Works

Ron Suppah, Tribal Chair  
Confederated Tribes of Warm Springs  
P.O. Box 1299  
Warm Springs, OR 97761

RE: U.S. Army Proposed Helicopter Training Routes -  
Western Washington and Northwestern Oregon

Dear Mr. Suppah:

The U.S. Army is conducting an Environmental Assessment (EA) in compliance with the National Environmental Policy Act to examine the potential impacts of establishing helicopter training routes and conducting subsequent training in parts of Washington and Oregon. Cultural resources studies required under Section 106 of the National Historic Preservation Act are being conducted concurrently with the EA, and the results will be integrated into the EA. This letter and associated map are being sent to solicit your opinion as to whether any traditional cultural properties (TCPs) or other historic properties would be affected by the proposed project.

The cultural resources study will examine the potential effects the project could have on historic properties. Historic properties are defined as cultural resources (structures, buildings, sites, objects, districts) that are on, or eligible for listing on, the National Register of Historic Places. Helicopter training and refueling exercises such as those proposed have the potential to affect historic properties via vibration and the introduction of visual and audible elements that challenge the properties' integrity of setting and feeling. Several similar studies have been conducted by the Air Force and other federal agencies nationwide, and an appropriate area of potential effects (APE) for such exercises is approximately six nautical miles (nm), three on either side of the route; however, the area affected by a single pass by an aircraft would likely be much narrower.

The proposed action includes aerial refueling training, terrain following/multi-mode radar (TF/MMR) training, and low-elevation training in southwestern Washington and northwestern Oregon. Five refueling routes (three new and two revised), one altered TF/MMR route, and one low-level training area would be established. All routes would start at Gray Army Airfield, Fort Lewis. Each of these actions has a different potential to affect historic properties. Aircraft taking part in training missions would consist of MH-60 Blackhawk and MH-47 Chinook helicopters, along with one C-130 tanker (used in refueling exercises only).

#### **Aerial Refueling**

Aerial refueling exercises would be conducted approximately 50 times per year and would range in elevation from approximately 2500 to 6000 feet mean sea level (MSL). Refuel Route 1

would begin northeast of Olympia, Washington and head west, turning to the northwest when it reaches Highway 101 north of Aberdeen, Washington, and eventually ending over the Pacific Ocean. Aircraft flying over this route would maintain elevations of 2,500 to 5,000 feet mean sea level. Refuel Route 2 would begin near Highway 101 south of Aberdeen, Washington, and head west, ending over the Pacific Ocean. Aircraft flying along this route would maintain elevations of 2,300 to 5,000 feet MSL. To reach this route from Fort Lewis, aircraft would head southwest a distance of 47 nm. Refuel Route 3 would begin northeast of Olympia, Washington, and head roughly southwest, passing west of Centralia, and ending over Pacific County near Naselle, Washington. Aircraft flying along this route would maintain elevations of 4,000 to 6,000 feet MSL. Proposed Refuel Route AR304, a 30-nm extension of an existing route published in the Department of Defense (DoD) Military Flight Information Publications, would begin south of Portland, Oregon, and head south, ending east of Eugene, Oregon. Aircraft flying along this route would maintain elevations of 3,100 to 5,000 feet MSL. To reach this route from Fort Lewis, aircraft would head south a distance of 110 nm, flying at an altitude of at least 500 feet above ground level (AGL). Proposed Refuel Route AR305, an extension of an existing route published in the DoD Military Flight Information Publications would begin north of Bend, Oregon, and head north to The Dalles, Oregon. This route would be 76 nm long, which is 14 nm longer than the current AR305. Aircraft flying along this route would maintain elevations of 6,000 to 8,000 feet MSL. To reach this route from Fort Lewis, aircraft would fly southeast a distance of 108 nm, flying at an altitude of at least 500 feet AGL. Aircraft would typically enter the route at its ending point, which is the closest point to Fort Lewis.

### **Low-Level Training**

Low-level exercises would be conducted approximately 60 times per year. Low-level training operations would take place in and near the Gifford Pinchot National Forest in Washington State. The boundaries of the low-level training area would form a five-sided polygon with a total area of approximately 396,000 acres. Helicopters could approach this area from any direction, flying along approved routes at altitudes of 500 feet AGL and above. Within the area, helicopters would perform various mission-essential tasks that involve flying at low altitudes, from the ground surface to a height of 500 feet AGL. Tasks could include following the contours of the earth as low as 50 feet above the highest obstacle (nap-of-the-earth flying), formation flight, confined area approaches, hovering, low-level navigation, sling load operation (carrying cargo externally in a sling), and other flight and maneuvering of helicopters. Refueling and expending of live ordnance would not occur. Pilots would also land at various locations within the training area to practice tasks such as confined area landings. It is anticipated that up to 10 landing areas would be required within the low-level training area. Once airspace is approved, landing sites would be identified, evaluated for their environmental impacts in subsequent analysis, and then approved by the decision-maker.

### **Terrain-Following/Multi-mode Radar**

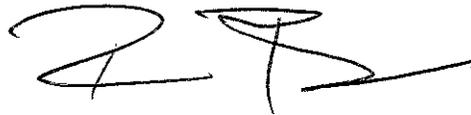
Terrain-following exercises would be conducted approximately 60 times per year. The proposed terrain-following/multi-mode radar route would use part of an existing VR route (a route flown using visual flight rules) and two IR routes (routes flown using instrument flight rules), with the addition of a new IR route leg, 42 nm long, to provide a complete route from Fort

Lewis to YTC. The route would head south from Fort Lewis, turning roughly east just past Highway 12. Just before the Cascade Range, the route would bend to the southeast, and then back to the east over the Cascade Range. The route would link up with an existing route published in the DoD Military Flight Information Publications east of the Cascades, and head north, ending southwest of Yakima, Washington. The total length of the route would be 106 nm. Uses of this route would include flying to YTC during inclement weather and proficiency/qualification training in terrain-following using multi-mode radar. During terrain-following training, pilots would use on-board radar that sweeps the terrain to maintain a fixed distance above the ground under conditions of limited visibility. During terrain-following exercises, aircraft would fly at altitudes of 300 to 500 feet AGL.

If you need any additional information or more detailed maps of any area, or if you have any concerns regarding the proposal's potential to affect TCPs or other historic properties, please let me know at your earliest convenience. We would appreciate a response by April 25, 2008, but if you need more time, please let me know. My phone number is 253 966-1785. Send responses to [bret.ruby@us.army.mil](mailto:bret.ruby@us.army.mil) or to the address below. Thank you for your time in reply to this letter.

Public Works  
IMWE-LEW-PWE MS17  
Attn: Dr. Ruby  
Box 339500  
Fort Lewis, Washington 98433-9500

Sincerely,

A handwritten signature in black ink, appearing to read 'Bret J. Ruby', with a stylized flourish at the end.

Bret J. Ruby, PhD  
Cultural Resource Manager  
Coordinator for Native American Affairs

cc: Sally Bird, Cultural Resources  
Robert Brunoe, Manager of Natural Resources



**DEPARTMENT OF THE ARMY**  
INSTALLATION MANAGEMENT COMMAND  
HEADQUARTERS, UNITED STATES ARMY GARRISON  
BOX 339500, MAIL STOP 17  
FORT LEWIS WASHINGTON 98433-9500

April 8, 2008

Public Works

Fawn Sharp, President  
Quinalt Indian Nation  
P.O. Box 189  
Taholah, WA 98587

RE: U.S. Army Proposed Helicopter Training Routes -  
Western Washington and Northwestern Oregon

Dear Ms. Sharp,

The U.S. Army is conducting an Environmental Assessment (EA) in compliance with the National Environmental Policy Act to examine the potential impacts of establishing helicopter training routes and conducting subsequent training in parts of Washington and Oregon. Cultural resources studies required under Section 106 of the National Historic Preservation Act are being conducted concurrently with the EA, and the results will be integrated into the EA. This letter and associated map are being sent to solicit your opinion as to whether any traditional cultural properties (TCPs) or other historic properties would be affected by the proposed project.

The cultural resources study will examine the potential effects the project could have on historic properties. Historic properties are defined as cultural resources (structures, buildings, sites, objects, districts) that are on, or eligible for listing on, the National Register of Historic Places. Helicopter training and refueling exercises such as those proposed have the potential to affect historic properties via vibration and the introduction of visual and audible elements that challenge the properties' integrity of setting and feeling. Several similar studies have been conducted by the Air Force and other federal agencies nationwide, and an appropriate area of potential effects (APE) for such exercises is approximately six nautical miles (nm), three on either side of the route; however, the area affected by a single pass by an aircraft would likely be much narrower.

The proposed action includes aerial refueling training, terrain following/multi-mode radar (TF/MMR) training, and low-elevation training in southwestern Washington and northwestern Oregon. Five refueling routes (three new and two revised), one altered TF/MMR route, and one low-level training area would be established. All routes would start at Gray Army Airfield, Fort Lewis. Each of these actions has a different potential to affect historic properties. Aircraft taking part in training missions would consist of MH-60 Blackhawk and MH-47 Chinook helicopters, along with one C-130 tanker (used in refueling exercises only).

#### **Aerial Refueling**

Aerial refueling exercises would be conducted approximately 50 times per year and would range in elevation from approximately 2500 to 6000 feet mean sea level (MSL). Refuel Route 1

would begin northeast of Olympia, Washington and head west, turning to the northwest when it reaches Highway 101 north of Aberdeen, Washington, and eventually ending over the Pacific Ocean. Aircraft flying over this route would maintain elevations of 2,500 to 5,000 feet mean sea level. Refuel Route 2 would begin near Highway 101 south of Aberdeen, Washington, and head west, ending over the Pacific Ocean. Aircraft flying along this route would maintain elevations of 2,300 to 5,000 feet MSL. To reach this route from Fort Lewis, aircraft would head southwest a distance of 47 nm. Refuel Route 3 would begin northeast of Olympia, Washington, and head roughly southwest, passing west of Centralia, and ending over Pacific County near Naselle, Washington. Aircraft flying along this route would maintain elevations of 4,000 to 6,000 feet MSL. Proposed Refuel Route AR304, a 30-nm extension of an existing route published in the Department of Defense (DoD) Military Flight Information Publications, would begin south of Portland, Oregon, and head south, ending east of Eugene, Oregon. Aircraft flying along this route would maintain elevations of 3,100 to 5,000 feet MSL. To reach this route from Fort Lewis, aircraft would head south a distance of 110 nm, flying at an altitude of at least 500 feet above ground level (AGL). Proposed Refuel Route AR305, an extension of an existing route published in the DoD Military Flight Information Publications would begin north of Bend, Oregon, and head north to The Dalles, Oregon. This route would be 76 nm long, which is 14 nm longer than the current AR305. Aircraft flying along this route would maintain elevations of 6,000 to 8,000 feet MSL. To reach this route from Fort Lewis, aircraft would fly southeast a distance of 108 nm, flying at an altitude of at least 500 feet AGL. Aircraft would typically enter the route at its ending point, which is the closest point to Fort Lewis.

### **Low-Level Training**

Low-level exercises would be conducted approximately 60 times per year. Low-level training operations would take place in and near the Gifford Pinchot National Forest in Washington State. The boundaries of the low-level training area would form a five-sided polygon with a total area of approximately 396,000 acres. Helicopters could approach this area from any direction, flying along approved routes at altitudes of 500 feet AGL and above. Within the area, helicopters would perform various mission-essential tasks that involve flying at low altitudes, from the ground surface to a height of 500 feet AGL. Tasks could include following the contours of the earth as low as 50 feet above the highest obstacle (nap-of-the-earth flying), formation flight, confined area approaches, hovering, low-level navigation, sling load operation (carrying cargo externally in a sling), and other flight and maneuvering of helicopters. Refueling and expending of live ordnance would not occur. Pilots would also land at various locations within the training area to practice tasks such as confined area landings. It is anticipated that up to 10 landing areas would be required within the low-level training area. Once airspace is approved, landing sites would be identified, evaluated for their environmental impacts in subsequent analysis, and then approved by the decision-maker.

### **Terrain-Following/Multi-mode Radar**

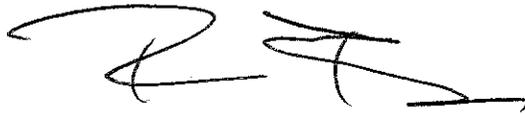
Terrain-following exercises would be conducted approximately 60 times per year. The proposed terrain-following/multi-mode radar route would use part of an existing VR route (a route flown using visual flight rules) and two IR routes (routes flown using instrument flight rules), with the addition of a new IR route leg, 42 nm long, to provide a complete route from Fort

Lewis to YTC. The route would head south from Fort Lewis, turning roughly east just past Highway 12. Just before the Cascade Range, the route would bend to the southeast, and then back to the east over the Cascade Range. The route would link up with an existing route published in the DoD Military Flight Information Publications east of the Cascades, and head north, ending southwest of Yakima, Washington. The total length of the route would be 106 nm. Uses of this route would include flying to YTC during inclement weather and proficiency/qualification training in terrain-following using multi-mode radar. During terrain-following training, pilots would use on-board radar that sweeps the terrain to maintain a fixed distance above the ground under conditions of limited visibility. During terrain-following exercises, aircraft would fly at altitudes of 300 to 500 feet AGL.

If you need any additional information or more detailed maps of any area, or if you have any concerns regarding the proposal's potential to affect TCPs or other historic properties, please let me know at your earliest convenience. We would appreciate a response by April 25, 2008, but if you need more time, please let me know. My phone number is 253 966-1785. Send responses to [bret.ruby@us.army.mil](mailto:bret.ruby@us.army.mil) or to the address below. Thank you for your time in reply to this letter.

Public Works  
IMWE-LEW-PWE MS17  
Attn: Dr. Ruby  
Box 339500  
Fort Lewis, Washington 98433-9500

Sincerely,

A handwritten signature in black ink, appearing to read 'Bret J. Ruby', with a long horizontal flourish extending to the right.

Bret J. Ruby, PhD  
Cultural Resource Manager  
Coordinator for Native American Affairs

cc: Lelani Chubby, Manager  
Dave Bingham, Director



**DEPARTMENT OF THE ARMY**  
**INSTALLATION MANAGEMENT COMMAND**  
**HEADQUARTERS, UNITED STATES ARMY GARRISON**  
**BOX 339500, MAIL STOP 17**  
**FORT LEWIS WASHINGTON 98433-9500**

April 8, 2008

Public Works

Cheryle Kennedy, Chairwoman  
Confederated Tribes of the Grand Ronde  
9615 Grand Ronde Road  
Grand Ronde, OR 97347

RE: U.S. Army Proposed Helicopter Training Routes -  
Western Washington and Northwestern Oregon

Dear Ms. Kennedy,

The U.S. Army is conducting an Environmental Assessment (EA) in compliance with the National Environmental Policy Act to examine the potential impacts of establishing helicopter training routes and conducting subsequent training in parts of Washington and Oregon. Cultural resources studies required under Section 106 of the National Historic Preservation Act are being conducted concurrently with the EA, and the results will be integrated into the EA. This letter and associated map are being sent to solicit your opinion as to whether any traditional cultural properties (TCPs) or other historic properties would be affected by the proposed project.

The cultural resources study will examine the potential effects the project could have on historic properties. Historic properties are defined as cultural resources (structures, buildings, sites, objects, districts) that are on, or eligible for listing on, the National Register of Historic Places. Helicopter training and refueling exercises such as those proposed have the potential to affect historic properties via vibration and the introduction of visual and audible elements that challenge the properties' integrity of setting and feeling. Several similar studies have been conducted by the Air Force and other federal agencies nationwide, and an appropriate area of potential effects (APE) for such exercises is approximately six nautical miles (nm), three on either side of the route; however, the area affected by a single pass by an aircraft would likely be much narrower.

The proposed action includes aerial refueling training, terrain following/multi-mode radar (TF/MMR) training, and low-elevation training in southwestern Washington and northwestern Oregon. Five refueling routes (three new and two revised), one altered TF/MMR route, and one low-level training area would be established. All routes would start at Gray Army Airfield, Fort Lewis. Each of these actions has a different potential to affect historic properties. Aircraft taking part in training missions would consist of MH-60 Blackhawk and MH-47 Chinook helicopters, along with one C-130 tanker (used in refueling exercises only).

**Aerial Refueling**

Aerial refueling exercises would be conducted approximately 50 times per year and would range in elevation from approximately 2500 to 6000 feet mean sea level (MSL). Refuel Route 1

would begin northeast of Olympia, Washington and head west, turning to the northwest when it reaches Highway 101 north of Aberdeen, Washington, and eventually ending over the Pacific Ocean. Aircraft flying over this route would maintain elevations of 2,500 to 5,000 feet mean sea level. Refuel Route 2 would begin near Highway 101 south of Aberdeen, Washington, and head west, ending over the Pacific Ocean. Aircraft flying along this route would maintain elevations of 2,300 to 5,000 feet MSL. To reach this route from Fort Lewis, aircraft would head southwest a distance of 47 nm. Refuel Route 3 would begin northeast of Olympia, Washington, and head roughly southwest, passing west of Centralia, and ending over Pacific County near Naselle, Washington. Aircraft flying along this route would maintain elevations of 4,000 to 6,000 feet MSL. Proposed Refuel Route AR304, a 30-nm extension of an existing route published in the Department of Defense (DoD) Military Flight Information Publications, would begin south of Portland, Oregon, and head south, ending east of Eugene, Oregon. Aircraft flying along this route would maintain elevations of 3,100 to 5,000 feet MSL. To reach this route from Fort Lewis, aircraft would head south a distance of 110 nm, flying at an altitude of at least 500 feet above ground level (AGL). Proposed Refuel Route AR305, an extension of an existing route published in the DoD Military Flight Information Publications would begin north of Bend, Oregon, and head north to The Dalles, Oregon. This route would be 76 nm long, which is 14 nm longer than the current AR305. Aircraft flying along this route would maintain elevations of 6,000 to 8,000 feet MSL. To reach this route from Fort Lewis, aircraft would fly southeast a distance of 108 nm, flying at an altitude of at least 500 feet AGL. Aircraft would typically enter the route at its ending point, which is the closest point to Fort Lewis.

### **Low-Level Training**

Low-level exercises would be conducted approximately 60 times per year. Low-level training operations would take place in and near the Gifford Pinchot National Forest in Washington State. The boundaries of the low-level training area would form a five-sided polygon with a total area of approximately 396,000 acres. Helicopters could approach this area from any direction, flying along approved routes at altitudes of 500 feet AGL and above. Within the area, helicopters would perform various mission-essential tasks that involve flying at low altitudes, from the ground surface to a height of 500 feet AGL. Tasks could include following the contours of the earth as low as 50 feet above the highest obstacle (nap-of-the-earth flying), formation flight, confined area approaches, hovering, low-level navigation, sling load operation (carrying cargo externally in a sling), and other flight and maneuvering of helicopters. Refueling and expending of live ordnance would not occur. Pilots would also land at various locations within the training area to practice tasks such as confined area landings. It is anticipated that up to 10 landing areas would be required within the low-level training area. Once airspace is approved, landing sites would be identified, evaluated for their environmental impacts in subsequent analysis, and then approved by the decision-maker.

### **Terrain-Following/Multi-mode Radar**

Terrain-following exercises would be conducted approximately 60 times per year. The proposed terrain-following/multi-mode radar route would use part of an existing VR route (a route flown using visual flight rules) and two IR routes (routes flown using instrument flight rules), with the addition of a new IR route leg, 42 nm long, to provide a complete route from Fort

Lewis to YTC. The route would head south from Fort Lewis, turning roughly east just past Highway 12. Just before the Cascade Range, the route would bend to the southeast, and then back to the east over the Cascade Range. The route would link up with an existing route published in the DoD Military Flight Information Publications east of the Cascades, and head north, ending southwest of Yakima, Washington. The total length of the route would be 106 nm. Uses of this route would include flying to YTC during inclement weather and proficiency/qualification training in terrain-following using multi-mode radar. During terrain-following training, pilots would use on-board radar that sweeps the terrain to maintain a fixed distance above the ground under conditions of limited visibility. During terrain-following exercises, aircraft would fly at altitudes of 300 to 500 feet AGL.

If you need any additional information or more detailed maps of any area, or if you have any concerns regarding the proposal's potential to affect TCPs or other historic properties, please let me know at your earliest convenience. We would appreciate a response by April 25, 2008, but if you need more time, please let me know. My phone number is 253 966-1785. Send responses to [bret.ruby@us.army.mil](mailto:bret.ruby@us.army.mil) or to the address below. Thank you for your time in reply to this letter.

Public Works  
IMWE-LEW-PWE MS17  
Attn: Dr. Ruby  
Box 339500  
Fort Lewis, Washington 98433-9500

Sincerely,

A handwritten signature in black ink, appearing to read 'B. Ruby', with a stylized flourish at the end.

Bret J. Ruby, PhD  
Cultural Resource Manager  
Coordinator for Native American Affairs

cc: Eirik Thorsgard, Cultural Protection Coordinator  
Mike Wilson, Director of Natural Resources



**DEPARTMENT OF THE ARMY**  
**INSTALLATION MANAGEMENT COMMAND**  
**HEADQUARTERS, UNITED STATES ARMY GARRISON**  
**BOX 339500, MAIL STOP 17**  
**FORT LEWIS WASHINGTON 98433-9500**

April 8, 2008

Public Works

Joseph S. Kirk, Chairman  
Klamath Tribe  
P.O. Box 436  
Chiloquin, OR 97624

RE: U.S. Army Proposed Helicopter Training Routes -  
Western Washington and Northwestern Oregon Vicinity

Dear Mr. Kirk,

The U.S. Army is conducting an Environmental Assessment (EA) in compliance with the National Environmental Policy Act to examine the potential impacts of establishing helicopter training routes and conducting subsequent training in parts of Washington and Oregon. Cultural resources studies required under Section 106 of the National Historic Preservation Act are being conducted concurrently with the EA, and the results will be integrated into the EA. This letter and associated map are being sent to solicit your opinion as to whether any traditional cultural properties (TCPs) or other historic properties would be affected by the proposed project.

The cultural resources study will examine the potential effects the project could have on historic properties. Historic properties are defined as cultural resources (structures, buildings, sites, objects, districts) that are on, or eligible for listing on, the National Register of Historic Places. Helicopter training and refueling exercises such as those proposed have the potential to affect historic properties via vibration and the introduction of visual and audible elements that challenge the properties' integrity of setting and feeling. Several similar studies have been conducted by the Air Force and other federal agencies nationwide, and an appropriate area of potential effects (APE) for such exercises is approximately six nautical miles (nm), three on either side of the route; however, the area affected by a single pass by an aircraft would likely be much narrower.

The proposed action includes aerial refueling training, terrain following/multi-mode radar (TF/MMR) training, and low-elevation training in southwestern Washington and northwestern Oregon. Five refueling routes (three new and two revised), one altered TF/MMR route, and one low-level training area would be established. All routes would start at Gray Army Airfield, Fort Lewis. Each of these actions has a different potential to affect historic properties. Aircraft taking part in training missions would consist of MH-60 Blackhawk and MH-47 Chinook helicopters, along with one C-130 tanker (used in refueling exercises only).

**Aerial Refueling**

Aerial refueling exercises would be conducted approximately 50 times per year and would range in elevation from approximately 2500 to 6000 feet mean sea level (MSL). Refuel Route 1

would begin northeast of Olympia, Washington and head west, turning to the northwest when it reaches Highway 101 north of Aberdeen, Washington, and eventually ending over the Pacific Ocean. Aircraft flying over this route would maintain elevations of 2,500 to 5,000 feet mean sea level. Refuel Route 2 would begin near Highway 101 south of Aberdeen, Washington, and head west, ending over the Pacific Ocean. Aircraft flying along this route would maintain elevations of 2,300 to 5,000 feet MSL. To reach this route from Fort Lewis, aircraft would head southwest a distance of 47 nm. Refuel Route 3 would begin northeast of Olympia, Washington, and head roughly southwest, passing west of Centralia, and ending over Pacific County near Naselle, Washington. Aircraft flying along this route would maintain elevations of 4,000 to 6,000 feet MSL. Proposed Refuel Route AR304, a 30-nm extension of an existing route published in the Department of Defense (DoD) Military Flight Information Publications, would begin south of Portland, Oregon, and head south, ending east of Eugene, Oregon. Aircraft flying along this route would maintain elevations of 3,100 to 5,000 feet MSL. To reach this route from Fort Lewis, aircraft would head south a distance of 110 nm, flying at an altitude of at least 500 feet above ground level (AGL). Proposed Refuel Route AR305, an extension of an existing route published in the DoD Military Flight Information Publications would begin north of Bend, Oregon, and head north to The Dalles, Oregon. This route would be 76 nm long, which is 14 nm longer than the current AR305. Aircraft flying along this route would maintain elevations of 6,000 to 8,000 feet MSL. To reach this route from Fort Lewis, aircraft would fly southeast a distance of 108 nm, flying at an altitude of at least 500 feet AGL. Aircraft would typically enter the route at its ending point, which is the closest point to Fort Lewis.

### **Low-Level Training**

Low-level exercises would be conducted approximately 60 times per year. Low-level training operations would take place in and near the Gifford Pinchot National Forest in Washington State. The boundaries of the low-level training area would form a five-sided polygon with a total area of approximately 396,000 acres. Helicopters could approach this area from any direction, flying along approved routes at altitudes of 500 feet AGL and above. Within the area, helicopters would perform various mission-essential tasks that involve flying at low altitudes, from the ground surface to a height of 500 feet AGL. Tasks could include following the contours of the earth as low as 50 feet above the highest obstacle (nap-of-the-earth flying), formation flight, confined area approaches, hovering, low-level navigation, sling load operation (carrying cargo externally in a sling), and other flight and maneuvering of helicopters. Refueling and expending of live ordnance would not occur. Pilots would also land at various locations within the training area to practice tasks such as confined area landings. It is anticipated that up to 10 landing areas would be required within the low-level training area. Once airspace is approved, landing sites would be identified, evaluated for their environmental impacts in subsequent analysis, and then approved by the decision-maker.

### **Terrain-Following/Multi-mode Radar**

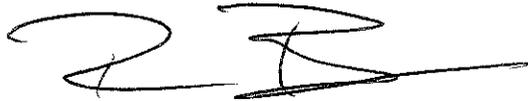
Terrain-following exercises would be conducted approximately 60 times per year. The proposed terrain-following/multi-mode radar route would use part of an existing VR route (a route flown using visual flight rules) and two IR routes (routes flown using instrument flight rules), with the addition of a new IR route leg, 42 nm long, to provide a complete route from Fort

Lewis to YTC. The route would head south from Fort Lewis, turning roughly east just past Highway 12. Just before the Cascade Range, the route would bend to the southeast, and then back to the east over the Cascade Range. The route would link up with an existing route published in the DoD Military Flight Information Publications east of the Cascades, and head north, ending southwest of Yakima, Washington. The total length of the route would be 106 nm. Uses of this route would include flying to YTC during inclement weather and proficiency/qualification training in terrain-following using multi-mode radar. During terrain-following training, pilots would use on-board radar that sweeps the terrain to maintain a fixed distance above the ground under conditions of limited visibility. During terrain-following exercises, aircraft would fly at altitudes of 300 to 500 feet AGL.

If you need any additional information or more detailed maps of any area, or if you have any concerns regarding the proposal's potential to affect TCPs or other historic properties, please let me know at your earliest convenience. We would appreciate a response by April 25, 2008, but if you need more time, please let me know. My phone number is 253 966-1785. Send responses to [bret.ruby@us.army.mil](mailto:bret.ruby@us.army.mil) or to the address below. Thank you for your time in reply to this letter.

Public Works  
IMWE-LEW-PWE MS17  
Attn: Dr. Ruby  
Box 339500  
Fort Lewis, Washington 98433-9500

Sincerely,

A handwritten signature in black ink, appearing to read 'Bret J. Ruby', with a long horizontal stroke extending to the right.

Bret J. Ruby, PhD  
Cultural Resource Manager  
Coordinator for Native American Affairs

cc: Perry Chocktoot, Culture & Heritage Director  
Elwood Miller, Natural Resources Director



**DEPARTMENT OF THE ARMY**  
**INSTALLATION MANAGEMENT COMMAND**  
**HEADQUARTERS, UNITED STATES ARMY GARRISON**  
**BOX 339500, MAIL STOP 17**  
**FORT LEWIS WASHINGTON 98433-9500**

April 8, 2008

Public Works

Cynthia Iyall, Tribal Chair  
Nisqually Tribe  
4820 She-Nah-Num Drive SE  
Olympia, WA 98513

RE: U.S. Army Proposed Helicopter Training Routes -  
Western Washington and Northwestern Oregon

Dear Ms. Iyall,

The U.S. Army is conducting an Environmental Assessment (EA) in compliance with the National Environmental Policy Act to examine the potential impacts of establishing helicopter training routes and conducting subsequent training in parts of Washington and Oregon. Cultural resources studies required under Section 106 of the National Historic Preservation Act are being conducted concurrently with the EA, and the results will be integrated into the EA. This letter and associated map are being sent to solicit your opinion as to whether any traditional cultural properties (TCPs) or other historic properties would be affected by the proposed project.

The cultural resources study will examine the potential effects the project could have on historic properties. Historic properties are defined as cultural resources (structures, buildings, sites, objects, districts) that are on, or eligible for listing on, the National Register of Historic Places. Helicopter training and refueling exercises such as those proposed have the potential to affect historic properties via vibration and the introduction of visual and audible elements that challenge the properties' integrity of setting and feeling. Several similar studies have been conducted by the Air Force and other federal agencies nationwide, and an appropriate area of potential effects (APE) for such exercises is approximately six nautical miles (nm), three on either side of the route; however, the area affected by a single pass by an aircraft would likely be much narrower.

The proposed action includes aerial refueling training, terrain following/multi-mode radar (TF/MMR) training, and low-elevation training in southwestern Washington and northwestern Oregon. Five refueling routes (three new and two revised), one altered TF/MMR route, and one low-level training area would be established. All routes would start at Gray Army Airfield, Fort Lewis. Each of these actions has a different potential to affect historic properties. Aircraft taking part in training missions would consist of MH-60 Blackhawk and MH-47 Chinook helicopters, along with one C-130 tanker (used in refueling exercises only).

**Aerial Refueling**

Aerial refueling exercises would be conducted approximately 50 times per year and would range in elevation from approximately 2500 to 6000 feet mean sea level (MSL). Refuel Route 1

would begin northeast of Olympia, Washington and head west, turning to the northwest when it reaches Highway 101 north of Aberdeen, Washington, and eventually ending over the Pacific Ocean. Aircraft flying over this route would maintain elevations of 2,500 to 5,000 feet mean sea level. Refuel Route 2 would begin near Highway 101 south of Aberdeen, Washington, and head west, ending over the Pacific Ocean. Aircraft flying along this route would maintain elevations of 2,300 to 5,000 feet MSL. To reach this route from Fort Lewis, aircraft would head southwest a distance of 47 nm. Refuel Route 3 would begin northeast of Olympia, Washington, and head roughly southwest, passing west of Centralia, and ending over Pacific County near Naselle, Washington. Aircraft flying along this route would maintain elevations of 4,000 to 6,000 feet MSL. Proposed Refuel Route AR304, a 30-nm extension of an existing route published in the Department of Defense (DoD) Military Flight Information Publications, would begin south of Portland, Oregon, and head south, ending east of Eugene, Oregon. Aircraft flying along this route would maintain elevations of 3,100 to 5,000 feet MSL. To reach this route from Fort Lewis, aircraft would head south a distance of 110 nm, flying at an altitude of at least 500 feet above ground level (AGL). Proposed Refuel Route AR305, an extension of an existing route published in the DoD Military Flight Information Publications would begin north of Bend, Oregon, and head north to The Dalles, Oregon. This route would be 76 nm long, which is 14 nm longer than the current AR305. Aircraft flying along this route would maintain elevations of 6,000 to 8,000 feet MSL. To reach this route from Fort Lewis, aircraft would fly southeast a distance of 108 nm, flying at an altitude of at least 500 feet AGL. Aircraft would typically enter the route at its ending point, which is the closest point to Fort Lewis.

### **Low-Level Training**

Low-level exercises would be conducted approximately 60 times per year. Low-level training operations would take place in and near the Gifford Pinchot National Forest in Washington State. The boundaries of the low-level training area would form a five-sided polygon with a total area of approximately 396,000 acres. Helicopters could approach this area from any direction, flying along approved routes at altitudes of 500 feet AGL and above. Within the area, helicopters would perform various mission-essential tasks that involve flying at low altitudes, from the ground surface to a height of 500 feet AGL. Tasks could include following the contours of the earth as low as 50 feet above the highest obstacle (nap-of-the-earth flying), formation flight, confined area approaches, hovering, low-level navigation, sling load operation (carrying cargo externally in a sling), and other flight and maneuvering of helicopters. Refueling and expending of live ordnance would not occur. Pilots would also land at various locations within the training area to practice tasks such as confined area landings. It is anticipated that up to 10 landing areas would be required within the low-level training area. Once airspace is approved, landing sites would be identified, evaluated for their environmental impacts in subsequent analysis, and then approved by the decision-maker.

### **Terrain-Following/Multi-mode Radar**

Terrain-following exercises would be conducted approximately 60 times per year. The proposed terrain-following/multi-mode radar route would use part of an existing VR route (a route flown using visual flight rules) and two IR routes (routes flown using instrument flight rules), with the addition of a new IR route leg, 42 nm long, to provide a complete route from Fort

Lewis to YTC. The route would head south from Fort Lewis, turning roughly east just past Highway 12. Just before the Cascade Range, the route would bend to the southeast, and then back to the east over the Cascade Range. The route would link up with an existing route published in the DoD Military Flight Information Publications east of the Cascades, and head north, ending southwest of Yakima, Washington. The total length of the route would be 106 nm. Uses of this route would include flying to YTC during inclement weather and proficiency/qualification training in terrain-following using multi-mode radar. During terrain-following training, pilots would use on-board radar that sweeps the terrain to maintain a fixed distance above the ground under conditions of limited visibility. During terrain-following exercises, aircraft would fly at altitudes of 300 to 500 feet AGL.

If you need any additional information or more detailed maps of any area, or if you have any concerns regarding the proposal's potential to affect TCPs or other historic properties, please let me know at your earliest convenience. We would appreciate a response by April 25, 2008, but if you need more time, please let me know. My phone number is 253 966-1785. Send responses to [bret.ruby@us.army.mil](mailto:bret.ruby@us.army.mil) or to the address below. Thank you for your time in reply to this letter.

Public Works  
IMWE-LEW-PWE MS17  
Attn: Dr. Ruby  
Box 339500  
Fort Lewis, Washington 98433-9500

Sincerely,



Bret J. Ruby, PhD  
Cultural Resource Manager  
Coordinator for Native American Affairs

cc: Thor Hoyte, Cultural Resources  
David Troutt, Natural Resources Director



**DEPARTMENT OF THE ARMY**  
**INSTALLATION MANAGEMENT COMMAND**  
**HEADQUARTERS, UNITED STATES ARMY GARRISON**  
**BOX 339500, MAIL STOP 17**  
**FORT LEWIS WASHINGTON 98433-9500**

April 8, 2008

Public Works

Wanda Johnson, Tribal Chair  
Burns Paiute Tribe  
100 Pasigo Street  
Burns, OR 97720

RE: U.S. Army Proposed Helicopter Training Routes -  
Western Washington and Northwestern Oregon

Dear Ms. Johnson,

The U.S. Army is conducting an Environmental Assessment (EA) in compliance with the National Environmental Policy Act to examine the potential impacts of establishing helicopter training routes and conducting subsequent training in parts of Washington and Oregon. Cultural resources studies required under Section 106 of the National Historic Preservation Act are being conducted concurrently with the EA, and the results will be integrated into the EA. This letter and associated map are being sent to solicit your opinion as to whether any traditional cultural properties (TCPs) or other historic properties would be affected by the proposed project.

The cultural resources study will examine the potential effects the project could have on historic properties. Historic properties are defined as cultural resources (structures, buildings, sites, objects, districts) that are on, or eligible for listing on, the National Register of Historic Places. Helicopter training and refueling exercises such as those proposed have the potential to affect historic properties via vibration and the introduction of visual and audible elements that challenge the properties' integrity of setting and feeling. Several similar studies have been conducted by the Air Force and other federal agencies nationwide, and an appropriate area of potential effects (APE) for such exercises is approximately six nautical miles (nm), three on either side of the route; however, the area affected by a single pass by an aircraft would likely be much narrower.

The proposed action includes aerial refueling training, terrain following/multi-mode radar (TF/MMR) training, and low-elevation training in southwestern Washington and northwestern Oregon. Five refueling routes (three new and two revised), one altered TF/MMR route, and one low-level training area would be established. All routes would start at Gray Army Airfield, Fort Lewis. Each of these actions has a different potential to affect historic properties. Aircraft taking part in training missions would consist of MH-60 Blackhawk and MH-47 Chinook helicopters, along with one C-130 tanker (used in refueling exercises only).

**Aerial Refueling**

Aerial refueling exercises would be conducted approximately 50 times per year and would range in elevation from approximately 2500 to 6000 feet mean sea level (MSL). Refuel Route 1

would begin northeast of Olympia, Washington and head west, turning to the northwest when it reaches Highway 101 north of Aberdeen, Washington, and eventually ending over the Pacific Ocean. Aircraft flying over this route would maintain elevations of 2,500 to 5,000 feet mean sea level. Refuel Route 2 would begin near Highway 101 south of Aberdeen, Washington, and head west, ending over the Pacific Ocean. Aircraft flying along this route would maintain elevations of 2,300 to 5,000 feet MSL. To reach this route from Fort Lewis, aircraft would head southwest a distance of 47 nm. Refuel Route 3 would begin northeast of Olympia, Washington, and head roughly southwest, passing west of Centralia, and ending over Pacific County near Naselle, Washington. Aircraft flying along this route would maintain elevations of 4,000 to 6,000 feet MSL. Proposed Refuel Route AR304, a 30-nm extension of an existing route published in the Department of Defense (DoD) Military Flight Information Publications, would begin south of Portland, Oregon, and head south, ending east of Eugene, Oregon. Aircraft flying along this route would maintain elevations of 3,100 to 5,000 feet MSL. To reach this route from Fort Lewis, aircraft would head south a distance of 110 nm, flying at an altitude of at least 500 feet above ground level (AGL). Proposed Refuel Route AR305, an extension of an existing route published in the DoD Military Flight Information Publications would begin north of Bend, Oregon, and head north to The Dalles, Oregon. This route would be 76 nm long, which is 14 nm longer than the current AR305. Aircraft flying along this route would maintain elevations of 6,000 to 8,000 feet MSL. To reach this route from Fort Lewis, aircraft would fly southeast a distance of 108 nm, flying at an altitude of at least 500 feet AGL. Aircraft would typically enter the route at its ending point, which is the closest point to Fort Lewis.

### **Low-Level Training**

Low-level exercises would be conducted approximately 60 times per year. Low-level training operations would take place in and near the Gifford Pinchot National Forest in Washington State. The boundaries of the low-level training area would form a five-sided polygon with a total area of approximately 396,000 acres. Helicopters could approach this area from any direction, flying along approved routes at altitudes of 500 feet AGL and above. Within the area, helicopters would perform various mission-essential tasks that involve flying at low altitudes, from the ground surface to a height of 500 feet AGL. Tasks could include following the contours of the earth as low as 50 feet above the highest obstacle (nap-of-the-earth flying), formation flight, confined area approaches, hovering, low-level navigation, sling load operation (carrying cargo externally in a sling), and other flight and maneuvering of helicopters. Refueling and expending of live ordnance would not occur. Pilots would also land at various locations within the training area to practice tasks such as confined area landings. It is anticipated that up to 10 landing areas would be required within the low-level training area. Once airspace is approved, landing sites would be identified, evaluated for their environmental impacts in subsequent analysis, and then approved by the decision-maker.

### **Terrain-Following/Multi-mode Radar**

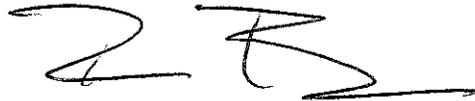
Terrain-following exercises would be conducted approximately 60 times per year. The proposed terrain-following/multi-mode radar route would use part of an existing VR route (a route flown using visual flight rules) and two IR routes (routes flown using instrument flight rules), with the addition of a new IR route leg, 42 nm long, to provide a complete route from Fort

Lewis to YTC. The route would head south from Fort Lewis, turning roughly east just past Highway 12. Just before the Cascade Range, the route would bend to the southeast, and then back to the east over the Cascade Range. The route would link up with an existing route published in the DoD Military Flight Information Publications east of the Cascades, and head north, ending southwest of Yakima, Washington. The total length of the route would be 106 nm. Uses of this route would include flying to YTC during inclement weather and proficiency/qualification training in terrain-following using multi-mode radar. During terrain-following training, pilots would use on-board radar that sweeps the terrain to maintain a fixed distance above the ground under conditions of limited visibility. During terrain-following exercises, aircraft would fly at altitudes of 300 to 500 feet AGL.

If you need any additional information or more detailed maps of any area, or if you have any concerns regarding the proposal's potential to affect TCPs or other historic properties, please let me know at your earliest convenience. We would appreciate a response by April 25, 2008, but if you need more time, please let me know. My phone number is 253 966-1785. Send responses to [bret.ruby@us.army.mil](mailto:bret.ruby@us.army.mil) or to the address below. Thank you for your time in reply to this letter.

Public Works  
IMWE-LEW-PWE MS17  
Attn: Dr. Ruby  
Box 339500  
Fort Lewis, Washington 98433-9500

Sincerely,

A handwritten signature in black ink, appearing to read 'Bret J. Ruby', with a long horizontal flourish extending to the right.

Bret J. Ruby, PhD  
Cultural Resource Manager  
Coordinator for Native American Affairs

cc: Don Munkers, General Manager and Cultural Resource Director  
Lawrence Schwabe, Fish and Wildlife Manager



**DEPARTMENT OF THE ARMY**  
**INSTALLATION MANAGEMENT COMMAND**  
**HEADQUARTERS, UNITED STATES ARMY GARRISON**  
**BOX 339500, MAIL STOP 17**  
**FORT LEWIS WASHINGTON 98433-9500**

April 8, 2008

Public Works

John Barnett, Tribal Chair  
Cowlitz Tribe  
P.O. Box 2547  
Longview, WA 98632-8594

RE: U.S. Army Proposed Helicopter Training Routes -  
Western Washington and Northwestern Oregon

Dear Mr. Barnett:

The U.S. Army is conducting an Environmental Assessment (EA) in compliance with the National Environmental Policy Act to examine the potential impacts of establishing helicopter training routes and conducting subsequent training in parts of Washington and Oregon. Cultural resources studies required under Section 106 of the National Historic Preservation Act are being conducted concurrently with the EA, and the results will be integrated into the EA. This letter and associated map are being sent to solicit your opinion as to whether any traditional cultural properties (TCPs) or other historic properties would be affected by the proposed project.

The cultural resources study will examine the potential effects the project could have on historic properties. Historic properties are defined as cultural resources (structures, buildings, sites, objects, districts) that are on, or eligible for listing on, the National Register of Historic Places. Helicopter training and refueling exercises such as those proposed have the potential to affect historic properties via vibration and the introduction of visual and audible elements that challenge the properties' integrity of setting and feeling. Several similar studies have been conducted by the Air Force and other federal agencies nationwide, and an appropriate area of potential effects (APE) for such exercises is approximately six nautical miles (nm), three on either side of the route; however, the area affected by a single pass by an aircraft would likely be much narrower.

The proposed action includes aerial refueling training, terrain following/multi-mode radar (TF/MMR) training, and low-elevation training in southwestern Washington and northwestern Oregon. Five refueling routes (three new and two revised), one altered TF/MMR route, and one low-level training area would be established. All routes would start at Gray Army Airfield, Fort Lewis. Each of these actions has a different potential to affect historic properties. Aircraft taking part in training missions would consist of MH-60 Blackhawk and MH-47 Chinook helicopters, along with one C-130 tanker (used in refueling exercises only).

**Aerial Refueling**

Aerial refueling exercises would be conducted approximately 50 times per year and would range in elevation from approximately 2500 to 6000 feet mean sea level (MSL). Refuel Route 1

would begin northeast of Olympia, Washington and head west, turning to the northwest when it reaches Highway 101 north of Aberdeen, Washington, and eventually ending over the Pacific Ocean. Aircraft flying over this route would maintain elevations of 2,500 to 5,000 feet mean sea level. Refuel Route 2 would begin near Highway 101 south of Aberdeen, Washington, and head west, ending over the Pacific Ocean. Aircraft flying along this route would maintain elevations of 2,300 to 5,000 feet MSL. To reach this route from Fort Lewis, aircraft would head southwest a distance of 47 nm. Refuel Route 3 would begin northeast of Olympia, Washington, and head roughly southwest, passing west of Centralia, and ending over Pacific County near Naselle, Washington. Aircraft flying along this route would maintain elevations of 4,000 to 6,000 feet MSL. Proposed Refuel Route AR304, a 30-nm extension of an existing route published in the Department of Defense (DoD) Military Flight Information Publications, would begin south of Portland, Oregon, and head south, ending east of Eugene, Oregon. Aircraft flying along this route would maintain elevations of 3,100 to 5,000 feet MSL. To reach this route from Fort Lewis, aircraft would head south a distance of 110 nm, flying at an altitude of at least 500 feet above ground level (AGL). Proposed Refuel Route AR305, an extension of an existing route published in the DoD Military Flight Information Publications would begin north of Bend, Oregon, and head north to The Dalles, Oregon. This route would be 76 nm long, which is 14 nm longer than the current AR305. Aircraft flying along this route would maintain elevations of 6,000 to 8,000 feet MSL. To reach this route from Fort Lewis, aircraft would fly southeast a distance of 108 nm, flying at an altitude of at least 500 feet AGL. Aircraft would typically enter the route at its ending point, which is the closest point to Fort Lewis.

### **Low-Level Training**

Low-level exercises would be conducted approximately 60 times per year. Low-level training operations would take place in and near the Gifford Pinchot National Forest in Washington State. The boundaries of the low-level training area would form a five-sided polygon with a total area of approximately 396,000 acres. Helicopters could approach this area from any direction, flying along approved routes at altitudes of 500 feet AGL and above. Within the area, helicopters would perform various mission-essential tasks that involve flying at low altitudes, from the ground surface to a height of 500 feet AGL. Tasks could include following the contours of the earth as low as 50 feet above the highest obstacle (nap-of-the-earth flying), formation flight, confined area approaches, hovering, low-level navigation, sling load operation (carrying cargo externally in a sling), and other flight and maneuvering of helicopters. Refueling and expending of live ordnance would not occur. Pilots would also land at various locations within the training area to practice tasks such as confined area landings. It is anticipated that up to 10 landing areas would be required within the low-level training area. Once airspace is approved, landing sites would be identified, evaluated for their environmental impacts in subsequent analysis, and then approved by the decision-maker.

### **Terrain-Following/Multi-mode Radar**

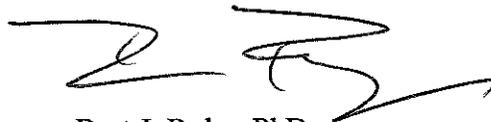
Terrain-following exercises would be conducted approximately 60 times per year. The proposed terrain-following/multi-mode radar route would use part of an existing VR route (a route flown using visual flight rules) and two IR routes (routes flown using instrument flight rules), with the addition of a new IR route leg, 42 nm long, to provide a complete route from Fort

Lewis to YTC. The route would head south from Fort Lewis, turning roughly east just past Highway 12. Just before the Cascade Range, the route would bend to the southeast, and then back to the east over the Cascade Range. The route would link up with an existing route published in the DoD Military Flight Information Publications east of the Cascades, and head north, ending southwest of Yakima, Washington. The total length of the route would be 106 nm. Uses of this route would include flying to YTC during inclement weather and proficiency/qualification training in terrain-following using multi-mode radar. During terrain-following training, pilots would use on-board radar that sweeps the terrain to maintain a fixed distance above the ground under conditions of limited visibility. During terrain-following exercises, aircraft would fly at altitudes of 300 to 500 feet AGL.

If you need any additional information or more detailed maps of any area, or if you have any concerns regarding the proposal's potential to affect TCPs or other historic properties, please let me know at your earliest convenience. We would appreciate a response by April 25, 2008, but if you need more time, please let me know. My phone number is 253 966-1785. Send responses to [bret.ruby@us.army.mil](mailto:bret.ruby@us.army.mil) or to the address below. Thank you for your time in reply to this letter.

Public Works  
IMWE-LEW-PWE MS17  
Attn: Dr. Ruby  
Box 339500  
Fort Lewis, Washington 98433-9500

Sincerely,



Bret J. Ruby, PhD  
Cultural Resource Manager  
Coordinator for Native American Affairs

cc: Ed Arthur, Cultural Resources  
Mike Iyall, Director of Natural Resources

## **Appendix D**

### **Scientific Names of Plants and Animals**



**SCIENTIFIC NAMES OF PLANTS AND ANIMALS**

This appendix contains a list of the common and scientific names of plant and animal species mentioned in the text of the EA.

Common Name	Scientific Name
<b>PLANTS</b>	
<b>Graminoids</b>	
Basin wildrye	<i>Leymus cinereus</i>
Bluebunch wheatgrass	<i>Pseudoregneria spicata</i>
California oatgrass	<i>Danthonia californica</i>
Cheatgrass	<i>Bromus tectorum</i>
Henderson’s needlegrass	<i>Achnatherum hendersonii</i>
Hitchcock’s blue-eyed grass	<i>Sisyrinchium hitchcockii</i>
Howell’s bentgrass	<i>Agrostis howellii</i>
Idaho fescue	<i>Festuca idahoensis</i>
Kentucky bluegrass	<i>Poa pratensis</i>
Medusahead	<i>Taeniatherum caput-medusae</i>
Mountain blue-eyed grass	<i>Sisyrinchium sarmentosum</i>
Needlegrass	<i>Stipa</i> spp.
Pennsylvania sedge	<i>Carex pennsylvanica</i>
San Francisco bluegrass	<i>Poa unilateralis</i>
Slough sedge	<i>Carex obnupta</i>
Thurber’s needlegrass	<i>Achnatherum thurberianum</i>
Wallowa needlegrass	<i>Acnathera wallowaensis</i>
<b>Forbs and Nonvascular Plants</b>	
American skunk cabbage	<i>Lysichiton americanus</i>
Bog anemone	<i>Anemone oregana</i> var. <i>felix</i>
Bradshaw’s desertparsley	<i>Lomatium bradshawii</i>
Bristlystem checkerbloom	<i>Sidalcea hirtipes</i>
Chamber’s paintbrush	<i>Castilleja chambersii</i>
Cliff Indian paintbrush	<i>Castilleja rupicola</i>
Clustered lady’s slipper	<i>Cypripedium fasciculatum</i>
Coldwater fumewort	<i>Corydalis caseana</i> ssp. <i>aquae-gelidae</i>
Columbian whitetop aster	<i>Sericocarpus rigidus</i>
Columbian yellowcress	<i>Rorippa columbiae</i>
Common ladyfern	<i>Athyrium filix-femina</i>
Cotton’s milkvetch	<i>Astragalus australis</i> var. <i>olympicus</i>
Deer fern	<i>Blechnum spicant</i>
Deltoid balsamroot	<i>Balsamorhiza deltiodea</i>
Disappearing monkeyflower	<i>Mimulus evanescens</i>



APPENDIX D – SCIENTIFIC NAMES OF PLANTS AND ANIMALS

Common Name	Scientific Name
Dwarf checkerbloom	<i>Sidalcea malviflora</i> ssp. <i>virgata</i>
Dwarf suncup	<i>Camissonia pygmaea</i>
Eared rockcress	<i>Arabis hastatula</i>
False lily of the valley	<i>Maianthemum dilatatum</i>
Field sagewort	<i>Artemisia campestris</i> ssp. <i>borealis</i> var. <i>wormskioldii</i>
Footsteps of spring	<i>Sanicula arctopoides</i>
Frigid shootingstar	<i>Dodecatheon austrofrigidum</i>
Frye’s limbella moss	<i>Limbella fryei</i>
Golden Indian paintbrush	<i>Castilleja levisecta</i>
Henderson’s checkerbloom	<i>Sidalcea hendersonii</i>
Howell’s fleabane	<i>Erigeron howellii</i>
Kincaid’s lupine	<i>Lupinus oreganus</i> var. <i>kincaidii</i>
Liverwort monkeyflower	<i>Mimulus jungermannioides</i>
Longbeard mariposa lily	<i>Calochortus longebarbatus</i> var. <i>longebarbatus</i>
Manyleaf giliata	<i>Gilia millefoliata</i>
Marsh sandwort	<i>Arenaria paludicola</i>
Mexican hedgenettle	<i>Stachys mexicana</i>
Miterwort	<i>Mitella</i> spp.
Mountain moonwort	<i>Botrychium montanum</i>
Nelson’s checkerbloom	<i>Sidalcea nelsoniana</i>
Nuttall’s violet	<i>Viola nuttallii</i>
Obscure buttercup	<i>Ranunculus tritermatus</i>
Obscure Indian paintbrush	<i>Castilleja cryptantha</i>
Oregon coolwort	<i>Sullivantia oregona</i>
Oregon daisy	<i>Erigeron oreganus</i>
Peacock larkspur	<i>Delphinium</i> x <i>pavonaceum</i>
Peck’s beardtongue	<i>Penstemon peckii</i>
Pink sand verbena	<i>Abronia umbellata</i> ssp. <i>breviflora</i>
Pioneer violet	<i>Viola glabella</i>
Pt. Reyes bird’s-beak	<i>Cordylanthus maritimus</i> ssp. <i>palustris</i>
Ray goldenweed	<i>Pyrrocoma radiata</i>
Redwood-sorrel	<i>Oxalis oregana</i>
Saddle Mountain bittercress	<i>Cardamine pattersonii</i>
Saddle Mountain saxifrage	<i>Saxifraga hitchcockiana</i>
Salmonflower biscuitroot	<i>Lomatium salmoniflorum</i>
Seabluff catchfly	<i>Silene douglasii</i> var. <i>oraria</i>
Sierra horkelia	<i>Horkelia congesta</i> ssp. <i>congesta</i>
Small camas	<i>Camassia quamash</i>
Suksdorf’s desertparsley	<i>Lomatium suksdorfii</i>
Suksdorf’s milkvetch	<i>Astragalus pulsiferae</i> var. <i>suksdorfii</i>



Common Name	Scientific Name
Swordfern	<i>Polystichum munitum</i>
Tall bugbane	<i>Actaea elata</i>
Thinleaf pea	<i>Lathyrus holochlorus</i>
Threelobe foamflower	<i>Tiarella trifoliata</i>
Torrey's pea	<i>Lathyrus torreyi</i>
Trianglelobe moonwort	<i>Botrychium ascendens</i>
Upland larkspur	<i>Delphinium nuttallii</i> ssp. <i>nuttallii</i>
Upland larkspur	<i>Delphinium nuttallii</i> ssp. <i>ochroleucum</i>
Ute lady's tresses	<i>Spiranthes diluvialis</i>
Vernal pool mousetail	<i>Myosurus sessilis</i>
Water howellia	<i>Howellia aquatilis</i>
Water parsley	<i>Oenanthe sarmentosa</i>
Wayside aster	<i>Eucephalus vialis</i>
White fairypoppy	<i>Meconella oregana</i>
Willamette fleabane	<i>Erigeron decumbens</i> var. <i>decumbens</i>
Woodland strawberry	<i>Fragaria vesca</i> ssp. <i>bracteata</i>
Youth on age	<i>Tolmeia menziesii</i>
<b>Shrubs and Trees</b>	
Antelope bitterbrush	<i>Purshia tridentata</i>
Beaked hazelnut	<i>Corylus cornuta</i>
Big sagebrush	<i>Artemisia tridentata</i>
Bigleaf maple	<i>Acer macrophyllum</i>
Black cottonwood	<i>Populus balsamifera</i> ssp. <i>trichocarpa</i>
California black oak	<i>Quercus kelloggii</i>
California hazelnut	<i>Corylus cornuta</i> var. <i>californica</i>
Cascade barberry	<i>Mahonia nervosa</i>
Common snowberry	<i>Symphoricarpos albus</i>
Douglas-fir	<i>Psuedotsuga menziesii</i>
Dune willow	<i>Salix hookeriana</i>
Dwarf rose	<i>Rosa gymnocarpa</i>
Grand fir	<i>Abies grandis</i>
Kinnikinnick	<i>Arctostaphylos uva-ursi</i>
Little sagebrush	<i>Artemisia arbuscula</i>
Lodgepole pine	<i>Pinus contorta</i>
Mountain hemlock	<i>Tsuga mertensiana</i>
Obscure Indian paintbrush	<i>Castilleja cryptantha</i>
Oceanspray	<i>Holodiscus discolor</i>
Oregon ash	<i>Fraxinus latifolia</i>
Oregon white oak	<i>Quercus garryana</i>
Pacific madrone	<i>Arbutus menziesii</i>



APPENDIX D – SCIENTIFIC NAMES OF PLANTS AND ANIMALS

Common Name	Scientific Name
Pacific poison oak	<i>Toxicodendron diversilobum</i>
Pacific silver fir	<i>Abies amabilis</i>
Ponderosa pine	<i>Pinus ponderosa</i>
Red alder	<i>Alnus rubra</i>
Rose spirea	<i>Spiraea douglasii</i>
Salmonberry	<i>Rubus spectabilis</i>
Saskatoon serviceberry	<i>Amelanchier alnifolia</i>
Scabland sagebrush	<i>Artemisia rigida</i>
Scotch broom	<i>Cytisus scoparius</i>
Shadscale saltbush	<i>Atriplex confertifolia</i>
Sitka spruce	<i>Picea sitchensis</i>
Smallflower blueberry	<i>Vaccinium virgatum</i>
Sweet cherry	<i>Prunus avium</i>
Vine maple	<i>Acer circinatum</i>
Western hemlock	<i>Tsuga heterophylla</i>
Western red cedar	<i>Thuja plicata</i>
Whitebark pine	<i>Pinus albicaulis</i>
<b>INVERTEBRATES</b>	
Fender’s blue butterfly	<i>Icaricia icarioides fenderi</i>
Mardon skipper	<i>Polites mardon</i>
Oregon silverspot butterfly	<i>Speyeria zerene hippolyta</i>
Taylor’s checkerspot	<i>Euphydryas editha taylori</i>
<b>AMPHIBIANS &amp; REPTILES</b>	
Bullfrog	<i>Rana catesbeiana</i>
Cascades frog	<i>Rana cascadae</i>
Columbia spotted frog	<i>Rana luteiventris</i>
Ensatina	<i>Ensatina eschscholtzii</i>
Gopher snake	<i>Pituophis melanoleucus</i>
Green sea turtle	<i>Chelonia mydas</i>
Leatherback sea turtle	<i>Dermochelys coriacea</i>
Loggerhead sea turtle	<i>Caretta caretta</i>
Long-toed salamander	<i>Ambystoma macrodactylum</i>
Night snake	<i>Hypsiglena torquata</i>
Northern alligator lizard	<i>Elgaria coerulea</i>
Northern red-legged frog	<i>Rana aurora</i>
Northwest garter snake	<i>Thamnophis ordinoides</i>
Northwestern salamander	<i>Ambystoma gracile</i>
Olive-ridley sea turtle	<i>Lepidochelys olivacea</i>
Oregon spotted frog	<i>Rana pretiosa</i>
Pacific giant salamander	<i>Dicamptodon tenebrus</i>



Common Name	Scientific Name
Pacific treefrog	<i>Hyla (Pseudacris) regilla</i>
Painted turtle	<i>Chrysemys picta</i>
Racer	<i>Coluber constrictor</i>
Rough-skinned newt	<i>Taricha granulosa</i>
Rubber boa	<i>Charina bottae</i>
Sagebrush lizard	<i>Sceloporus graciosus</i>
Short-horned lizard	<i>Phrynosoma douglassii</i>
Side-blotched lizard	<i>Uta stansburiana</i>
Striped whipsnake	<i>Masticophis taeniatus</i>
Western fence lizard	<i>Sceloporus occidentalis</i>
Western pond turtle	<i>Clemmys marmorata</i>
Western rattlesnake	<i>Crotalus viridis</i>
Western red-backed salamander	<i>Plethodon vehiculum</i>
Western skink	<i>Eumeces skiltonianus</i>
Western toad	<i>Bufo boreas</i>
<b>BIRDS</b>	
American avocet	<i>Recurvirostra americana</i>
American coot	<i>Fulica americana</i>
American kestrel	<i>Falco sparverius</i>
Bald eagle	<i>Haliaeetus leucocephalus</i>
Band-tailed pigeon	<i>Columba fasciata</i>
Barred owl	<i>Strix varia</i>
Belted kingfisher	<i>Ceryle alcyon</i>
Black duck	<i>Anas rubripes</i>
Black turnstone	<i>Arenaria melanocephala</i>
Black-bellied plover	<i>Pluvialis squatarola</i>
Black-necked stilt	<i>Himantopus mexicanus</i>
Blue-winged teal	<i>Anas discors</i>
Bonaparte's gull	<i>Larus philadelphia</i>
Brandt's cormorant	<i>Phalacrocorax penicillatus</i>
Brant	<i>Branta bernicla</i>
Brown pelican	<i>Pelecanus occidentalis</i>
Bufflehead	<i>Bucephala albeola</i>
Bushtit	<i>Psaltriparus minimus</i>
Cackling goose	<i>Branta hutchinsii</i>
California gull	<i>Larus californicus</i>
California quail	<i>Callipepla californica</i>
Canada goose	<i>Branta canadensis</i>
Caspian tern	<i>Sterna caspia</i>
Cassin's auklet	<i>Ptychoramphus aleuticus</i>



## APPENDIX D – SCIENTIFIC NAMES OF PLANTS AND ANIMALS

Common Name	Scientific Name
Chestnut-backed chickadee	<i>Parus rufescens</i>
Chukar	<i>Alectoris chukar</i>
Cinnamon teal	<i>Anas cyanoptera</i>
Common loon	<i>Gavia immer</i>
Common merganser	<i>Mergus merganser</i>
Common murre	<i>Uria aalge</i>
Common nighthawk	<i>Chordeiles minor</i>
Common yellowthroat	<i>Geothlypis trichas</i>
Double-crested cormorant	<i>Phalacrocorax auritus</i>
Dunlin	<i>Calidris alpina</i>
Eared grebe	<i>Podiceps nigricollis</i>
Gadwall	<i>Anas strepera</i>
Glaucous-winged gull	<i>Larus glaucescens</i>
Golden-crowned kinglet	<i>Regulus satrapa</i>
Great blue heron	<i>Ardea herodias</i>
Greater sage-grouse	<i>Centrocercus urophasianus</i>
Greater scaup	<i>Aythya marila</i>
Great-horned owl	<i>Bubo virginianus</i>
Green-winged teal	<i>Anas crecca</i>
Horned grebe	<i>Podiceps auritus</i>
Horned lark	<i>Eremophila alpestris</i>
Killdeer	<i>Charadrius vociferus</i>
Least sandpiper	<i>Calidris minutilla</i>
Long-billed dowitcher	<i>Limnodromus scolopaceus</i>
Mallard	<i>Anas platyrhynchos</i>
Marbled godwit	<i>Limosa fedoa</i>
Marbled murrelet	<i>Brachyramphus marmoratus</i>
Mew gull	<i>Larus canus</i>
Mountain quail	<i>Oreortyx pictus</i>
Mourning dove	<i>Zenaida macroura</i>
Northern harrier	<i>Circus cyaneus</i>
Northern pintail	<i>Anas acuta</i>
Northern shoveler	<i>Anas clypeata</i>
Olive-sided flycatcher	<i>Contopus borealis</i>
Orange-crowned warbler	<i>Vermivora celata</i>
Osprey	<i>Pandion haliaetus</i>
Pacific loon	<i>Gavia pacifica (=arctica)</i>
Pelagic cormorant	<i>Phalacrocorax pelagicus</i>
Pied-billed grebe	<i>Podilymbus podiceps</i>
Pigeon guillemot	<i>Cepphus columba</i>



Common Name	Scientific Name
Purple martin	<i>Progne subis</i>
Red-breasted merganser	<i>Mergus serrator</i>
Redhead	<i>Aythya americana</i>
Red-necked grebe	<i>Podiceps grisegena</i>
Red-tailed hawk	<i>Buteo jamaicensis</i>
Red-throated loon	<i>Gavia stellata</i>
Ring-billed gull	<i>Larus delawarensis</i>
Ring-necked pheasant	<i>Phasianus colchicus</i>
Rock pigeon	<i>Columba livia</i>
Rough-legged hawk	<i>Buteo lagopus</i>
Ruddy duck	<i>Oxyura jamaicensis</i>
Ruffed grouse	<i>Bonasa umbellus</i>
Rufous hummingbird	<i>Selasphorus rufus</i>
Sanderling	<i>Calidris alba</i>
Sandhill crane	<i>Grus canadensis</i>
Short-eared owl	<i>Asio flammeus</i>
Short-tailed albatross	<i>Phoebastria albatrus</i>
Snow goose	<i>Chen caerulescens</i>
Sooty grouse	<i>Dendragapus fuliginosus</i>
Sooty shearwater	<i>Puffinus griseus</i>
Spotted towhee	<i>Pipilo maculatus (=erythrophthalmus)</i>
Streaked horned lark	<i>Eremophila alpestris strigata</i>
Surf scoter	<i>Melanitta perspicillata</i>
Surfbird	<i>Aphriza virgata</i>
Swainson's hawk	<i>Buteo swainsoni</i>
Trumpeter swan	<i>Cygnus buccinator</i>
Tundra swan	<i>Cygnus columbianus</i>
Vaux's swift	<i>Chaetura vauxi</i>
Vesper sparrow	<i>Pooecetes gramineus</i>
Violet-green swallow	<i>Tachycineta thalassina</i>
Western gull	<i>Larus occidentalis</i>
Western sandpiper	<i>Calidris mauri</i>
Western screech owl	<i>Otus kennicottii</i>
Western snowy plover	<i>Charadrius alexandrinus nivosus</i>
White-breasted nuthatch	<i>Sitta carolinensis</i>
White-crowned sparrow	<i>Zonotrichia leucophrys</i>
White-winged scoter	<i>Melanitta fusca</i>
Willow flycatcher	<i>Empidonax traillii</i>
Wilson's phalarope	<i>Phalaropus tricolor</i>
Wilson's warbler	<i>Wilsonia pusilla</i>



Common Name	Scientific Name
Wood duck	<i>Aix sponsa</i>
Yellow-billed cuckoo	<i>Coccyzus americanus</i>
Yellow-rumped warbler	<i>Dendroica coronata</i>
Yellow warbler	<i>Dendroica petechia</i>
<b>FISH</b>	
Black crappie	<i>Pomoxis nigromaculatus</i>
Brown trout	<i>Salmo trutta trutta</i>
Bull trout	<i>Salvelinus confluentus</i>
Chinook salmon	<i>Oncorhynchus tshawytscha</i>
Chum salmon	<i>Oncorhynchus keta</i>
Coastal cutthroat trout	<i>Oncorhynchus clarkii clarkii</i>
Coho salmon	<i>Oncorhynchus kisutch</i>
Cutthroat trout	<i>Oncorhynchus clarkii</i>
Dolly Varden trout	<i>Salvelinus malma malma</i>
Eastern brook trout	<i>Salvelinus fontinalis</i>
Green sturgeon	<i>Acipenser medirostris</i>
Kokanee	<i>Oncorhynchus nerka</i>
Lake trout	<i>Salvelinus namaycush</i>
Largemouth bass	<i>Micropterus salmoides</i>
Lingcod	<i>Ophiodon elongatus</i>
Mountain whitefish	<i>Prosopium williamsoni</i>
Northern anchovy	<i>Engraulis mordax</i>
Pacific hake	<i>Merluccius productus</i>
Pacific halibut	<i>Hippoglossus stenolepis</i>
Pacific herring	<i>Clupea pallasii pallasii</i>
Pacific sardine	<i>Sardinops sagax</i>
Pacific tomcod	<i>Microgadus proximus</i>
Pink salmon	<i>Oncorhynchus gorbuscha</i>
Rainbow trout	<i>Oncorhynchus mykiss</i>
Rockfish	<i>Sebastes</i> spp. <i>sebastolobus</i>
Sockeye salmon	<i>Oncorhynchus nerka</i>
Sole	family Pleuronectidae
Steelhead trout	<i>Oncorhynchus mykiss</i>
White sturgeon	<i>Acipenser transmontanus</i>
Yellow perch	<i>Perca flavescens</i>
<b>TERRESTRIAL MAMMALS</b>	
American beaver	<i>Castor canadensis</i>
Badger	<i>Taxidea taxus</i>
Bighorn sheep	<i>Ovis canadensis</i>
Black bear	<i>Ursus americanus</i>



Common Name	Scientific Name
Black-tailed jackrabbit	<i>Lepus californicus</i>
Bobcat	<i>Lynx rufus</i>
Canada lynx	<i>Lynx canadensis</i>
Columbian black-tailed deer	<i>Odocoileus hemionus columbianus</i>
Columbian white-tailed deer	<i>Odocoileus virginianus leucurus</i>
Cougar	<i>Puma concolor</i>
Coyote	<i>Canis latrans</i>
Ermine	<i>Mustela erminea</i>
Fringed myotis	<i>Myotis thysanodes</i>
Gray wolf	<i>Canis lupus</i>
Grizzly bear	<i>Ursus horribilis</i>
Long-legged myotis	<i>Myotis volans</i>
Long-tailed weasel	<i>Mustela frenata</i>
Mazama pocket gopher	<i>Thomomys mazama</i>
Mink	<i>Mustela vison</i>
Mountain beaver	<i>Aplodontia rufa</i>
Mountain goat	<i>Oreamnos americanus</i>
Mule deer	<i>Odocoileus hemionus hemionus</i>
Nuttall's cottontail	<i>Sylvilagus nuttallii</i>
Pacific fisher	<i>Martes pennanti</i>
Pallid bat	<i>Antrozous pallidus</i>
Raccoon	<i>Procyon lotor</i>
Red fox	<i>Vulpes vulpes</i>
River otter	<i>Lutra canadensis</i>
Rocky Mountain elk	<i>Cervus elaphus nelsoni</i>
Roosevelt elk	<i>Cervus elaphus roosevelti</i>
Silver-haired bat	<i>Lasionycteris noctivagans</i>
Small-footed myotis	<i>Myotis ciliolabrum</i>
Snowshoe hare	<i>Lepus americanus</i>
Spotted skunk	<i>Spilogale gracilis</i>
Striped skunk	<i>Mephitis mephitis</i>
Townsend's big-eared bat	<i>Plecotus townsendii</i>
Townsend's ground squirrel	<i>Spermophilus townsendii</i>
Virginia opossum	<i>Didelphis virginiana</i>
Wolverine	<i>Gulo gulo</i>
Yuma myotis	<i>Myotis yumanensis</i>
<b>MARINE MAMMALS</b>	
Beluga whale	<i>Delphinapterus leucas</i>
Blue whale	<i>Balaenoptera musculus</i>
Bowhead whale	<i>Balaena mysticetus</i>



Common Name	Scientific Name
California gray whale	<i>Eschrichtius robustus</i>
California sea lion	<i>Zalophus californianus</i>
Dall's porpoise	<i>Phocoenoides dalli</i>
Finback whale	<i>Balaenoptera physalus</i>
Harbor porpoise	<i>Phocoenoides phocoena</i>
Humpback whale	<i>Megaptera novaeangliae</i>
Killer whale (orca)	<i>Orcinus orca</i>
Minke whale	<i>Balaenoptera acutorostrata</i>
Northern elephant seal	<i>Mirounga angustirostris</i>
Northern fur seal	<i>Callorhinus ursinus</i>
Northern right whale	<i>Eubalaena glacialis</i>
Northern right whale dolphin	<i>Lissodelphis borealis</i>
Northern sea lion	<i>Eumetopias jubatus</i>
Northern sea otter	<i>Enhydra lutris kenyonii</i>
Pacific harbor seal	<i>Phoca vitulina</i>
Pacific white sided dolphin	<i>Lagenorhynchus obliquidens</i>
Risso's dolphin	<i>Grampus griseus</i>
Sei whale	<i>Balaenoptera borealis</i>
Sperm whale	<i>Physeter macrocephalus</i>
Steller sea lion	<i>Eumetopias jubatus</i>

## **Appendix E**

# **Air Quality Emissions Calculations and Effects Analysis**





## AIR QUALITY EMISSIONS CALCULATIONS AND EFFECTS ANALYSIS

Air quality impacts from the 160<sup>th</sup> SOAR Proposed Action and alternatives were evaluated in accordance with federal, state, and local air pollution standards and regulations based on pollutant emissions analysis. Air emissions were estimated for baseline conditions (Alternative A – No Action) and compared with emissions that would result from Alternative B (Proposed Action - Publish New Routes/Extend Existing Routes) and Alternative C (Use Existing Routes).

### E.1 Air Quality Standards and Impact Methodology

In the following section and tables, volatile organic compounds (VOC) are precursors to the formation of ozone in the atmosphere; nitrogen oxides (NO<sub>x</sub>) include NO<sub>2</sub> and other related compounds; and sulfur oxides (SO<sub>x</sub>) include SO<sub>2</sub> and other related compounds. Because VOCs and NO<sub>x</sub> are precursors to the formation of ozone in the atmosphere, control of these pollutants is the primary method of reducing ozone concentrations in the atmosphere. The emissions of particulate matter were calculated based on emission factors for total suspended particulates (i.e., particulates that are less than 30 microns in diameter), which includes PM<sub>10</sub> (particulate matter less than 10 microns in diameter) and PM<sub>2.5</sub> (particulate matter less than 2.5 microns in diameter) as components. Because the NAAQS are for PM<sub>10</sub> and PM<sub>2.5</sub>, all particulates are conservatively assumed to be PM<sub>10</sub>.

Although not a health-based pollutant impact, emissions of carbon dioxide (CO<sub>2</sub>) have been determined to contribute to a global phenomenon of warming linked to climate change. This analysis does not present a detailed discussion of climate change, but does quantify CO<sub>2</sub> emissions associated with the project and evaluates these impacts relative to baseline conditions (Alternative A).

#### E.1.1 Significance Thresholds

For federal projects, significance of the Proposed Action is based on compliance with both the NAAQS and the General Conformity Rule by regional air basin.

*Ambient Air Quality Standards.* Air quality impacts from a proposed activity or action would be significant if they:

- increase ambient air pollutant concentrations above any NAAQS;
- contribute to an existing violation of any NAAQS;
- interfere with or delay timely attainment of NAAQS; or
- impair visibility within any federally-mandated Class I area.

As described in Section 3, the Clean Air Act established Prevention of Significant Deterioration (PSD) regulations to protect the air quality in regions that already meet the NAAQS. Certain national parks, monuments, and wilderness areas have been designated as PSD Class I areas, where appreciable deterioration in air quality is considered significant. The closest PSD Class I areas to the airspaces potentially affected by



the Proposed Action include the Goat Rocks Wilderness in Lewis and Yakima counties, Washington, and the Mount Adams Wilderness in Skamania and Yakima counties, Washington. In both areas, air quality-related values include the effect of nitrogen deposition on the pH in lakes and the effect of atmospheric ozone concentrations on conifers. Because the Proposed Action does not involve creation or modification of any new stationary sources, the PSD requirements do not apply. The level of increased emissions and ground-level impacts were used, however, to qualitatively assess potential impairments to visibility in federal Class I areas.

*Federal Conformity.* Under the General Conformity Rule of the Clean Air Act, Section 176(c), the U.S. Environmental Protection Agency (USEPA) established certain statutory requirements for federal agencies with proposed federal activities to demonstrate conformity of the proposed activities with the State Implementation Plan for attainment of the NAAQS. Certain actions are exempted from conformity determinations, while others are presumed to conform if the total project emissions are below *de minimis* levels and less than ten percent of the regional emissions inventory.

The region potentially affected by the Proposed Action and alternatives is in attainment with NAAQS for all pollutants, with the exception of a portion of Pierce County, Washington designated as nonattainment for PM<sub>2.5</sub>, a portion of Lane County, Oregon designated as nonattainment for PM<sub>10</sub>, and another portion of Lane County, Oregon designated as nonattainment for PM<sub>10</sub> and PM<sub>2.5</sub>. Emission thresholds for federal actions within these nonattainment areas are 100 tons per year for each pollutant. Several parts of the region are so-called maintenance areas, defined as areas that were previously nonattainment areas but have since been redesignated as attainment areas. In order to maintain continued attainment with the NAAQS, these areas are subject to general conformity thresholds of 100 tons per year for each pollutant that was formerly designated as nonattainment (71 FR 40420, 17 July 2006). Within the project area, maintenance areas include portions of the south Puget Sound region near JBLM (ozone, CO, PM); the Portland, Oregon/Vancouver, Washington urban area (ozone, CO); the Yakima, Washington area (CO and PM); the Eugene/Springfield, Oregon urban area (CO); and the Salem/Keizer, Oregon urban area (CO and ozone).

The airspaces potentially affected by Alternatives B and C span a large area over 31 counties in Washington and Oregon. The potential effects on air quality, however, would typically be confined within each particular air basin in which the emissions occur. Federal regulations delineate air basins in terms of Air Quality Control Regions (AQCR), as defined in 40 Code of Federal Regulations [CFR] 81. For the analysis of air emissions, each air refueling route and training area (as well as the approach route to each airspace, where applicable) was subdivided by AQCR. Emissions across all training activities were summed within each AQCR to determine the total air quality impact within each air basin. Specifically, the proposed aircraft operational changes will occur in the following six regions:

- AQCR 190, Central Oregon Intrastate, as defined in 40 CFR 81.219, including Deschutes, Jefferson, Hood River, and Wasco counties in Oregon.
- AQCR 192, Northwest Oregon Intrastate, Oregon, as defined in 40 CFR 81.249, including Clatsop County in Oregon.



- AQCR 193, Portland Interstate, Oregon and Washington, as defined in 40 CFR 81.51, including Clackamas, Columbia, Lane, Linn, Marion, Multnomah, Washington, Yamhill counties in Oregon; and Clark, Cowlitz, and Lewis counties in Washington.
- AQCR 228, Olympic-Northwestern Washington, as defined in 40 CFR 81.187, including Grays Harbor, Jefferson, Mason, Pacific, and Thurston counties in Washington.
- AQCR 229, Puget Sound, Washington, as defined in 40 CFR 81.32, including Pierce County in Washington.
- AQCR 230, South Central Washington, as defined in 40 CFR 81.189, including Klickitat, Skamania, and Yakima counties in Washington.

Airspaces located over the ocean are not classified as being in any particular AQCR and are grouped into a single category, designated “ocean.”

### **E.1.2 Air Emission Source Categories**

Air emissions are generated through a wide range of source activities, and include construction emissions, operational emissions, indirect emissions, and aircraft emissions. Where applicable, source categories and emission rates are described below.

*Construction Emissions.* No construction activities are proposed under either Alternative B or Alternative C.

*Operational Emissions.* Operational activities as related to air quality typically include stationary sources, such as boilers, engines, fuel storage and dispensing, and aircraft maintenance activities; and mobile sources, such as on-base automobiles, aircraft, aerospace ground support equipment, and commuting via personal vehicles to and from the base. Aside from the proposed changes in the locations of aircraft training activities, which are outlined below, no additions or modifications to current stationary or mobile source emissions are proposed under either Alternative B or Alternative C.

*Indirect Emissions.* Federal actions that would create changes in the number of personnel at a base or traffic patterns surrounding a base, including commuter traffic, are classified as indirect air emissions. No changes to activities contributing to indirect air emissions are proposed under either Alternative B or Alternative C.

*Aircraft Emissions.* Emissions from aircraft are generated by flying and refueling operations. Flying operations proposed under each alternative include shifts in the locations of current aircraft training activities from JBLM and JBLM-YTC to the various existing and proposed airspaces. For the purposes of emission calculations, it was assumed that two-thirds of the aircraft operations considered under Alternatives B and C are currently occurring at JBLM, with the remaining one-third of aircraft operations considered under Alternatives B and C occurring at JBLM-YTC. The emission estimates here include only those flying activities that would occur along published routes and possible flight paths to and from the published routes.

Aircraft emissions from these operations were calculated using engine data, engine emission factors, and time in mode data from *Calculations Procedures for Emission Inventory Preparation, Volume IV: Mobile Sources*



(USEPA 1992), *Aircraft/Auxiliary Power Units/Aerospace Ground Support Equipment Emission Factors* (Wade 2002), and *Air Emissions Inventory Guidance Document for Mobile Sources at Air Force Installations* (O'Brien and Wade 2003). The calculations were performed under the assumption that aircraft would fly within the air refueling routes at 105 to 115 nm/hr (121 to 132 miles/hr) during the entire sortie.

Although spills of fuel during aircraft refueling operations are rare (the 160<sup>th</sup> SOAR has experienced only three, worldwide, since 1972), the emissions of air pollutants resulting from a fuel spill incident have been addressed. According to the 160<sup>th</sup> SOAR, the maximum amount of fuel that could be spilled during a refueling exercise is the 34 gallons that would be present in the connecting hose between the C-130 and the helicopter. A spill incident would shut down the training activity, so 34 gallons would be the maximum amount of fuel released during a training exercise. Assuming a very unrealistic scenario of 60 fuel spills per year, a fuel density of approximately 7 pounds per gallon, and the evaporation of all spilled fuel into the atmosphere as VOC, the maximum annual emissions from spills during air refueling activities would be 7.1 tons of VOC per year.

No additional takeoffs and landings, low-approach or touch-and-go operations, aircraft flying hours, or aircraft maintenance or related activities are being proposed under either Alternative B or Alternative C.

## **E.2 Air Quality Impact Analysis**

Air impacts were evaluated by calculating emission estimates for Alternative B and Alternative C, and comparing these with emission estimates for baseline conditions (No Action). Because the No Action alternative does not change emissions, air impacts for Alternatives A and B were calculated as the net change in emissions for each of the six air quality regions (including ocean) potentially affected by the alternatives.

### **E.2.1 Alternative B**

Alternative B includes the use of five aircraft refuel routes (1, 2, 3, AR304, and AR305), a low-level training area, and a terrain-following/multi-mode radar (TF/MMR) route. Because activities in these airspaces would replace current aircraft flying activities within JBLM and JBLM-YTC, no additional landings and take-offs (LTOs) would occur under this alternative. Aircraft emissions from flying operations would be redistributed from their current locations to the proposed routes and training area.

Under Alternative B, the 160<sup>th</sup> SOAR would conduct 50 training activities per year along each of the five aircraft refueling routes. Each training activity would involve a maximum of nine MH-47 Chinook or MH-60 Blackhawk helicopters, or any combination thereof, and one fixed-wing C-130 Hercules tanker. The C-130 would originate from a location other than JBLM, and only its activities within the refuel route are considered here (i.e., emissions from LTO operations and the approach of the C-130 from its origin to the refuel route were not quantified). Helicopter operations include an LTO at JBLM, approach to the refuel route, and flying activities within the refuel route. Training activities within the refuel route were assumed to last a maximum of 3 hours.



Low-level training operations under Alternative B would occur a maximum of 60 times per year and would include a maximum of two MH-47 Chinook or MH-60 Blackhawk helicopters, or one of each type of helicopter, and no fixed-wing aircraft. During each training operation, the two helicopters would fly for 3 hours within the proposed low-level training area located 27 miles south of JBLM (at its closest point) in Lewis, Skamania, and Yakima counties in Washington. Each training activity would include up to ten LTOs within the low-level training area in addition to the LTO at the aircraft's point of origin, either JBLM or JBLM-YTC.

Terrain-following/multi-mode radar operations would occur a maximum of 60 times per year and would involve a maximum of two MH-47 Chinook or MH-60 Blackhawk helicopters, or any combination thereof, and no fixed-wing aircraft. The TF/MMR operation would consist of helicopters flying for 2 hours between JBLM and JBLM-YTC, taking off from one location and landing at the other. Each training event is a one-way trip between the installations.

Emissions from the aircraft under Alternative B were compared to baseline emissions within each AQCR to assess the impact of the Proposed Action on air quality within each air basin. Table D.1 shows the changes in aircraft emissions that would occur in each air basin, compared to baseline conditions, if Alternative B were to be implemented.

**Table E.1 – Change in Aircraft Emissions, Baseline versus Alternative B**

AQCR	CO	VOC	NOx	SOx	PM*	CO <sub>2</sub>
	(tons/year)					
190	5	3	37	2	3	11,251
192	0	0	0	0	0	0
193	17	11	85	5	8	26,776
228	1	1	9	1	1	2,837
229	(14)	(10)	(102)	(6)	(9)	(31,355)
230	(17)	(10)	(82)	(5)	(8)	(25,628)
Ocean	7	5	53	3	5	16,121
<b>Total**</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
Note: Numbers in parentheses indicate reductions in emissions within an air basin. * PM indicates total particulate matter and is used to estimate PM <sub>10</sub> and PM <sub>2.5</sub> emissions. ** Net emission changes are zero in all cases. Source: ENSR 2008.						

Emissions of criteria pollutants and CO<sub>2</sub> would decrease in AQCRs 229 and 230 as a result of aircraft operations being transferred away from JBLM and JBLM-YTC. Emissions would increase in the other AQCRs, which are located south and west of JBLM and JBLM-YTC. The largest increases would occur in AQCR 193, which includes the city of Portland, Oregon. The increases would not exceed the conformity thresholds of 100 tons per year for NOx, VOC, and CO, and would not be expected to have a significant effect on the air quality of these regions.



**E.2.2 Alternative C**

Alternative C includes the use of four aircraft refuel routes (AR626, AR628, AR304, and AR305). Low-level training activities would not change and would continue to occur at JBLM. No TF/MMR training flights would be conducted under Alternative C. Because activities in the refuel routes would replace current aircraft flying activities within JBLM and JBLM-YTC, no increase in LTOs would occur under this alternative. Aircraft emissions from flying operations would be redistributed from their current locations to the proposed routes.

Under Alternative C, the 160<sup>th</sup> SOAR would conduct 60 training activities per year within each of the four aircraft refueling routes. Each training activity would involve a maximum of nine MH-47 Chinook or MH-60 Blackhawk helicopters, or any combination thereof, and one fixed-wing C-130 Hercules tanker. The C-130 would originate from a location other than JBLM, and only its activities within the refuel route are considered here (i.e., emissions from LTO operations and the approach of the C-130 from its origin to the refuel route were not quantified). Helicopter operations include an LTO at JBLM, approach to the refuel route, and flying activities within the refuel route. Training activities within the refuel route were assumed to last a maximum of 3 hours.

Emissions from the aircraft under Alternative C were compared to baseline emissions within each AQCR to assess the impact of the Proposed Action on air quality within each air basin. Table D.2 shows the changes in aircraft emissions that would occur in each air basin, compared to baseline conditions, if Alternative C were to be implemented.

**Table E.2 – Changes in Aircraft Emissions, Baseline vs. Alternative C**

AQCR	CO	VOC	NOx	SOx	PM*	CO2
	(tons/year)					
190	6	4	44	3	4	13,501
192	0	0	1	0	0	170
193	11	8	80	5	7	24,774
228	(3)	(2)	(25)	(2)	(2)	(7,730)
229	(7)	(6)	(74)	(4)	(7)	(22,828)
230	(10)	(7)	(59)	(3)	(5)	(18,355)
Ocean	5	3	34	2	3	10,468
<b>Total**</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

Note: Numbers in parentheses indicate reductions in emissions within an air basin.  
 \* PM indicates total particulate matter and is used to estimate PM<sub>10</sub> and PM<sub>2.5</sub> emissions.  
 \*\* Net emission changes are zero in all cases.  
 Source: ENSR 2008.

Emissions of criteria pollutants and CO<sub>2</sub> would decrease in AQCRs 228, 229, and 230 as a result of aircraft operations being transferred away from JBLM and JBLM-YTC. Emissions would increase in the other AQCRs, which are located south and west of JBLM and JBLM-YTC. The largest increases would occur in



AQCR 193, which includes the city of Portland, Oregon. The increases would not exceed the conformity thresholds of 100 tons per year for NO<sub>x</sub>, VOC, and CO, and would not be expected to have a significant effect on the air quality of these regions.

### **E.3 Conclusions**

The air quality analysis concludes that the predominant source of increased air emissions expected from Alternatives B and C would be the combustion of fuels by aircraft during training sorties through the proposed airspaces within the mixing layer of the atmosphere. Any aircraft use within the airspace potentially affected by the Proposed Action would generate localized changes in CO, NO<sub>x</sub>, PM<sub>10</sub>, SO<sub>x</sub>, and VOC emissions. However, the net effect of the actions under either alternative is that total emissions would not change. Only the distribution of emissions among the various airspaces would change, resulting in decreases in some locations and increases in other locations. Therefore, because the localized increases would not exceed the conformity thresholds of 100 tons per year, the Proposed Action and alternatives would not be expected to have a significant effect on the air quality of these regions.

In addition, because the only impacts would be changes in localized levels of emissions, and there would not be any overall change in CO<sub>2</sub> emissions due to either Alternative B or Alternative C when compared to the No Action Alternative, the project would not be expected to contribute to any increase in global warming.

### **E.4 References**

- ENSR. 2008. Air Quality Calculations for Proposed Off-Post Aviation Operations, 160<sup>th</sup> Special Operations Aviation Regiment. Orange, California.
- O'Brien, J.R., and M.D. Wade. 2003. Air Emissions Inventory Guidance Document for Mobile Sources at Air Force Installations. Air Force Institute for Environment, Safety, and Occupational Health Risk Analysis, Risk Analysis Directorate, Environmental Analysis Division, Brooks City Base, Texas. IERA-RS-BR-SR-2001-0010, Revised December 2003.
- U.S. Environmental Protection Agency. 1992. Procedures for Emission Inventory Preparation, Volume IV: Mobile Sources. EPA-450/4-81-026d (Revised).
- Wade, M.D. 2002. Aircraft/Auxiliary Power Units/Aerospace Ground Support Equipment Emission Factors. Air Force Institute for Environment, Safety, and Occupational Health Risk Analysis, Risk Analysis Directorate, Environmental Analysis Division, Brooks City Base, Texas. IERA-RS-BR-SR-2003-0002, October 2002.

FlLewisEA-AQcalcs.xls  
Fort Lewis EFs

Aircraft	Type	Engine	No. Eng.
CH-47	Helicopter	T64-415	2
CH-60	Helicopter	T700-GE-700	2
C-130H	Transport	T58-A-15	4

Engine	Reference
CH-47	AWST (1992), p. 98
CH-60	Wade (2002), p. 9
C-130H	Wade (2002), p. 6

EF	Reference
CH-47	EPA (1992), p. 185
CH-60	Wade (2002), p.43; SOx:USAF/IERA (2002) p. 25,51 (WA,OR)
C-130H	Wade (2002), p.44; SOx:USAF/IERA (2002) p. 25,51 (WA,OR)

Aircraft Emissions - Sorties (Military Mode)

	(lb/hr)						
	Fuel	CO	VOC	NOx	SOx	PM	CO2
CH-47	3831.6	4.94	1.07	38.28	2.07	3.83	12069.54
CH-60	1412.0	0.70	4.36	12.16	1.36	3.68	4447.8
C-130H	9824.0	17.40	2.76	112.20	9.43	5.28	30945.6

Aircraft Emissions - LTOs

	(lb/LTO)						
	Fuel	CO	VOC	NOx	SOx	PM	CO2
CH-47	907.0	11.26	3.44	7.36	0.49	0.91	2857.1004
CH-60	360.0	3.68	4.77	2.66	0.35	0.81	1134.105
C-130H	1640.8	28.80	18.13	9.84	1.12	1.92	5168.6712

Aircraft Emissions - TGOs

	(lb/TGO)						
	Fuel	CO	VOC	NOx	SOx	PM	CO2
CH-47	772.6	1.27	0.17	7.08	0.42	0.77	2433.7404
CH-60	293.5	0.15	1.00	2.47	0.28	0.71	924.63
C-130H	686.8	1.66	0.32	6.53	0.66	1.22	2163.5712

<http://www.eia.doe.gov/oiat/1605/coefficients.html>

Spills  
34 gal/spill  
1 spill/training  
1 trainings/yr  
7 lb/gal  
2000 lb/ton  
0.119 tons VOC/yr

Baseline  
Sum of all routes and areas.  
All occurring on post.  
2/3 on Ft. Lewis  
1/3 on YTC

Aircraft	Approach hr/year	Fuel	CO	VOC	NOx	SOx	PM	CO2
		tons/year						
CH-47	3499	6702.9	8.6	1.9	67.0	3.6	6.7	21114.2
CH-60	3499	2470.1	1.2	7.6	21.3	2.4	6.4	7780.9
C-130	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<b>Total</b>	<b>3499</b>	<b>6702.9</b>	<b>8.6</b>	<b>7.6</b>	<b>67.0</b>	<b>3.6</b>	<b>6.7</b>	<b>21114.2</b>

AQCR	On-Post
190	0
192	0
193	0
228	22
229	44
230	33
Ocean	0

AQCR	Hours	Fuel	CO	VOC	NOx	SOx	PM	CO2
190	0	0	0	0	0	0	0	0
192	0	0	0	0	0	0	0	0
193	0	0	0	0	0	0	0	0
228	777	1489	2	2	15	1	1	4692
229	1555	2979	4	3	30	2	3	9385
230	1166	2234	3	3	22	1	2	7037
Ocean	0	0	0	0	0	0	0	0
<b>Total</b>	<b>3499</b>	<b>6703</b>	<b>9</b>	<b>8</b>	<b>67</b>	<b>4</b>	<b>7</b>	<b>21114</b>

Aircraft	Training hr/year	Fuel	CO	VOC	NOx	SOx	PM	CO2
		tons/year						
CH-47	7350	14081.1	18.2	3.9	140.7	7.6	14.1	44355.6
CH-60	7350	5189.1	2.6	16.0	44.7	5.0	13.5	16345.7
C-130	750	3684.0	6.5	1.0	42.1	3.5	2.0	11604.6
<b>Total</b>	<b>8100</b>	<b>17765.1</b>	<b>24.7</b>	<b>17.1</b>	<b>182.7</b>	<b>11.1</b>	<b>16.1</b>	<b>55960.2</b>

AQCR	On-Post
190	0
192	0
228	22
229	44
230	33
Ocean	0

AQCR	Hours	Fuel	CO	VOC	NOx	SOx	PM	CO2
190	0	0	0	0	0	0	0	0
192	0	0	0	0	0	0	0	0
228	1800	3948	5	4	41	2	4	12435
229	3600	7896	11	8	81	5	7	24874
230	2700	5921	8	6	61	4	5	18652
Ocean	0	0	0	0	0	0	0	0
<b>Total</b>	<b>8100</b>	<b>17765</b>	<b>25</b>	<b>17</b>	<b>183</b>	<b>11</b>	<b>16</b>	<b>55960</b>

Aircraft	LTO #/year
CH-47	3690
CH-60	3690
C-130	0
<b>Total</b>	<b>3690</b>

Fuel	CO	VOC	NOx	SOx	PM	CO2
tons/year						
1673.4	20.8	6.3	13.6	0.9	1.7	5271.4
664.3	6.8	8.8	4.9	0.6	1.5	2092.4
0.0	0.0	0.0	0.0	0.0	0.0	0.0
<b>1673.4</b>	<b>20.8</b>	<b>8.8</b>	<b>13.6</b>	<b>0.9</b>	<b>1.7</b>	<b>5271.4</b>

AQCR	On-Post
190	0
192	0
193	0
228	0
229	67
230	33
Ocean	0

AQCR	LTO
190	0
192	0
193	0
228	0
229	2460
230	1230
Ocean	0
<b>Total</b>	<b>3690</b>

Fuel	CO	VOC	NOx	SOx	PM	CO2
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
1116	14	6	9	1	1	3514
558	7	3	5	0	1	1757
0	0	0	0	0	0	0
<b>1673</b>	<b>21</b>	<b>9</b>	<b>14</b>	<b>1</b>	<b>2</b>	<b>5271</b>

Totals 15289 26141 54 33 263 16 24 82346

AQCR Summary	LTO	Hours	Fuel	CO	VOC	NOx	SOx	PM	CO2
190	0	0	0	0	0	0	0	0	0
192	0	0	0	0	0	0	0	0	0
193	0	0	0	0	0	0	0	0	0
228	0	2577	5437	7	5	55	3	5	17127
229	2460	5156	11991	29	17	120	7	11	37773
230	1230	3866	8713	18	11	88	5	8	27446
Ocean	0	0	0	0	0	0	0	0	0
<b>Total</b>	<b>3690</b>	<b>11599</b>	<b>26141</b>	<b>54</b>	<b>33</b>	<b>263</b>	<b>16</b>	<b>24</b>	<b>82346</b>

	Tons per Year							Car years
	Fuel	CO	VOC	NOx	SOx	PM	CO2	
AR-1	3850	8	5	39	2	4	12129	2581
AR-2	4540	8	5	46	3	4	14302	3043
AR-3	3850	8	5	39	2	4	12129	2581
AR-304	5898	10	7	60	3	6	18579	3953
AR-305	5855	10	7	59	3	6	18443	3924
LLTR	1633	9	4	15	1	2	5144	1095
TF-MMR	514	1	1	5	0	1	1620	345
<b>TOTAL</b>	<b>26141</b>	<b>54</b>	<b>33</b>	<b>263</b>	<b>16</b>	<b>24</b>	<b>82346</b>	<b>17520</b>

All B				Tons per Year					
AQCR Summary	LTO	MTR Hours	Fuel	CO	VOC	NOx	SOx	PM	CO2
190	0	1630	3572	5	3	37	2	3	11251
192	0	0	0	0	0	0	0	0	0
193	1200	3888	8500	17	11	85	5	8	26776
228	0	2996	6338	9	6	65	4	6	19963
229	2430	488	2037	15	7	18	1	2	6418
230	60	287	577	1	1	6	0	1	1817
Ocean	0	2310	5118	7	5	53	3	5	16121
<b>Total</b>	<b>3690</b>	<b>11599</b>	<b>26141</b>	<b>54</b>	<b>33</b>	<b>263</b>	<b>16</b>	<b>24</b>	<b>82346</b>

Baseline				Tons per Year					
AQCR Summary	LTO	MTR Hours	Fuel	CO	VOC	NOx	SOx	PM	CO2
192	0	0	0	0	0	0	0	0	0
193	0	0	0	0	0	0	0	0	0
228	0	2577	5437	7	5	55	3	5	17127
229	2460	5156	11991	29	17	120	7	11	37773
230	1230	3866	8713	18	11	88	5	8	27446
Ocean	0	0	0	0	0	0	0	0	0
<b>Total</b>	<b>3690</b>	<b>11599</b>	<b>26141</b>	<b>54</b>	<b>33</b>	<b>263</b>	<b>16</b>	<b>24</b>	<b>82346</b>

Difference All B minus Baseline				Tons per Year					
AQCR Summary	LTO	MTR Hours	Fuel	CO	VOC	NOx	SOx	PM	CO2
190	0	1630	3572	5	3	37	2	3	11251
192	0	0	0	0	0	0	0	0	0
193	1200	3888	8500	17	11	85	5	8	26776
228	0	419	900	1	1	9	1	1	2837
229	(30)	(4667)	(9954)	(14)	(10)	(102)	(6)	(9)	(31355)
230	(1170)	(3579)	(8136)	(17)	(10)	(82)	(5)	(8)	(25628)
Ocean	0	2310	5118	7	5	53	3	5	16121
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

Baseline (Alt C)  
Sum of all routes and areas.  
All occurring on post.  
2/3 on Fl. Lewis  
1/3 on YTC

Aircraft		Approach	Fuel	CO	VOC	NOx	SOx	PM	CO2
CH-47		hr/year	tons/year						
CH-47		3461	6629.6	8.6	1.9	66.2	3.6	6.6	20883.3
CH-60		3461	2443.1	1.2	7.5	21.0	2.3	6.4	7695.8
C-130		0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<b>Total</b>		<b>3461</b>	<b>6629.6</b>	<b>8.6</b>	<b>7.5</b>	<b>66.2</b>	<b>3.6</b>	<b>6.6</b>	<b>20883.3</b>

AQCR	On-Post	AQCR	Hours	Fuel	CO	VOC	NOx	SOx	PM	CO2
190	0	190	0	0	0	0	0	0	0	0
192	0	192	0	0	0	0	0	0	0	0
193	0	193	0	0	0	0	0	0	0	0
228	22	228	769	1473	2	2	15	1	1	4641
229	44	229	1538	2947	4	3	29	2	3	9282
230	33	230	1153	2210	3	3	22	1	2	6960
Ocean	0	Ocean	0	0	0	0	0	0	0	0
		<b>Total</b>	<b>3461</b>	<b>6630</b>	<b>9</b>	<b>8</b>	<b>66</b>	<b>4</b>	<b>7</b>	<b>20883</b>

Aircraft		Training	Fuel	CO	VOC	NOx	SOx	PM	CO2
CH-47		hr/year	tons/year						
CH-47		4590	8793.5	11.3	2.5	87.8	4.7	8.8	27699.6
CH-60		4590	3240.5	1.6	10.0	27.9	3.1	8.4	10207.7
C-130		510	2505.1	4.4	0.7	28.6	2.4	1.3	7891.1
<b>Total</b>		<b>5100</b>	<b>11298.6</b>	<b>15.8</b>	<b>10.7</b>	<b>116.5</b>	<b>7.2</b>	<b>10.1</b>	<b>35590.7</b>

AQCR	On-Post	AQCR	Hours	Fuel	CO	VOC	NOx	SOx	PM	CO2
190	0	190	0	0	0	0	0	0	0	0
192	0	192	0	0	0	0	0	0	0	0
228	22	228	1133	2511	4	2	26	2	2	7909
229	44	229	2267	5022	7	5	52	3	5	15820
230	33	230	1700	3766	5	4	39	2	3	11862
Ocean	0	Ocean	0	0	0	0	0	0	0	0
		<b>Total</b>	<b>5100</b>	<b>11299</b>	<b>16</b>	<b>11</b>	<b>116</b>	<b>7</b>	<b>10</b>	<b>35591</b>

Aircraft		LTO	Fuel	CO	VOC	NOx	SOx	PM	CO2
CH-47		#/year	tons/year						
CH-47		1530	693.9	8.6	2.6	5.6	0.4	0.7	2185.7
CH-60		1530	275.4	2.8	3.6	2.0	0.3	0.6	867.6
C-130		0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<b>Total</b>		<b>1530</b>	<b>693.9</b>	<b>8.6</b>	<b>3.6</b>	<b>5.6</b>	<b>0.4</b>	<b>0.7</b>	<b>2185.7</b>

AQCR	On-Post	AQCR	LTO	Fuel	CO	VOC	NOx	SOx	PM	CO2
190	0	190	0	0	0	0	0	0	0	0
192	0	192	0	0	0	0	0	0	0	0
193	0	193	0	0	0	0	0	0	0	0
228	0	228	0	0	0	0	0	0	0	0
229	67	229	1020	463	6	2	4	0	0	1457
230	33	230	510	231	3	1	2	0	0	728
Ocean	0	Ocean	0	0	0	0	0	0	0	0
		<b>Total</b>	<b>1530</b>	<b>694</b>	<b>9</b>	<b>4</b>	<b>6</b>	<b>0</b>	<b>1</b>	<b>2186</b>

Totals 8561 18622 33 22 188 11 17 58660

AQCR Summary	LTO	Hours	Fuel	CO	VOC	NOx	SOx	PM	CO2
190	0	0	0	0	0	0	0	0	0
192	0	0	0	0	0	0	0	0	0
193	0	0	0	0	0	0	0	0	0
228	0	1902	3984	5	4	41	2	4	12549
229	1020	3805	8432	17	11	85	5	8	26559
230	510	2853	6207	11	7	63	4	6	19551
Ocean	0	0	0	0	0	0	0	0	0
<b>Total</b>	<b>1530</b>	<b>8561</b>	<b>18622</b>	<b>33</b>	<b>22</b>	<b>188</b>	<b>11</b>	<b>17</b>	<b>58660</b>

FlLewisEA-AQcalcs.xls  
All C Totals

	Tons per Year							Car years
	Fuel	CO	VOC	NOx	SOx	PM	CO2	
AR-304	7078	12	8	72	4	7	22294	4744
AR-305	7026	12	8	71	4	7	22132	4709
AR-626	2593	5	3	26	2	2	8169	1738
AR-628	1925	4	2	20	1	2	6065	1290
<b>TOTAL</b>	<b>18622</b>	<b>33</b>	<b>22</b>	<b>188</b>	<b>11</b>	<b>17</b>	<b>58660</b>	<b>12481</b>

All C

AQCR Summary	LTO	MTR Hours	Tons per Year						
			Fuel	CO	VOC	NOx	SOx	PM	CO2
190	0	1956	4286	6	4	44	3	4	13501
192	0	28	54	0	0	1	0	0	170
193	0	3824	7865	11	8	80	5	7	24774
228	0	799	1530	2	2	15	1	2	4820
229	1530	256	1185	9	4	11	1	1	3732
230	0	198	380	0	0	4	0	0	1196
Ocean	0	1500	3323	5	3	34	2	3	10468
<b>Total</b>	<b>1530</b>	<b>8560</b>	<b>18622</b>	<b>33</b>	<b>22</b>	<b>188</b>	<b>11</b>	<b>17</b>	<b>58660</b>

Baseline

AQCR Summary	LTO	MTR Hours	Tons per Year						
			Fuel	CO	VOC	NOx	SOx	PM	CO2
192	0	0	0	0	0	0	0	0	0
193	0	0	0	0	0	0	0	0	0
228	0	1902	3984	5	4	41	2	4	12549
229	1020	3805	8432	17	11	85	5	8	26559
230	510	2853	6207	11	7	63	4	6	19551
Ocean	0	0	0	0	0	0	0	0	0
<b>Total</b>	<b>1530</b>	<b>8561</b>	<b>18622</b>	<b>33</b>	<b>22</b>	<b>188</b>	<b>11</b>	<b>17</b>	<b>58660</b>

Difference All C minus Baseline

AQCR Summary	LTO	MTR Hours	Tons per Year						
			Fuel	CO	VOC	NOx	SOx	PM	CO2
190	0	1956	4286	6	4	44	3	4	13501
192	0	28	54	0	0	1	0	0	170
193	0	3824	7865	11	8	80	5	7	24774
228	0	(1104)	(2454)	(3)	(2)	(25)	(2)	(2)	(7730)
229	510	(3549)	(7247)	(7)	(6)	(74)	(4)	(7)	(22828)
230	(510)	(2655)	(5827)	(10)	(7)	(59)	(3)	(5)	(18355)
Ocean	0	1500	3323	5	3	34	2	3	10468
<b>Total</b>	<b>0</b>	<b>(0)</b>	<b>(0)</b>	<b>(0)</b>	<b>(0)</b>	<b>(0)</b>	<b>(0)</b>	<b>(0)</b>	<b>(0)</b>

APPROACH		Alt B							Alt C				No Action	
State	AQCR	AR-1	AR-2	AR-3	AR-304	AR-305	TF/MMR	LLTA	AR-304	AR-305	AR-626	AR-628	LLTA	On-Post
OR	190					11				11				
OR	192										33			
Both	193				81	54		25	81	54		33		
WA	228	50	93	50	17	6		25	17	6	100	33		22
WA	229	50	7	50	2	16		25	2	16				44
WA	230					14		25		14				33
Ocean	Ocean													
Total	Pcts	100	100	100	100	100	0	100	100	101	100	100	0	100

TRAINING		Alt B							Alt C				No Action	
State	AQCR	AR-1	AR-2	AR-3	AR-304	AR-305	TF/MMR	LLTA	AR-304	AR-305	AR-626	AR-628	LLTA	On-Post
OR	190					100				100				
OR	192													
Both	193			13	100		52	100	100					
WA	228	63	14	56			6						22	22
WA	229						10						44	44
WA	230						32						33	33
Ocean	Ocean	37	86	31							100	100		
Total	Pcts	100	100	100	100	100	100	100	100	100	100	100	100	100

LTO's		Alt B							Alt C				No Action	
State	AQCR	AR-1	AR-2	AR-3	AR-304	AR-305	TF/MMR	LLTA	AR-304	AR-305	AR-626	AR-628	LLTA	On-Post
OR	190													
OR	192													
WA	228													
WA	229	100	100	100	100	100	50	9	100	100	100	100	67	67
WA	230						50						33	33
Ocean	Ocean													
Total	Pcts	100	100	100	100	100	100	100	100	100	100	100	100	100

AR-1

Route Length (nmi) 101  
Minimum Altitude (ft-AGL)  
Distance from Ft. Lewis 15  
Training Duration (hr) 3  
Trainings per Year 50  
CH-47 per Training (max) 9  
CH-60 per Training (max) 1  
C-130 per Training (max) 9  
Air Speed (knots)- min 80  
LTO per Training 1

Aircraft	Approach	Fuel	CO	VOC	NOx	SOx	PM	CO2
	hr/year	tons/year						
CH-47	169	323.3	0.4	0.1	3.2	0.2	0.3	1018.4
CH-60	169	119.1	0.1	0.4	1.0	0.1	0.3	375.3
C-130		0.0	0.0	0.0	0.0	0.0	0.0	0.0
<b>Total</b>	<b>169</b>	<b>323.3</b>	<b>0.4</b>	<b>0.4</b>	<b>3.2</b>	<b>0.2</b>	<b>0.3</b>	<b>1018.4</b>

AQCR	AR-1
190	0
192	0
193	0
228	50
229	50
230	0
Ocean	0

AQCR	Hours	Fuel	CO	VOC	NOx	SOx	PM	CO2
190	0	0	0	0	0	0	0	0
192	0	0	0	0	0	0	0	0
193	0	0	0	0	0	0	0	0
228	84	162	0	0	2	0	0	509
229	84	162	0	0	2	0	0	509
230	0	0	0	0	0	0	0	0
Ocean	0	0	0	0	0	0	0	0
<b>Total</b>	<b>169</b>	<b>323</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>1018</b>

Aircraft	Training	Fuel	CO	VOC	NOx	SOx	PM	CO2
	hr/year	tons/year						
CH-47	1350	2586.3	3.3	0.7	25.8	1.4	2.6	8146.9
CH-60	1350	953.1	0.5	2.9	8.2	0.9	2.5	3002.3
C-130	150	736.8	1.3	0.2	8.4	0.7	0.4	2320.9
<b>Total</b>	<b>1500</b>	<b>3323.1</b>	<b>4.6</b>	<b>3.2</b>	<b>34.3</b>	<b>2.1</b>	<b>3.0</b>	<b>10467.9</b>

AQCR	AR-1
190	0
192	0
228	63
229	0
230	0
Ocean	37

AQCR	Hours	Fuel	CO	VOC	NOx	SOx	PM	CO2
190	0	0	0	0	0	0	0	0
192	0	0	0	0	0	0	0	0
228	945	2094	3	2	22	1	2	6595
229	0	0	0	0	0	0	0	0
230	0	0	0	0	0	0	0	0
Ocean	555	1230	2	1	13	1	1	3873
<b>Total</b>	<b>1500</b>	<b>3323</b>	<b>5</b>	<b>3</b>	<b>34</b>	<b>2</b>	<b>3</b>	<b>10468</b>

Aircraft	LTO
#/year	
CH-47	450
CH-60	450
C-130	0
<b>Total</b>	<b>450</b>

Fuel	CO	VOC	NOx	SOx	PM	CO2
tons/year						
204.1	2.5	0.8	1.7	0.1	0.2	642.8
81.0	0.8	1.1	0.6	0.1	0.2	255.2
0.0	0.0	0.0	0.0	0.0	0.0	0.0
<b>204.1</b>	<b>2.5</b>	<b>1.1</b>	<b>1.7</b>	<b>0.1</b>	<b>0.2</b>	<b>642.8</b>

AQCR	AR-1
190	0
192	0
193	0
228	0
229	100
230	0
Ocean	0

AQCR	LTO
190	0
192	0
193	0
228	0
229	450
230	0
Ocean	0
	<b>450</b>

Fuel	CO	VOC	NOx	SOx	PM	CO2
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
204	3	1	2	0	0	643
0	0	0	0	0	0	0
0	0	0	0	0	0	0
<b>204</b>	<b>3</b>	<b>1</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>643</b>

Totals 2119 3850 8 5 39 2 4 12129

AQCR Summary	LTO	Hours	Fuel	CO	VOC	NOx	SOx	PM	CO2
190	0	0	0	0	0	0	0	0	0
192	0	0	0	0	0	0	0	0	0
193	0	0	0	0	0	0	0	0	0
228	0	1029	2255	3	2	23	1	2	7104
229	450	84	366	3	1	3	0	0	1152
230	0	0	0	0	0	0	0	0	0
Ocean	0	555	1230	2	1	13	1	1	3873
<b>Total</b>	<b>450</b>	<b>1669</b>	<b>3850</b>	<b>8</b>	<b>5</b>	<b>39</b>	<b>2</b>	<b>4</b>	<b>12129</b>

AR-2  
Route Length (nmi) 137  
Minimum Altitude (ft-AGL)  
Distance from Ft. Lewis 47  
Training Duration (hr) 3  
Trainings per Year 50  
CH-47 per Training (max) 9  
CH-60 per Training (max) 9  
C-130 per Training (max) 1  
Air Speed (knots)- min 80  
LTO per Training 1

Aircraft	Approach hr/year	Fuel	CO	VOC	NOx	SOx	PM	CO2
<b>CH-47</b>	529	1013.0	1.3	0.3	10.1	0.5	1.0	3190.9
<b>CH-60</b>	529	373.3	0.2	1.2	3.2	0.4	1.0	1175.9
<b>C-130</b>		0.0	0.0	0.0	0.0	0.0	0.0	0.0
<b>Total</b>	<b>529</b>	<b>1013.0</b>	<b>1.3</b>	<b>1.2</b>	<b>10.1</b>	<b>0.5</b>	<b>1.0</b>	<b>3190.9</b>

AQCR	AR-2	Hours	Fuel	CO	VOC	NOx	SOx	PM	CO2
190	0	0	0	0	0	0	0	0	0
192	0	0	0	0	0	0	0	0	0
193	0	0	0	0	0	0	0	0	0
228	93	492	942	1	1	9	1	1	2968
229	7	37	71	0	0	1	0	0	223
230	0	0	0	0	0	0	0	0	0
Ocean	0	0	0	0	0	0	0	0	0
<b>Total</b>		<b>529</b>	<b>1013</b>	<b>1</b>	<b>1</b>	<b>10</b>	<b>1</b>	<b>1</b>	<b>3191</b>

Aircraft	Training hr/year	Fuel	CO	VOC	NOx	SOx	PM	CO2
<b>CH-47</b>	1350	2586.3	3.3	0.7	25.8	1.4	2.6	8146.9
<b>CH-60</b>	1350	953.1	0.5	2.9	8.2	0.9	2.5	3002.3
<b>C-130</b>	150	736.8	1.3	0.2	8.4	0.7	0.4	2320.9
<b>Total</b>	<b>1500</b>	<b>3323.1</b>	<b>4.6</b>	<b>3.2</b>	<b>34.3</b>	<b>2.1</b>	<b>3.0</b>	<b>10467.9</b>

AQCR	AR-2	Hours	Fuel	CO	VOC	NOx	SOx	PM	CO2
190	0	0	0	0	0	0	0	0	0
192	0	0	0	0	0	0	0	0	0
228	14	210	465	1	0	5	0	0	1466
229	0	0	0	0	0	0	0	0	0
230	0	0	0	0	0	0	0	0	0
Ocean	86	1290	2858	4	3	29	2	3	9002
<b>Total</b>		<b>1500</b>	<b>3323</b>	<b>5</b>	<b>3</b>	<b>34</b>	<b>2</b>	<b>3</b>	<b>10468</b>

Aircraft	LTO #/year	Fuel	CO	VOC	NOx	SOx	PM	CO2
<b>CH-47</b>	450	204.1	2.5	0.8	1.7	0.1	0.2	642.8
<b>CH-60</b>	450	81.0	0.8	1.1	0.6	0.1	0.2	255.2
<b>C-130</b>	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<b>Total</b>	<b>450</b>	<b>204.1</b>	<b>2.5</b>	<b>1.1</b>	<b>1.7</b>	<b>0.1</b>	<b>0.2</b>	<b>642.8</b>

AQCR	AR-2	LTO	Fuel	CO	VOC	NOx	SOx	PM	CO2
190	0	0	0	0	0	0	0	0	0
192	0	0	0	0	0	0	0	0	0
193	0	0	0	0	0	0	0	0	0
228	0	0	0	0	0	0	0	0	0
229	100	450	204	3	1	2	0	0	643
230	0	0	0	0	0	0	0	0	0
Ocean	0	0	0	0	0	0	0	0	0
<b>Total</b>		<b>450</b>	<b>204</b>	<b>3</b>	<b>1</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>643</b>

Totals 2479 4540 8 5 46 3 4 14302

AQCR Summary	LTO	Hours	Fuel	CO	VOC	NOx	SOx	PM	CO2
190	0	0	0	0	0	0	0	0	0
192	0	0	0	0	0	0	0	0	0
193	0	0	0	0	0	0	0	0	0
228	0	702	1407	2	2	14	1	1	4433
229	450	37	275	3	1	2	0	0	866
230	0	0	0	0	0	0	0	0	0
Ocean	0	1290	2858	4	3	29	2	3	9002
<b>Total</b>	<b>450</b>	<b>2029</b>	<b>4540</b>	<b>8</b>	<b>5</b>	<b>46</b>	<b>3</b>	<b>4</b>	<b>14302</b>

AR-3  
Route Length (nmi) 97  
Minimum Altitude (ft-AGL)  
Distance from Ft. Lewis 15  
Training Duration (hr) 3  
Trainings per Year 50  
CH-47 per Training (max) 9  
CH-60 per Training (max) 9  
C-130 per Training (max) 1  
Air Speed (knots)- min 80  
LTO per Training 1

	Approach	Fuel	CO	VOC	NOx	SOx	PM	CO2	
<b>Aircraft</b>	<b>hr/year</b>	<b>tons/year</b>							
CH-47	169	323.3	0.4	0.1	3.2	0.2	0.3	1018.4	
CH-60	169	119.1	0.1	0.4	1.0	0.1	0.3	375.3	
C-130		0.0	0.0	0.0	0.0	0.0	0.0	0.0	
<b>Total</b>	<b>169</b>	<b>323.3</b>	<b>0.4</b>	<b>0.4</b>	<b>3.2</b>	<b>0.2</b>	<b>0.3</b>	<b>1018.4</b>	

AQCR	AR-3	Hours	Fuel	CO	VOC	NOx	SOx	PM	CO2
190	0	0	0	0	0	0	0	0	0
192	0	0	0	0	0	0	0	0	0
193	0	0	0	0	0	0	0	0	0
228	50	84	162	0	0	2	0	0	509
229	50	84	162	0	0	2	0	0	509
230	0	0	0	0	0	0	0	0	0
Ocean	0	0	0	0	0	0	0	0	0
<b>Total</b>		<b>169</b>	<b>323</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>1018</b>

	Training	Fuel	CO	VOC	NOx	SOx	PM	CO2	
<b>Aircraft</b>	<b>hr/year</b>	<b>tons/year</b>							
CH-47	1350	2586.3	3.3	0.7	25.8	1.4	2.6	8146.9	
CH-60	1350	953.1	0.5	2.9	8.2	0.9	2.5	3002.3	
C-130	150	736.8	1.3	0.2	8.4	0.7	0.4	2320.9	
<b>Total</b>	<b>1500</b>	<b>3323.1</b>	<b>4.6</b>	<b>3.2</b>	<b>34.3</b>	<b>2.1</b>	<b>3.0</b>	<b>10467.9</b>	

AQCR	AR-3	Hours	Fuel	CO	VOC	NOx	SOx	PM	CO2
190	0	0	0	0	0	0	0	0	0
192	0	0	0	0	0	0	0	0	0
228	56	840	1861	3	2	19	1	2	5862
229	0	0	0	0	0	0	0	0	0
230	0	0	0	0	0	0	0	0	0
Ocean	31	465	1030	1	1	11	1	1	3245
<b>Total</b>		<b>1500</b>	<b>3323</b>	<b>5</b>	<b>3</b>	<b>34</b>	<b>2</b>	<b>3</b>	<b>10468</b>

	LTO	Fuel	CO	VOC	NOx	SOx	PM	CO2	
<b>Aircraft</b>	<b>#/year</b>	<b>tons/year</b>							
CH-47	450	204.1	2.5	0.8	1.7	0.1	0.2	642.8	
CH-60	450	81.0	0.8	1.1	0.6	0.1	0.2	255.2	
C-130	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
<b>Total</b>	<b>450</b>	<b>204.1</b>	<b>2.5</b>	<b>1.1</b>	<b>1.7</b>	<b>0.1</b>	<b>0.2</b>	<b>642.8</b>	

AQCR	AR-3	LTO	Fuel	CO	VOC	NOx	SOx	PM	CO2
190	0	0	0	0	0	0	0	0	0
192	0	0	0	0	0	0	0	0	0
193	0	0	0	0	0	0	0	0	0
228	0	0	0	0	0	0	0	0	0
229	100	450	204	3	1	2	0	0	643
230	0	0	0	0	0	0	0	0	0
Ocean	0	0	0	0	0	0	0	0	0
<b>Total</b>		<b>450</b>	<b>204</b>	<b>3</b>	<b>1</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>643</b>

Totals 2119 3850 8 5 39 2 4 12129

AQCR Summary	LTO	Hours	Fuel	CO	VOC	NOx	SOx	PM	CO2
190	0	0	0	0	0	0	0	0	0
192	0	0	0	0	0	0	0	0	0
193	0	195	432	1	0	4	0	0	1361
228	0	924	2023	3	2	21	1	2	6371
229	450	84	366	3	1	3	0	0	1152
230	0	0	0	0	0	0	0	0	0
Ocean	0	465	1030	1	1	11	1	1	3245
<b>Total</b>	<b>450</b>	<b>1669</b>	<b>3850</b>	<b>8</b>	<b>5</b>	<b>39</b>	<b>2</b>	<b>4</b>	<b>12129</b>

AR-304  
Route Length (nmi) 75  
Minimum Altitude (ft-AGL)  
Distance from Ft. Lewis 110  
Training Duration (hr) 3  
Trainings per Year 50  
CH-47 per Training (max) 9  
CH-60 per Training (max) 9  
C-130 per Training (max) 1  
Air Speed (knots)- min 80  
LTO per Training 1

	Approach	Fuel	CO	VOC	NOx	SOx	PM	CO2
Aircraft	hr/year	tons/year						
CH-47	1238	2370.8	3.1	0.7	23.7	1.3	2.4	7468.0
CH-60	1238	873.7	0.4	2.7	7.5	0.8	2.3	2752.1
C-130		0.0	0.0	0.0	0.0	0.0	0.0	0.0
<b>Total</b>	<b>1238</b>	<b>2370.8</b>	<b>3.1</b>	<b>2.7</b>	<b>23.7</b>	<b>1.3</b>	<b>2.4</b>	<b>7468.0</b>

AQCR	AR-304
190	0
192	0
193	81
228	17
229	2
230	0
Ocean	0

AQCR	Hours	Fuel	CO	VOC	NOx	SOx	PM	CO2
190	0	0	0	0	0	0	0	0
192	0	0	0	0	0	0	0	0
193	1002	1920	2	2	19	1	2	6049
228	210	403	1	0	4	0	0	1270
229	25	47	0	0	0	0	0	149
230	0	0	0	0	0	0	0	0
Ocean	0	0	0	0	0	0	0	0
<b>Total</b>	<b>1238</b>	<b>2371</b>	<b>3</b>	<b>3</b>	<b>24</b>	<b>1</b>	<b>2</b>	<b>7468</b>

	Training	Fuel	CO	VOC	NOx	SOx	PM	CO2
Aircraft	hr/year	tons/year						
CH-47	1350	2586.3	3.3	0.7	25.8	1.4	2.6	8146.9
CH-60	1350	953.1	0.5	2.9	8.2	0.9	2.5	3002.3
C-130	150	736.8	1.3	0.2	8.4	0.7	0.4	2320.9
<b>Total</b>	<b>1500</b>	<b>3323.1</b>	<b>4.6</b>	<b>3.2</b>	<b>34.3</b>	<b>2.1</b>	<b>3.0</b>	<b>10467.9</b>

AQCR	AR-304
190	0
192	0
228	0
229	0
230	0
Ocean	0

AQCR	Hours	Fuel	CO	VOC	NOx	SOx	PM	CO2
190	0	0	0	0	0	0	0	0
192	0	0	0	0	0	0	0	0
228	0	0	0	0	0	0	0	0
229	0	0	0	0	0	0	0	0
230	0	0	0	0	0	0	0	0
Ocean	0	0	0	0	0	0	0	0
<b>Total</b>	<b>1500</b>	<b>3323</b>	<b>5</b>	<b>3</b>	<b>34</b>	<b>2</b>	<b>3</b>	<b>10468</b>

Aircraft	LTO #/year
CH-47	450
CH-60	450
C-130	0
<b>Total</b>	<b>450</b>

Fuel	CO	VOC	NOx	SOx	PM	CO2
tons/year						
204.1	2.5	0.8	1.7	0.1	0.2	642.8
81.0	0.8	1.1	0.6	0.1	0.2	255.2
0.0	0.0	0.0	0.0	0.0	0.0	0.0
<b>204.1</b>	<b>2.5</b>	<b>1.1</b>	<b>1.7</b>	<b>0.1</b>	<b>0.2</b>	<b>642.8</b>

AQCR	AR-304
190	0
192	0
193	0
228	0
229	100
230	0
Ocean	0

AQCR	LTO
190	0
192	0
193	0
228	0
229	450
230	0
Ocean	0
<b>Total</b>	<b>450</b>

Fuel	CO	VOC	NOx	SOx	PM	CO2
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
204	3	1	2	0	0	643
0	0	0	0	0	0	0
0	0	0	0	0	0	0
<b>204</b>	<b>3</b>	<b>1</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>643</b>

Totals 3188 5898 10 7 60 3 6 18579

AQCR Summary	LTO	Hours	Fuel	CO	VOC	NOx	SOx	PM	CO2
190	0	0	0	0	0	0	0	0	0
192	0	0	0	0	0	0	0	0	0
193	0	2502	5243	7	5	53	3	5	16517
228	0	210	403	1	0	4	0	0	1270
229	450	25	251	3	1	2	0	0	792
230	0	0	0	0	0	0	0	0	0
Ocean	0	0	0	0	0	0	0	0	0
<b>Total</b>	<b>450</b>	<b>2738</b>	<b>5898</b>	<b>10</b>	<b>7</b>	<b>60</b>	<b>3</b>	<b>6</b>	<b>18579</b>

AR-305  
Route Length (nmi) 76  
Minimum Altitude (ft-AGL)  
Distance from Ft. Lewis 108  
Training Duration (hr) 3  
Trainings per Year 50  
CH-47 per Training (max) 9  
CH-60 per Training (max) 9  
C-130 per Training (max) 1  
Air Speed (knots)- min 80  
LTO per Training 1

Aircraft	Approach hr/year	Fuel	CO	VOC	NOx	SOx	PM	CO2
tons/year								
CH-47	1215	2327.7	3.0	0.7	23.3	1.3	2.3	7332.2
CH-60	1215	857.8	0.4	2.6	7.4	0.8	2.2	2702.0
C-130		0.0	0.0	0.0	0.0	0.0	0.0	0.0
<b>Total</b>	<b>1215</b>	<b>2327.7</b>	<b>3.0</b>	<b>2.6</b>	<b>23.3</b>	<b>1.3</b>	<b>2.3</b>	<b>7332.2</b>

AQCR	AR-305
190	11
192	0
193	54
228	6
229	16
230	14
Ocean	0

AQCR	Hours	Fuel	CO	VOC	NOx	SOx	PM	CO2
190	130	249	0	0	2	0	0	783
192	0	0	0	0	0	0	0	0
193	661	1266	2	1	13	1	1	3986
228	71	136	0	0	1	0	0	427
229	189	362	0	0	4	0	0	1139
230	165	316	0	0	3	0	0	997
Ocean	0	0	0	0	0	0	0	0
<b>Total</b>	<b>1215</b>	<b>2328</b>	<b>3</b>	<b>3</b>	<b>23</b>	<b>1</b>	<b>2</b>	<b>7332</b>

Aircraft	Training hr/year	Fuel	CO	VOC	NOx	SOx	PM	CO2
tons/year								
CH-47	1350	2586.3	3.3	0.7	25.8	1.4	2.6	8146.9
CH-60	1350	953.1	0.5	2.9	8.2	0.9	2.5	3002.3
C-130	150	736.8	1.3	0.2	8.4	0.7	0.4	2320.9
<b>Total</b>	<b>1500</b>	<b>3323.1</b>	<b>4.6</b>	<b>3.2</b>	<b>34.3</b>	<b>2.1</b>	<b>3.0</b>	<b>10467.9</b>

AQCR	AR-305
190	100
192	0
228	0
229	0
230	0
Ocean	0

AQCR	Hours	Fuel	CO	VOC	NOx	SOx	PM	CO2
190	1500	3323	5	3	34	2	3	10468
192	0	0	0	0	0	0	0	0
228	0	0	0	0	0	0	0	0
229	0	0	0	0	0	0	0	0
230	0	0	0	0	0	0	0	0
Ocean	0	0	0	0	0	0	0	0
<b>Total</b>	<b>1500</b>	<b>3323</b>	<b>5</b>	<b>3</b>	<b>34</b>	<b>2</b>	<b>3</b>	<b>10468</b>

Aircraft	LTO #/year
CH-47	450
CH-60	450
C-130	0
<b>Total</b>	<b>450</b>

Fuel	CO	VOC	NOx	SOx	PM	CO2
tons/year						
204.1	2.5	0.8	1.7	0.1	0.2	642.8
81.0	0.8	1.1	0.6	0.1	0.2	255.2
0.0	0.0	0.0	0.0	0.0	0.0	0.0
<b>204.1</b>	<b>2.5</b>	<b>1.1</b>	<b>1.7</b>	<b>0.1</b>	<b>0.2</b>	<b>642.8</b>

AQCR	AR-305
190	0
192	0
193	0
228	0
229	100
230	0
Ocean	0

AQCR	LTO
190	0
192	0
193	0
228	0
229	450
230	0
Ocean	0
<b>Total</b>	<b>450</b>

Fuel	CO	VOC	NOx	SOx	PM	CO2
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
204	3	1	2	0	0	643
0	0	0	0	0	0	0
0	0	0	0	0	0	0
<b>204</b>	<b>3</b>	<b>1</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>643</b>

Totals 3165 5855 10 7 59 3 6 18443

AQCR Summary	LTO	Hours	Fuel	CO	VOC	NOx	SOx	PM	CO2
190	0	1630	3572	5	3	37	2	3	11251
192	0	0	0	0	0	0	0	0	0
193	0	661	1266	2	1	13	1	1	3986
228	0	71	136	0	0	1	0	0	427
229	450	189	566	3	1	5	0	1	1782
230	0	165	316	0	0	3	0	0	997
Ocean	0	0	0	0	0	0	0	0	0
<b>Total</b>	<b>450</b>	<b>2715</b>	<b>5855</b>	<b>10</b>	<b>7</b>	<b>59</b>	<b>3</b>	<b>6</b>	<b>18443</b>

LLTA  
 Route Length (nmi) n/a  
 Minimum Altitude (ft-AGL) 60  
 Distance from Ft. Lewis 60  
 Training Duration (hr) 3  
 Trainings per Year 60  
 CH-47 per Training (max) 2  
 CH-60 per Training (max) 2  
 C-130 per Training (max) 0  
 Air Speed (knots)- min 80  
 LTO per Training 11

	Approach	Fuel	CO	VOC	NOx	SOx	PM	CO2
<b>Aircraft</b>	<b>hr/year</b>	<b>tons/year</b>						
CH-47	180	344.8	0.4	0.1	3.4	0.2	0.3	1086.3
CH-60	180	127.1	0.1	0.4	1.1	0.1	0.3	400.3
C-130		0.0	0.0	0.0	0.0	0.0	0.0	0.0
<b>Total</b>	<b>180</b>	<b>344.8</b>	<b>0.4</b>	<b>0.4</b>	<b>3.4</b>	<b>0.2</b>	<b>0.3</b>	<b>1086.3</b>

AQCR	LLTA	AQCR	Hours	Fuel	CO	VOC	NOx	SOx	PM	CO2
190	0	190	0	0	0	0	0	0	0	0
192	0	192	0	0	0	0	0	0	0	0
193	25	193	45	86	0	0	1	0	0	272
228	25	228	45	86	0	0	1	0	0	272
229	25	229	45	86	0	0	1	0	0	272
230	25	230	45	86	0	0	1	0	0	272
Ocean	0	Ocean	0	0	0	0	0	0	0	0
		<b>Total</b>	<b>180</b>	<b>345</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>1086</b>

	Training	Fuel	CO	VOC	NOx	SOx	PM	CO2
<b>Aircraft</b>	<b>hr/year</b>	<b>tons/year</b>						
CH-47	360	689.7	0.9	0.2	6.9	0.4	0.7	2172.5
CH-60	360	254.2	0.1	0.8	2.2	0.2	0.7	800.6
C-130	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<b>Total</b>	<b>360</b>	<b>689.7</b>	<b>0.9</b>	<b>0.8</b>	<b>6.9</b>	<b>0.4</b>	<b>0.7</b>	<b>2172.5</b>

AQCR	LLTA	AQCR	Hours	Fuel	CO	VOC	NOx	SOx	PM	CO2
190	0	190	0	0	0	0	0	0	0	0
192	0	192	0	0	0	0	0	0	0	0
228	0	228	0	0	0	0	0	0	0	0
229	0	229	0	0	0	0	0	0	0	0
230	0	230	0	0	0	0	0	0	0	0
Ocean	0	Ocean	0	0	0	0	0	0	0	0
		<b>Total</b>	<b>360</b>	<b>690</b>	<b>1</b>	<b>1</b>	<b>7</b>	<b>0</b>	<b>1</b>	<b>2173</b>

Aircraft	LTO #/year	Fuel	CO	VOC	NOx	SOx	PM	CO2
CH-47	1320	598.6	7.4	2.3	4.9	0.3	0.6	1885.7
CH-60	1320	237.6	2.4	3.1	1.8	0.2	0.5	748.5
C-130	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<b>Total</b>	<b>1320</b>	<b>598.6</b>	<b>7.4</b>	<b>3.1</b>	<b>4.9</b>	<b>0.3</b>	<b>0.6</b>	<b>1885.7</b>

AQCR	LLTA	AQCR	LTO	Fuel	CO	VOC	NOx	SOx	PM	CO2
190	0	190	0	0	0	0	0	0	0	0
192	0	192	0	0	0	0	0	0	0	0
193	91	193	1200	544	7	3	4	0	1	1714
228	0	228	0	0	0	0	0	0	0	0
229	9	229	120	54	1	0	0	0	0	171
230	0	230	0	0	0	0	0	0	0	0
Ocean	0	Ocean	0	0	0	0	0	0	0	0
		<b>Total</b>	<b>1320</b>	<b>599</b>	<b>7</b>	<b>3</b>	<b>5</b>	<b>0</b>	<b>1</b>	<b>1886</b>

Totals 1860 1633 9 4 15 1 2 5144

AQCR Summary	LTO	Hours	Fuel	CO	VOC	NOx	SOx	PM	CO2
190	0	0	0	0	0	0	0	0	0
192	0	0	0	0	0	0	0	0	0
193	1200	405	1320	8	4	12	1	1	4158
228	0	45	86	0	0	1	0	0	272
229	120	45	141	1	0	1	0	0	443
230	0	45	86	0	0	1	0	0	272
Ocean	0	0	0	0	0	0	0	0	0
<b>Total</b>	<b>1320</b>	<b>540</b>	<b>1633</b>	<b>9</b>	<b>4</b>	<b>15</b>	<b>1</b>	<b>2</b>	<b>5144</b>

TF/MMR  
Route Length (nmi)  
Minimum Altitude (ft-AGL)  
Distance from Ft. Lewis  
Training Duration (hr) 2  
Trainings per Year 60  
CH-47 per Training (max) 2  
CH-60 per Training (max) 2  
C-130 per Training (max) 0  
Air Speed (knots)- min 80  
LTO per Training 1

Aircraft	Approach	Fuel	CO	VOC	NOx	SOx	PM	CO2
		tons/year						
CH-47	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CH-60	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C-130		0.0	0.0	0.0	0.0	0.0	0.0	0.0
<b>Total</b>	<b>0</b>	<b>0.0</b>						

AQCR	TF/MMR
190	0
192	0
193	0
228	0
229	0
230	0
Ocean	0

AQCR	Hours	Fuel	CO	VOC	NOx	SOx	PM	CO2
190	0	0	0	0	0	0	0	0
192	0	0	0	0	0	0	0	0
193	0	0	0	0	0	0	0	0
228	0	0	0	0	0	0	0	0
229	0	0	0	0	0	0	0	0
230	0	0	0	0	0	0	0	0
Ocean	0	0	0	0	0	0	0	0
<b>Total</b>	<b>0</b>							

Aircraft	Training hr/year	Fuel	CO	VOC	NOx	SOx	PM	CO2
		tons/year						
CH-47	240	459.8	0.6	0.1	4.6	0.2	0.5	1448.3
CH-60	240	169.4	0.1	0.5	1.5	0.2	0.4	533.7
C-130	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<b>Total</b>	<b>240</b>	<b>459.8</b>	<b>0.6</b>	<b>0.5</b>	<b>4.6</b>	<b>0.2</b>	<b>0.5</b>	<b>1448.3</b>

AQCR	TF/MMR
190	0
192	0
228	6
229	10
230	32
Ocean	0

AQCR	Hours	Fuel	CO	VOC	NOx	SOx	PM	CO2
190	0	0	0	0	0	0	0	0
192	0	0	0	0	0	0	0	0
228	14	28	0	0	0	0	0	87
229	24	46	0	0	0	0	0	145
230	77	147	0	0	1	0	0	463
Ocean	0	0	0	0	0	0	0	0
<b>Total</b>	<b>240</b>	<b>460</b>	<b>1</b>	<b>1</b>	<b>5</b>	<b>0</b>	<b>0</b>	<b>1448</b>

Aircraft	LTO #/year
CH-47	120
CH-60	120
C-130	0
<b>Total</b>	<b>120</b>

Fuel	CO	VOC	NOx	SOx	PM	CO2
		tons/year				
54.4	0.7	0.2	0.4	0.0	0.1	171.4
21.6	0.2	0.3	0.2	0.0	0.0	68.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0
<b>54.4</b>	<b>0.7</b>	<b>0.3</b>	<b>0.4</b>	<b>0.0</b>	<b>0.1</b>	<b>171.4</b>

AQCR	TF/MMR
190	0
192	0
193	0
228	0
229	50
230	50
Ocean	0

AQCR	LTO
190	0
192	0
193	0
228	0
229	60
230	60
Ocean	0
<b>Total</b>	<b>120</b>

Fuel	CO	VOC	NOx	SOx	PM	CO2
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
27	0	0	0	0	0	86
27	0	0	0	0	0	86
0	0	0	0	0	0	0
<b>54</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>171</b>

Totals 360 514 1 1 5 0 1 1620

AQCR Summary	LTO	Hours	Fuel	CO	VOC	NOx	SOx	PM	CO2
190	0	0	0	0	0	0	0	0	0
192	0	0	0	0	0	0	0	0	0
193	0	125	239	0	0	2	0	0	753
228	0	14	28	0	0	0	0	0	87
229	60	24	73	0	0	1	0	0	231
230	60	77	174	1	0	2	0	0	549
Ocean	0	0	0	0	0	0	0	0	0
<b>Total</b>	<b>120</b>	<b>240</b>	<b>514</b>	<b>1</b>	<b>1</b>	<b>5</b>	<b>0</b>	<b>1</b>	<b>1620</b>



AR-305  
Route Length (nmi) 76  
Minimum Altitude (ft-AGL)  
Distance from Ft. Lewis 108  
Training Duration (hr) 3  
Trainings per Year 60  
CH-47 per Training (max) 9  
CH-60 per Training (max) 9  
C-130 per Training (max) 1  
Air Speed (knots)- min 80  
LTO per Training 1

Aircraft	Approach hr/year	Fuel	CO	VOC	NOx	SOx	PM	CO2
		tons/year						
CH-47	1458	2793.2	3.6	0.8	27.9	1.5	2.8	8798.7
CH-60	1458	1029.3	0.5	3.2	8.9	1.0	2.7	3242.4
C-130		0.0	0.0	0.0	0.0	0.0	0.0	0.0
<b>Total</b>	<b>1458</b>	<b>2793.2</b>	<b>3.6</b>	<b>3.2</b>	<b>27.9</b>	<b>1.5</b>	<b>2.8</b>	<b>8798.7</b>

AQCR	AR-305
190	11
192	0
193	54
228	6
229	16
230	14
Ocean	0

AQCR	Hours	Fuel	CO	VOC	NOx	SOx	PM	CO2
190	156	298	0	0	3	0	0	940
192	0	0	0	0	0	0	0	0
193	793	1519	2	2	15	1	2	4784
228	85	163	0	0	2	0	0	513
229	226	434	1	0	4	0	0	1367
230	198	380	0	0	4	0	0	1196
Ocean	0	0	0	0	0	0	0	0
<b>Total</b>	<b>1458</b>	<b>2793</b>	<b>4</b>	<b>3</b>	<b>28</b>	<b>2</b>	<b>3</b>	<b>8799</b>

Aircraft	Training hr/year	Fuel	CO	VOC	NOx	SOx	PM	CO2
		tons/year						
CH-47	1620	3103.6	4.0	0.9	31.0	1.7	3.1	9776.3
CH-60	1620	1143.7	0.6	3.5	9.8	1.1	3.0	3602.7
C-130	180	884.2	1.6	0.2	10.1	0.8	0.5	2785.1
<b>Total</b>	<b>1800</b>	<b>3987.8</b>	<b>5.6</b>	<b>3.8</b>	<b>41.1</b>	<b>2.5</b>	<b>3.6</b>	<b>12561.4</b>

AQCR	AR-305
190	100
192	0
228	0
229	0
230	0
Ocean	0

AQCR	Hours	Fuel	CO	VOC	NOx	SOx	PM	CO2
190	1800	3988	6	4	41	3	4	12561
192	0	0	0	0	0	0	0	0
228	0	0	0	0	0	0	0	0
229	0	0	0	0	0	0	0	0
230	0	0	0	0	0	0	0	0
Ocean	0	0	0	0	0	0	0	0
<b>Total</b>	<b>1800</b>	<b>3988</b>	<b>6</b>	<b>4</b>	<b>41</b>	<b>3</b>	<b>4</b>	<b>12561</b>

Aircraft	LTO #/year
CH-47	540
CH-60	540
C-130	
<b>Total</b>	<b>540</b>

Fuel	CO	VOC	NOx	SOx	PM	CO2
tons/year						
244.9	3.0	0.9	2.0	0.1	0.2	771.4
97.2	1.0	1.3	0.7	0.1	0.2	306.2
0.0	0.0	0.0	0.0	0.0	0.0	0.0
<b>244.9</b>	<b>3.0</b>	<b>1.3</b>	<b>2.0</b>	<b>0.1</b>	<b>0.2</b>	<b>771.4</b>

AQCR	AR-305
190	0
192	0
193	0
228	0
229	100
230	0
Ocean	0

AQCR	LTO
190	0
192	0
193	0
228	0
229	540
230	0
Ocean	0
<b>Total</b>	<b>540</b>

Fuel	CO	VOC	NOx	SOx	PM	CO2
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
245	3	1	2	0	0	771
0	0	0	0	0	0	0
0	0	0	0	0	0	0
<b>245</b>	<b>3</b>	<b>1</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>771</b>

Totals 3798 7026 12 8 71 4 7 22132

AQCR Summary	LTO	Hours	Fuel	CO	VOC	NOx	SOx	PM	CO2
190	0	1956	4286	6	4	44	3	4	13501
192	0	0	0	0	0	0	0	0	0
193	0	793	1519	2	2	15	1	2	4784
228	0	85	163	0	0	2	0	0	513
229	540	226	679	4	2	6	0	1	2138
230	0	198	380	0	0	4	0	0	1196
Ocean	0	0	0	0	0	0	0	0	0
<b>Total</b>	<b>540</b>	<b>3258</b>	<b>7026</b>	<b>12</b>	<b>8</b>	<b>71</b>	<b>4</b>	<b>7</b>	<b>22132</b>

AR-626  
Route Length (nmi) n/a  
Minimum Altitude (ft-AGL)  
Distance from Ft. Lewis 77  
Training Duration (hr) 3  
Trainings per Year 25  
CH-47 per Training (max) 9  
CH-60 per Training (max) 9  
C-130 per Training (max) 1  
Air Speed (knots)- min 80  
LTO per Training 1

Aircraft	AQCR	AR-626
CH-47	190	0
CH-60	192	0
C-130	193	0
	228	100
	229	0
	230	0
Ocean	0	0
<b>Total</b>		

Approach	Fuel	CO	VOC	NOx	SOx	PM	CO2	
<b>hr/year</b>	<b>tons/year</b>							
433	829.8	1.1	0.2	8.3	0.4	0.8	2613.8	
433	305.8	0.2	0.9	2.6	0.3	0.8	963.2	
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
<b>Total</b>	<b>433</b>	<b>829.8</b>	<b>1.1</b>	<b>0.9</b>	<b>8.3</b>	<b>0.4</b>	<b>0.8</b>	<b>2613.8</b>

Hours	Fuel	CO	VOC	NOx	SOx	PM	CO2	
0	0	0	0	0	0	0	0	
0	0	0	0	0	0	0	0	
0	0	0	0	0	0	0	0	
0	0	0	0	0	0	0	0	
433	830	1	1	8	0	1	2614	
0	0	0	0	0	0	0	0	
0	0	0	0	0	0	0	0	
0	0	0	0	0	0	0	0	
0	0	0	0	0	0	0	0	
<b>Total</b>	<b>433</b>	<b>830</b>	<b>1</b>	<b>1</b>	<b>8</b>	<b>0</b>	<b>1</b>	<b>2614</b>

Aircraft	AQCR	AR-626
CH-47	190	0
CH-60	192	0
C-130	193	0
	228	0
	229	0
	230	0
Ocean	100	0
<b>Total</b>		

Training	Fuel	CO	VOC	NOx	SOx	PM	CO2
<b>hr/year</b>	<b>tons/year</b>						
675	1293.2	1.7	0.4	12.9	0.7	1.3	4073.5
675	476.6	0.2	1.5	4.1	0.5	1.2	1501.1
75	368.4	0.7	0.1	4.2	0.4	0.2	1160.5
<b>Total</b>	<b>750</b>	<b>1661.6</b>	<b>2.3</b>	<b>1.6</b>	<b>17.1</b>	<b>1.1</b>	<b>5233.9</b>

Hours	Fuel	CO	VOC	NOx	SOx	PM	CO2
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
750	1662	2	2	17	1	1	5234
<b>Total</b>	<b>750</b>	<b>1662</b>	<b>2</b>	<b>2</b>	<b>17</b>	<b>1</b>	<b>5234</b>

Aircraft	LTO	#/year
CH-47	225	
CH-60	225	
C-130		
<b>Total</b>	<b>225</b>	

AQCR	AR-626	AQCR	LTO
190	0	190	0
192	0	192	0
193	0	193	0
228	0	228	0
229	100	229	225
230	0	230	0
Ocean	0	Ocean	0
<b>Total</b>		<b>Total</b>	<b>225</b>

Fuel	CO	VOC	NOx	SOx	PM	CO2
<b>tons/year</b>						
102.0	1.3	0.4	0.8	0.1	0.1	321.4
40.5	0.4	0.5	0.3	0.0	0.1	127.6
0.0	0.0	0.0	0.0	0.0	0.0	0.0
<b>102.0</b>	<b>1.3</b>	<b>0.5</b>	<b>0.8</b>	<b>0.1</b>	<b>0.1</b>	<b>321.4</b>

Fuel	CO	VOC	NOx	SOx	PM	CO2
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
102	1	1	1	0	0	321
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
<b>102</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>321</b>

Totals 1408 2593 5 3 26 2 2 8169

AQCR Summary	LTO	Hours	Fuel	CO	VOC	NOx	SOx	PM	CO2
190	0	0	0	0	0	0	0	0	0
192	0	0	0	0	0	0	0	0	0
193	0	0	0	0	0	0	0	0	0
228	0	433	830	1	1	8	0	1	2614
229	225	0	102	1	1	1	0	0	321
230	0	0	0	0	0	0	0	0	0
Ocean	0	750	1662	2	2	17	1	1	5234
<b>Total</b>	<b>225</b>	<b>1183</b>	<b>2593</b>	<b>5</b>	<b>3</b>	<b>26</b>	<b>2</b>	<b>2</b>	<b>8169</b>

AR-628  
Route Length (nmi) n/a  
Minimum Altitude (ft-AGL)  
Distance from Ft. Lewis 15  
Training Duration (hr) 3  
Trainings per Year 25  
CH-47 per Training (max) 9  
CH-60 per Training (max) 9  
C-130 per Training (max) 1  
Air Speed (knots)- min 80  
LTO per Training 1

AQCR	AR-628
190	0
192	33
193	33
228	33
229	0
230	0
Ocean	0

Aircraft	hr/year
CH-47	84
CH-60	84
C-130	0.0
Total	84

Approach	Fuel	CO	VOC	NOx	SOx	PM	CO2
tons/year							
CH-47	161.6	0.2	0.0	1.6	0.1	0.2	509.2
CH-60	59.6	0.0	0.2	0.5	0.1	0.2	187.6
C-130	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	84	161.6	0.2	1.6	0.1	0.2	509.2

Hours	Fuel	CO	VOC	NOx	SOx	PM	CO2
0	0	0	0	0	0	0	0
28	54	0	0	1	0	0	170
28	54	0	0	1	0	0	170
28	54	0	0	1	0	0	170
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
Total	84	162	0	0	2	0	509

Aircraft	hr/year
CH-47	675
CH-60	675
C-130	75
Total	750

Training	Fuel	CO	VOC	NOx	SOx	PM	CO2
tons/year							
CH-47	1293.2	1.7	0.4	12.9	0.7	1.3	4073.5
CH-60	476.6	0.2	1.5	4.1	0.5	1.2	1501.1
C-130	368.4	0.7	0.1	4.2	0.4	0.2	1160.5
Total	750	1661.6	2.3	1.6	1.1	1.5	5233.9

AQCR	AR-628
190	0
192	0
228	0
229	0
230	0
Ocean	100

Aircraft	hr/year
CH-47	675
CH-60	675
C-130	75
Total	750

Hours	Fuel	CO	VOC	NOx	SOx	PM	CO2
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
750	1662	2	2	17	1	1	5234
Total	750	1662	2	2	17	1	5234

Aircraft	LTO #/year
CH-47	225
CH-60	225
C-130	0
Total	225

Fuel	CO	VOC	NOx	SOx	PM	CO2
tons/year						
102.0	1.3	0.4	0.8	0.1	0.1	321.4
40.5	0.4	0.5	0.3	0.0	0.1	127.6
0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	102.0	1.3	0.5	0.8	0.1	321.4

AQCR	AR-628
190	0
192	0
193	0
228	0
229	100
230	0
Ocean	0

Aircraft	LTO #/year
CH-47	225
CH-60	225
C-130	0
Total	225

Fuel	CO	VOC	NOx	SOx	PM	CO2
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
102	1	1	1	0	0	321
0	0	0	0	0	0	0
0	0	0	0	0	0	0
Total	102	1	1	1	0	321

Totals 1059 1925 4 2 20 1 2 6065

AQCR Summary	LTO	Hours	Fuel	CO	VOC	NOx	SOx	PM	CO2
190	0	0	0	0	0	0	0	0	0
192	0	28	54	0	0	1	0	0	170
193	0	28	54	0	0	1	0	0	170
228	0	28	54	0	0	1	0	0	170
229	225	0	102	1	1	1	0	0	321
230	0	0	0	0	0	0	0	0	0
Ocean	0	750	1662	2	2	17	1	1	5234
Total	225	834	1925	4	2	20	1	2	6064