

Appendix F – Multi-Species Biological Assessment

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I. INTRODUCTION

The purpose of this Biological Assessment (BA) is to evaluate and disclose the effects of the Blue Mountain Land Exchange (BMLEX) on Snake River and Mid-Columbia River steelhead (*Onchorhynchus mykiss*), bull trout (*Salvelinus confluentus*), Snake River fall run Chinook salmon (*Oncorhynchus tshawytscha*), Snake River spring/summer run Chinook salmon, Canada lynx (*Lynx canadensis*), and bald eagle (*Haliaeetus leucocephalus*), pursuant to the Endangered Species Act (ESA) of 1973, as amended.

The BMLEX involves 254 individual land parcels distributed over parts of the Malheur (Mal), Umatilla (Uma), and Wallowa-Whitman (W-W) National Forests and adjacent private lands. 30,907 acres would be acquired into the National Forest System and 17,756 acres would be conveyed to private parties. The project covers a broad range of biophysical and geophysical conditions from canyon grasslands along the Imnaha River to mixed conifer montane settings in the John Day River basin. Not only does this project represent a broad range of habitat conditions, but it is also distributed over a large geographic area of approximately 90 by 150 miles. Parcels range in size from 0.56 acres (FW30) to 1,271.15 acres (PU16B), and some are isolated while others are aggregated into several hundred contiguous acres. For these reasons it is extremely difficult to define meaningful logical resource units. Generally the logical resource units for this analysis will not conform to conventional projects that are smaller in scope and involve actual activities that alter the environment. Fisheries are conveniently analyzed at the 5th level hydrologic unit code (HUC) scale, and in some cases the 6th level HUC or the Distinct Population Segment scales.

The project assessed in this BA differs from conventional projects in that no immediate changes to the environment will result from the implementation of the action. The “action” being analyzed is a changing of land deeds between the Forest Service and several private landowners, and a subsequent change in management authority and emphasis on those exchanged lands. Generally public lands are subject to more stringent standards designed to protect and conserve natural resources than privately owned lands. Additionally, a great amount of oversight exists for public land agencies ensuring that legally mandated management standards be applied. Although some standards exist for private lands, there is often little incentive to adhere to such standards and little or no oversight. For example, section 7 of the ESA establishes a process through which Federal land management agencies are required to consult with regulatory agencies (Fish and Wildlife Service and National Marine Fisheries Service) on all projects that may affect a Federally listed species. Section 10 of the ESA requires private landowners to apply for incidental take permits and develop Habitat Conservation Plans for projects that may result in “take” of listed species.

Parcel labeling system

Land exchange parcels are identified by a numbering convention where the first letter (F= Federal or P=Private) represents current ownership, the second letter (W=Wallowa- Whitman, U=Umatilla, and M=Malheur) represents the National Forest, and ends with a numerical, unique identifier. Some parcels also include a alphabetical character at the end as part of the unique identifier.

- FW parcels are Federal parcels on the Wallowa-Whitman NF to be conveyed to private ownership.
- PW parcels are private parcels that would become part of the Wallowa-Whitman NF.
- FU parcels are Federal parcels on the Umatilla NF to be conveyed to private ownership.
- PU parcels are private parcels that would become part of the Umatilla NF.
- FM parcels are Federal parcels on the Malheur NF to be conveyed to private ownership.
- PM parcels are private parcels that would become part of the Malheur NF.

II. LISTED SPECIES

Both the Snake River and Mid-Columbia steelhead trout (*Oncorhynchus mykiss*) are listed as threatened under the Endangered Species Act. These two populations represent Distinct Population Segments (DPS), units by which National Marine Fisheries Service (NMFS) tracks status and recovery of listed anadromous fish populations.

Bull trout (*Salvelinus confluentus*) is listed as Threatened under the ESA and exist in a somewhat restricted distribution that is tied to cool, high water quality. Bull trout involved in this project are within the Columbia River Distinct Population Segment (DPS). Effects to bull trout from this land exchange would be similar to those discussed for steelhead and Chinook with a few exceptions. Some bull trout habitat is identified that does not support anadromous fisheries. Bull trout spawn at a different time of year than most of the steelhead and Chinook runs in northeast Oregon, leading to different timing considerations for instream work or livestock grazing along spawning and rearing habitat.

Chinook salmon (*Oncorhynchus tshawytscha*) within the Snake River basin is listed as Threatened under the Endangered Species Act. There are two separate listings of Chinook salmon in the Snake River system, a fall run and a spring/summer run. Chinook salmon also occur in the Mid-Columbia basin and are not listed under ESA. However, Chinook habitat in the Mid-Columbia basin is recognized as essential fish habitat (EFH) under the Magnuson-Stevens Fishery Conservation and Management Act, as amended. Effects to Chinook are the same as those discussed for steelhead, but different amounts and locations of habitat are involved.

Northern bald eagle (*Haliaeetus leucocephalus*) and Canada lynx (*Lynx canadensis*) are also threatened species covered by this BA.

III. ASSUMPTIONS

Since the action does not involve actual changes to the environment, some things must be assumed in order to discuss potential effects. These assumptions are based on existing law and observed practices.

- Forested parcels (and forested portions of parcels) containing merchantable timber (generally >9" average d.b.h.) being conveyed from Forest Service to private will be logged to standards in the Oregon Forest Practices Act within 10 years. It is common practice for private forests in northeastern Oregon to be logged to a commercial thinning or clearcut with reserve trees prescription. Larger diameter trees are usually targeted for harvest on private lands, whereas prescriptions on public lands generally focus on retention of the largest trees and removal of smaller, dead, defective and poor form trees. The results are typically a higher basal area with a large tree component on public land and a lower basal area with a lower average tree diameter retained on private lands.
- Parcels being conveyed from the Forest Service to private will be grazed by domestic livestock (usually cattle) for at least a part of the year. There are no state standards governing livestock grazing on private lands. Where practicable, acquired lands will be incorporated into surrounding grazing allotments, but very few changes will occur except through future revisions of allotment management plans.
- Culverts that are impassable to fish, drainage features associated with roads that contribute sediment to streams, cattle feedlots within 300' of fish bearing streams, and other site-specific resource concerns involving fisheries and water quality are likely to be remedied or mitigated within 10 years (1 year if threatened or endangered species are involved) by the Forest Service once acquired. Many of these situations may persist on private lands indefinitely.

- Road access by the general public will not change appreciably following this land exchange. Gated roads on private parcels will remain gated following acquisition, and roads currently open to the public on private lands will remain open following acquisition. This is a consideration for potential sediment input from roads.

IV. DEFINITIONS

The following definitions are commonly used in NEPA and/or ESA, and will be used for the purpose of this effects analysis:

- Direct Effects – effects that are caused by the action and occur at or nearly the same time and place of the action. An exception to this definition will be used to compare net increases or decreases in habitat for listed species within 5th or 6th level HUC watersheds. For example acres or miles of habitat being conveyed or acquired are referred to as direct effects although the actual effects relate to what activities may occur on those lands at some point in the future.
- Indirect Effects – effects that are caused by the action and are later in time or farther removed in space, but are reasonably foreseeable.
- Aggregate Effects – effects that result from the incremental impacts of the action when added to other past, present, and reasonably foreseeable future actions. Aggregate effects overlap in time and space.
- Cumulative Effects – effects occurring on state or private lands that may contribute to the effects from the action being analyzed.
- Convey – refers to land parcels being exchanged from Forest Service to private ownership.
- Acquire – refers to the “acquisition” of land parcels from private to Forest Service ownership.

V. BASELINE CONDITIONS

Typically environmental baseline conditions are presented in a Biological Assessment to serve as the basis for which to compare the environmental effects of an action. In the case of this land exchange there will be no changes to the environment resulting directly from the action (changing of land deeds). Possible changes to the environment would occur later in time, and effects would be analyzed and consulted on through the Level I process for actions on acquired lands, and ESA section 10 requirements would apply to conveyed lands if the proposed action(s) involve take of a listed species. Changes in ownership patterns and net change (increases or decreases) in habitat going from less protective to more protective management standards are the most relevant considerations for this project. Therefore, a detailed environmental baseline that documents specifics on habitat components and conditions would be of little utility in assessing effects of this action. More meaningful is the amount of habitat for listed species that exists within affected watersheds, and how the exchange of lands would affect the quantity and patterns of habitat considering shifts in management emphasis that would occur after the exchange. In place of a detailed environmental baseline, a general assessment of the conditions of conveyed fisheries habitat is provided. The focus of this baseline information will be on steelhead habitat to be conveyed since steelhead represents the greatest amount of habitat involved in the exchange, and overlaps a considerable amount of habitat of the other listed fish species. Trend information (in terms of matrix pathways and indicators) about conveyed steelhead habitat comes from various BA’s, BO’s, and watershed analyses that cover the watersheds in this project, and is summarized in Table BA-17. A general assessment of the trend of steelhead habitat that is being acquired is also provided (Table BA-18).

Appendix BA-1 shows the amount of steelhead trout habitat that exists in the watersheds that contain land exchange parcels, and the amount of habitat involved in the exchange for steelhead. The amount of bull trout habitat that exists within watersheds affected by the exchange is in Table BA-1. Chinook salmon habitat is similarly summarized in Table BA-2. Environmental baseline for Canada lynx and bald eagle is included in their respective sections.

Table BA-17: Baseline information on steelhead habitat proposed for conveyance, by DPS.

MPI Pathways	MPI Indicators	Snake River DPS		Mid-Columbia DPS		
		Big Sheep 1706010203	Meadow Cr. 1706010402	Beech 1707020109	LNFDJR 1707020210	Strawberry 1707020108
Water Quality	Temperature	R	N	N	N	N
	Sediment	R	N	N	R	R
	Chem. Cont.	A	A	R	A	N
Access	Physical barriers	A	A	N	A	N
Habitat Elements	Substrate Embeddedness	R	N	N	R	N
	Large Wood	A	R	R	N	N
	Pool Frequency/Quality	R	R	N	N	N
	Large Pools	R	N	R	R	N
	Off Channel Habitat	A	A	R	N	N
	Refugia	A	A	R	N	N
Channel Conditions & Dynamics	Width:Depth	A	R	R	N	N
	Streambank Condition	A	R	R	R	N
	Floodplain Connectivity	A	A	R	R	N
Flow/Hydrology	Change in Peak/Base Flow	R	N	R	N	N
	Drainage Network Increase	A	N	R	R	N
Watershed Condition	Rd Density & Location	R	N	N	R	R
	Disturbance History	R	R	R	A	N
	RHCA's	R	A	R	U	N

The condition of each MPI parameter is indicated in the following manner: A = properly functioning; R = functioning at risk; N = not properly functioning; and U = data unavailable.

Table BA-18: Baseline information on steelhead habitat proposed for acquisition in the Mid-Columbia DPS.

MPI Pathways	MPI Indicators	Beech 1707020109	NFJD/Big 170702033	*Laycock 170702010	Murderer's 170702014	UMDR 170702031	Meachum 170701032	Potamus 170702027	U Canas 170702025	UNFDJR 170702021	Wall Creek 170702028
Water Quality	Temperature	N	N	N	N	N	N	N	N	R	N
	Sediment	N	U	N	A	R	U	R	R	R	A
	Chem. Cont.	R	A	R	A	R	A	A	A	R	A
Access	Physical barriers	N	A	N	A	N	A	R	A	U	R
Habitat Elements	Substrate Embeddedness	N	U	N	U	N	A	R	R	N	R
	Large Wood	R	U	R	N	R	A	R	R	R	R
	Pool Frequency/Quality	N	A	N	A	N	N	N	N	N	N
	Large Pools	R	A	R	R	N	N	R	A	A	A
	Off Channel Habitat	R	U	R	N	R	R	N	N	A	N
	Refugia	R	U	R	U	R	R	N	N	U	N
Channel Conditions & Dynamics	Width:Depth	R	U	R	R	R	N	R	A	U	R
	Streambank Condition	R	R	R	A	R	U	A	U	R	A
	Floodplain Connectivity	R	U	R	N	R	A	U	U	U	U
Flow/Hydrology	Change in Peak/Base Flow	R	U	R	N	R	U	U	U	U	U
	Drainage Network Increase	R	A	R	U	R	A	U	U	R	U
Watershed Condition	Rd Density & Location	N	A	N	R	N	R	N	N	A	N
	Disturbance History	R	A	R	R	R	A	A	A	U	R
	RHCA's	R	A	R	R	R	R	N	N	U	R

The condition of each MPI parameter is indicated in the following manner: A = properly functioning; R = functioning at risk; N = not properly functioning; and U = data unavailable.
 *PFC information was not available for the Laycock Creek 5th field HUC, so ratings from the 4th field HUC (Upper John Day River sub-basin) were used in Table BA-18.

Table BA-18 Continued: Baseline information on steelhead habitat proposed for **acquisition** in the **Snake River DPS**.

MPI Pathways	MPI Indicators	Big Sheep 170601023	Chesnimus 170601064	*LBig Sheep 170601024	L Imnaha 170601025	Meadow Cr 170601042	#M Imnaha 170601022	U Joseph Cr 170601065
Water Quality	Temperature	R	N	R	N	N	N	N
	Sediment	R	A	R	R	N	R	R
	Chem. Cont.	A	A	A	A	A	A	A
Access	Physical barriers	A	R	A	A	A	A	R
Habitat Elements	Substrate Embeddedness	R	A	R	R	N	R	R
	Large Wood	A	A	R	N	R	N	A
	Pool Freq/Quality	R	R	R	N	R	R	R
	Large Pools	R	R	R	N	N	R	R
	Off Channel Habitat	A	A	A	A	A	A	A
	Refugia	A	A	R	A	A	R	A
Channel Conditions & Dynamics	Width:Depth	A	A	A	A	R	R	A
	Streambank Condition	A	A	A	A	R	R	A
	Floodplain Conn.	A	A	A	R	A	R	A
Flow/Hydrology	Change in Peak/Base Flow	R	R	R	A	N	A	R
	Drainage Network Increase	A	R	A	A	N	A	R
Watershed Condition	Rd Density & Location	R	N	R	R	N	R	N
	Disturbance History	R	R	R	R	R	R	R
	RHCA's	R	A	R	R	A	R	A

The condition of each MPI parameter is indicated in the following manner: A = properly functioning; R = functioning at risk; N = not properly functioning; and U = data unavailable.

*Properly functioning condition rating were not available for Lower Big Sheep Creek, but field observations and PFC ratings from Big Sheep Creek and the 4th level HUC were used to arrive at the values in Table BA-18.

#Properly functioning condition ratings were not available for Middle Imnaha River, but field observations and PFC ratings from the Lower Imnaha and the 4th level HUC were used to arrive at the values in Table BA-18.

Table BA-1: Bull Trout habitat within watersheds that contain land exchange parcels.

Watershed Name	HUC #	Miles of FMO	Miles of SR
Upper NF John Day River	1707020201	1.90	56.29
Upper Wallowa River	1706010501	8.41	5.08
Wenaha River	1706010603	10.36	58.31
Strawberry Creek	1707020108	24.99	27.16
Umatilla River/Mission Creek	1707010303	27.72	5.62
Upper Camas Creek	1707020205	0	23.29
Upper Eagle Creek	1705020310	21.17	41.18
Upper Imnaha River	1706010201	0	40.05
Upper John Day River	1707020106	5.30	55.61
NF John Day River/Big Creek	1707020203	27.10	8.8
NF John Day River/Potamus Creek	1707020207	40.03	0
Snake River/Divide Creek	1706010104	17.34	0
Snake River/Indian Creek	1705020107	52.83	4.36
Meachum Creek	1707010302	20.86	16.02
Middle Imnaha River	1706010202	17.97	8.75
Middle Wallowa River	1706010503	18.28	0
Lower NF John Day River	1707020210	22.07	0
Lower Wallowa River	1706010506	31.44	8.61
Lower Imnaha River	1706010205	22.98	0
Grande Ronde River/Rondowa	1706010601	27.70	0
Laycock Creek	1707020110	14.81	0
Lower Big Sheep Creek	1706010204	32.63	7.75
Lostine River	1706010502	9.96	16.22
Fields Creek	1707020111	20.26	0
Grande Ronde R/Five Points Creek	1706010404	21.71	16.07
Grande Ronde River/Mud Creek	1706010602	8.04	0
Bear Creek	1706010504	9.99	18.98
Big Creek	1707020303	22.29	29.62
Upper Big Sheep Creek	1706010203	25.62	22.73
Camp Creek	1707020302	17.93	35.72
Total Miles of Bull Trout in DPS		581.69	506.22

Table BA-2: Chinook salmon habitat within watersheds that contain land exchange parcels.

Watershed Name	Watershed Number	Miles of Chinook Habitat
SNAKE RIVER DPS		
UPPER BIG SHEEP CREEK	1706010203	24.23
LOWER BIG SHEEP CREEK	1706010204	6.97
GRANDE RONDE R/MUD CR	1706010602	3.45
LOSTINE RIVER	1706010502	24.80
LOWER IMNAHA RIVER	1706010205	28.92
LOWER WALLOWA RIVER	1706010506	23.66
MIDDLE IMNAHA RIVER	1706010202	26.02
UPPER WALLOWA RIVER	1706010501	23.53
GRANDE RONDE R/FIVE POINTS CR	1706010404	6.04
MEADOW CREEK	1706010402	10.43
MEACHAM CREEK	1707010302	1.13
Total for Snake River DPS		179.18
MID COLUMBIA DPS		
UPPER JOHN DAY RIVER	1707020106	10.88
BIG CREEK	1707020303	9.14
Total for Mid-Columbia DPS		20.02
TOTAL:		199.20

VI. MANAGEMENT ACTIONS

Potential effects to steelhead, Chinook salmon, and bull trout will focus on four primary areas of management: **forest management (logging), roads, water rights, and grazing by livestock**. The mechanisms involved in these activities that could affect fisheries will be described, and subsequently referenced in the effects discussions that follow. Net increase or decrease of habitat for threatened or endangered species being conveyed or acquired will be discussed rather than repeat specifics of each management activity (eg. Roads) or mechanism (eg. Culverts that prevent fish passage).

Forest Management – Logging of mid and late structural forested stands involves a few mechanisms that could result in effects to fisheries habitat. However, the majority of effects can be reduced or eliminated through retention of stream buffers.

1. Removal of trees that contribute to stream shade or could be recruited as large woody material in the channel can lead to degraded stream conditions. Increased stream temperatures can result from reduced shade, and reductions in future large woody material can lead to decreased pool frequency, less cover for fish, and decreased structural complexity in streams. These effects result in less usable fish habitat, increased watershed efficiency (a negative effect related to the rate that water escapes a landscape), and overall lower productivity for fish.
2. Skid trails, forwarder trails, temporary roads, and landings are typically involved in timber harvest operations, creating compaction, soil displacement, sites for accelerated erosion, and sites for invasion of undesirable weeds. When located outside of RHCA's and mitigated with proper restoration techniques these features have little or no influence on streams. However, if left un-mitigated or placed in RHCA's these features can contribute sediment to streams, change seasonal run-off patterns, and ultimately reduce fish habitat quality.
3. A third but less understood mechanism is the effect of reduced tree canopy over the landscape that can change snow accumulation patterns, and timing of peak flows.

Logging of mid and late structural forested stands would progress at a rate determined by timber markets and landowner objectives on private lands. Logging on Forest Service lands would proceed at a rate determined by Forest priorities and stand conditions. PACFISH/INFISH buffers would be applied to all logging on public lands. Buffers on private lands would be retained at least to the minimum required by the Oregon Forest Practices Act. Buffers on private lands would be marginal for protection of fisheries resources, but are considered adequate for maintaining water quality to Oregon DEQ standards. Table BA-4 contains forest structure information for the watersheds in this project that involve 5% or more of their area in exchange parcels (acquired and conveyed), and Appendix BA-3 shows acres and percent of stand initiation stands (SI, un-merchantable, early successional stands) and mid/late structure stands (represents stands with merchantable timber) by watersheds in the exchange. The information in Table BA-4 and Appendix BA-3 provides an idea of how many acres of merchantable timber is available and could be logged in the future.

Table BA-3 compares buffer widths between PACFISH/INFISH and Oregon Forest Practices Act. Table BA-3 is a summary of standard buffers by stream category, but there are many specific considerations that qualify these buffers that could not be summarized in table form. For example, the Oregon Forest Practices Act has different target basal areas for different stream sizes and types. These specifics are covered in detail in "Oregon's Forest Protection Laws, An Illustrated Manual", pages 21-33 (Logan 2002). The type of harvest is also used in determining what level of management can occur within riparian management areas (RMA). Likewise, the PACFISH/INFISH standards contain considerations for managing within RCHA's where such actions would help in the attainment of riparian management objectives (RMO). Stream and wetland protection measures used by the Forest Service are more protective of water and fisheries resources than the state of Oregon standards. For instance, state administrative rules require buffers on small type F, D and N streams that only restrict removal of non-commercial trees, allowing for the removal of trees that are most valuable as large woody material and shade production. Medium and large streams (type F, D and N) require buffers ranging

from 50'-100' (see Table BA-3) where basal area determined to be excess can be removed. This retains the trees immediately adjacent to streams, but allows for removal of some trees within the RMA that may contribute to stream shade, future instream structure and roughness elements in the floodplain. These narrower buffers of vegetation may be less effective in filtering sediment from runoff than PACFISH/INFISH RHCA's. Compared to PACFISH/INFISH standards, the Oregon Forest Practices Act likely provides protections for water quality and riparian habitat immediately adjacent to streams, but does not provide for the full complement of structure necessary for proper function, process and form of fish bearing streams.

The effects of upland logging are difficult to assess in terms of actual effects to fish populations, but it is reasonable to assume an increased likelihood of negative effects with increased acres of logging. It is also reasonable to assume that PACFISH/INFISH stream buffers include a greater margin of protection than the narrower buffers afforded by the Oregon Forest Practices Act. Therefore, logging on Forest Service lands would pose less of a risk to fisheries than logging on private lands.

Table BA-3: Comparison of stream buffer requirements from Oregon Forest Practices Act.

Stream Size/Class	Stream Type	Stream Buffer	Comments
Oregon Forest Practices Act			
Small	Type F	50'	Restrictions only apply to non-commercial trees for small type N streams.
	Type D	20'	
	Type N	10'	
Medium	Type F	70'	Logging of trees surplus to target basal areas is allowed within RMAs
	Type D	50'	
	Type N	50'	
Large	Type F	100'	Logging of trees surplus to target basal areas is allowed within RMAs
	Type D	70'	
	Type N	70'	
PACFISH/INFISH Applies to all Forest Service Lands			
Class I & II	Fish Bearing	300'	*Fully protected buffer
Class III	Perennial, No Fish	150'	*Fully protected buffer
Class IV	Intermittent	100'	*Fully protected buffer

Type F – Streams that have fish and may also be used for domestic water.

Type D – Streams used for Domestic water and have no fish.

Type N – All other streams that do not meet criteria for types F or D.

Small – Average annual flow of two cu. ft. per second or less or any stream with a drainage area less than 200 acres, generally less than four feet wide.

Medium – Average annual flow greater than two and less than ten cu. ft. per second, generally between 4-20 feet wide.

Large – Average annual flow greater than ten cu. ft. per second, generally greater than 20 feet wide.

RMA – Riparian Management Area

*Fully protected buffer – There are instances where RHCA's can be actively managed, but there are several criteria that must be met, and these activities would go through Level I consultation with the regulatory agencies.

Table BA-4 contains a summary of the acres of merchantable forest (mid and late structure available for harvest), non-forested acres, and miles of fish bearing, perennial (non-fish bearing), and intermittent streams, for the fourteen subwatersheds that involve at least five percent of their area in this exchange. There were actually fifteen subwatersheds that met the > five percent criteria in the proposed action, but once Alternative 5 (preferred) was finalized only fourteen met this criteria. The Imnaha River/Deer Creek subwatershed is still listed in Table BA-4 although only 4.3% of its area is in the exchange.

Of the 46 fifth level HUCs involved in this exchange, six account for 50% of the acres, and twelve account for 75% of the acres. This indicates that many watersheds involve extremely minor acreages that would not represent measurable changes to fisheries resources. However, there are fourteen subwatersheds (sixth level

HUC) that involve at least 5% (% acquired + % conveyed) of their area in this exchange, warranting closer examination. This is the same approach that was taken in the Hydrology report for the Draft EIS (page 9) to assess water quality and yield.

HUC 6	Subwatershed Name	SWS Acres	Mid and Late Forest Structure Available for Harvest					Non-Forested				
			Conveyed / % of SWS		Miles of Steam Class fish/perennial /intermittent	Acquired acres/ % of SWS		Miles of Steam Class fish/perennial /intermittent	Conveyed / % of SWS		Acquired / % of SWS	
Lower Snake Basin												
*170601020206	IMNAHA River/DEER CR	22998	0	0%	0/ 0/ 0.7	74	negligible	3.5/0/4.6	39	0.2%	940	4.1%
170601020304	BIG SHEEP CR/CARROL CR	16580	738	4.5%	.4/1.3/4.6	0	0%	0.0	327	2.0%	0	0%
170601020504	LOWER HORSE CR	12742	0	0%	0.0	267	2.1%	3.1/0/8.1	0	0%	753	5.9%
170601020510	IMNAHA RIVER/ THORN CR	20852	0	0.0%	0.0	203	1.0%	5.1/9/40.6	0	0%	3341	16%
170601060207	LOWER MUD CR	10995	450	4.1%	0/ 0/ 3.9	142	1.3%	0/2/4	497	4.5%	256	2.3%
170601060312	DRY GULCH	11967	0	0%	0.0	638	5.3%	0/0/1.3	0	0%	175	1.5%
170601060401	UPPER CHESNIM CR	19000	0	0%	0.0	626	3.3%	1.1/1/2.2	0	0%	714	3.8%
Middle Columbia Basin												
170701030203	BUTCHER CR	25760	1954	7.6%	3.6/6.3/13.2	1691	6.6%	4/6.7/12.9	1150	4.5%	967	3.8%
John Day Basin												
170702010402	BARK CABIN	15995	0	0%	0.0	928	5.8%	2.1/0/3.9	0	0%	128	0.8%
170702010803	BEAR CR	12448	2520	20.2%	3.6/1.4/9.7	2	0%	0/0/0	12	0.1%	0	0%
170702020305	NF JD /ORIENTAL	15740	0	0%	0.0	255	1.6% **	0/4.8/5.2	0	0%	4	0%
170702020306	TEXAS BAR	19904	0	0%	0.0	2143	10.8%	2.1/3.9/ 13.5	0	0%	25	0.1%
170702020601	SNIPE	27606	768	2.7%	0/5/4.8	0	0%	0.0	379	1.4%	0	0%
170702020804	UPPER WILSON	26657	0	0%	0	0	0%	3.3/1.8/7	0	0	60	0.20%
170702021001	UPPER DEER CR	16467	1970	12%	1.4/8/3.9	232	1.4%	0/0/6	282	1.7%	7	0%

* Watershed 170601020206, IMNAHA RIVER/DEER CREEK does not involve >5% of its area in alternative 5. After changes between alternative 1 and 5 were made only 4.3% of the subwatershed acres are involved (0.2% conveyed & 4.1% acquired).

** 1720 acres of recently harvest land (structure = SI) would be acquired in the Upper Wilson SWS, which, with the non-forested acres accounts for about 6.7% of the subwatershed, and about 1600 acres (7% of the SWS) of SI structure in the North Fork John Day/Oriental SWS.

Roads – There are many road and access related issues that are being considered in this exchange, although site-specific decisions concerning roads is not a part of the BMLEX decision. Page 2 of the Roads Specialist Report states in assumptions that: 1) “any deferred road maintenance activities related to public safety, protection of cultural resources, or protection of Threatened and Endangered species, or related to providing functional drainage would be implemented as soon as possible following the exchange, most likely within the first year” (Assumption #3, BA p. 4) , 2) “Roads that are currently closed for public access will remain closed.” and 3) “Roads that are currently open for public access will remain open and maintained for High Clearance vehicles, except where roads need to be closed for public safety reasons”. Roads are relevant to fisheries in the following ways:

1. Roads located within RHCA’s often occupy up to half of the riparian area, restricting lateral channel migration and full use of the floodplain.
2. Roads create barriers to fish movement where culverts are undersized, too steep, or perched.
3. Native surface and gravel surface roads often contribute sediment to nearby streams, particularly when drainage structures are absent or poorly maintained. This can contribute to increased substrate embeddedness, thereby reducing effectiveness of spawning habitat or contributing to mortality of fish eggs.
4. Roads can increase the drainage network on a watershed scale, increasing watershed efficiency when roads become hydrologically connected to streams. This results in more rapid movement of water from landscapes, as roads become conduits for water rather than water infiltrating through the soil and being slowly released over a longer time period. The effect to fish is changes in water quantity and peak flow timing that can interrupt migration, decrease available refugia, and create seasonal in-stream barriers to fish movement.

Considering the first assumption on page two of the Roads Specialist Report, the most pressing effects to listed fisheries would be addressed on acquired roads within one year of this exchange. Other less direct effects to fisheries would be addressed later (first decade) and would depend on availability of funding and Forest priorities. Roads that remain in private ownership are generally in poorer condition than roads on Forest Service lands. Roads that are acquired by the Forest Service are more likely to be maintained to reduce sediment, culverts replaced and maintained to accommodate fish passage, and draw bottom roads decommissioned or relocated to restore floodplain function. Roads conveyed from Forest Service to private could expect to be maintained only to address immediate needs for logging or access by the landowner. Drainage structures are likely to be less frequently maintained and one would expect no decrease in roads within RHCA’s on private lands. Although best management practices are intended for forest operations on non-federal lands (Hydrology report page 23), very little oversight is available to enforce these requirements, and some of the poor road conditions found on private lands are not associated with “forest operations” and would not fall under the authority of the Oregon Forest Practices Act. Roads within 300’ of a stream are more likely to contribute to the detrimental effects discussed above. Table BA-5 is a summary of roads (open and closed) involved in the exchange, and displays miles of road within 300’ of streams.

Table BA-5: Roads Summary (miles).

Acquired roads	96
Acquired roads within 300’ of streams	53
Conveyed roads	56
Closed roads	28
Open roads	25
Net Change	+ 40

Future activities associated with timber management will involve road construction, reconstruction, temporary roads, etc. However, with much more land being acquired by the Forest Service than conveyed to private the road density is likely to decrease relative to the current condition. The Forest Service has road density standards and guidelines to ensure that road densities are kept below established maximums. The locations and drainage networks as they relate to water quality and fisheries habitat are always considerations in road design on Forest System lands.

The drainage network in the affected watersheds may improve as 30,907 acres and 96 miles of road comes under Forest Service management. Road maintenance, requiring log haul during dry or frozen conditions, and decommissioning of unneeded roads will mitigate sediment delivery to streams from Forest Service roads. As for conveyed lands, specific road standards that address stream crossings are included in the Oregon Forest Practices Act. The Forest Practices Act also includes requirements for road placement, culvert specifications, other drainage structures, and how to dispose of road waste materials. These standards are designed to reduce the effects from roads on fisheries and water quality. Standards for Forest Service roads exceed those for private land, thus include an additional measure of protection for fisheries and water quality. Forest Service roads generally receive more use, but are likely to receive more regular maintenance than comparable roads on private property. Detrimental effects from roads on listed fisheries will likely be less on Forest Service roads, so the amount of road miles coming from private to Federal represents potential improvements or reduced negative effects from the existing condition.

The changes in road density that may occur on lands conveyed to private ownership is not practical to quantify due to the uncertainties involved in specific road needs for each parcel and logging operation, but can be discussed in general, qualitative terms. Conveyed parcels that do not have a road system in place to facilitate logging will likely experience increases in road densities. The fifth level HUC watersheds most likely to experience increases in road densities are those that currently contain merchantable timber (Appendix BA-3 and Table BA-4). Table BA-15 summarizes the potential for increases in road density for watersheds that contain conveyed steelhead habitat and merchantable timber. The estimated need for additional roads is based on an excerpt from “Society of American Foresters, Forestry Handbook, Logging Chapter, 05/27/1980”. Although over 25 years old, this reference likely still applies to most private forest lands where ground based (skidder) logging remains the most common logging system employed.

The five fifth level HUCs in table BA-15 are those containing parcels for conveyance that also have steelhead habitat, and roads. All parcels for conveyance are displayed if they involved roads AND merchantable timber, whether they would convey steelhead habitat or not. The purpose of this table is to key in on the places where road densities are most likely to increase as an indirect result of this land exchange. Table BA-16 summarizes the existing road densities for only the parcels contained in Table BA-15. Road densities in Table BA-16 can be compared to a threshold density of 5 miles per square mile that represents the typical road density required to access merchantable timber for ground based logging systems. Ground based logging systems, typically skidder, is by far the most common method of extracting timber from private timber lands in northeast Oregon, although mechanical harvesters and forwarders that require fewer roads than conventional skidders are being utilized on some industrial timber lands.

Road densities in Table BA-16 were calculated for only the conveyed acres (total acres of parcels, including non-forested areas) within 5th level HUCs where steelhead habitat is proposed for conveyance. Strawberry Creek (1707020108) is the only watershed that currently exceeds 5 miles/square mile, therefore would expect to require no or minimal additional roads to access merchantable timber once conveyed. The other four watersheds are currently below the 5 miles/square mile threshold and would require additional roads to access merchantable timber. The far right two columns of Table BA-15 display the total road densities by 5th and 6th level HUCs for the watersheds where steelhead habitat would be conveyed. These densities provide a broader perspective of the road situation in these watersheds.

Roads that would not change jurisdiction would remain under Forest Service maintenance (except in the rare occasions where such roads are County or other jurisdiction). Roads that would transfer jurisdiction with the parcels would become the responsibility (maintenance) of the new landowner. Generally roads that stay under Forest Service jurisdiction would remain on a more regular maintenance schedule and be maintained to a higher standard than roads that are conveyed to private parties.

Table BA-15: Roads associated with conveyed merchantable timber in watersheds where steelhead habitat will be conveyed.

Watershed Name and 5 th Level HUC	Parcel	Parcel Acres	Acres Merch. Timber Conveyed	Miles of Road in parcel	Miles of Road, no change in jurisdiction	Miles of Road, jurisdiction transferred with parcel	*Total Rd Density Mi./Sq. Mi.	
							6 th HUC	5 th HUC
Mid-Columbia DPS								
Beech Creek 1707020109	FM11	64	27	0.9	0.6	0.3	1.7-4.7	1.7-4.7
	FM12	236	229	2.0	1.8	0.2		
	FM13	317	317	0.7	0.0	0.7		
		617	387	3.6	2.4	1.2		
Lower NF John Day River 1707020210	FM18	480	436	3.2	0.0	3.2	1.7-4.7	Umatilla portion to is 0.7-1.7
	FM17	596	582	3.7	0.9	2.8		
	FM19	309	191	0.7	0.0	0.7		
	FM20	41	41	0.3	0.0	0.3		
	FM21	241	233	1.7	0.9	0.8		
	FU27	102	7	0.4	0.0	0.4		
	FM15	325	321	0.0	0.0	0.0		
	FM16A	246	138	0.0	0.0	0.0		
	FM16B	82	67	0.0	0.0	0.0		
		2422	2016	10	1.8	8.2		
Strawberry Creek 1707020108	FM4	368	361	4.1	0.0	4.1	>4.7	>4.7 Portion that contains Strawberry Wilderness is 0.7-1.7
	FM6	302	302	4.2	0.0	4.2		
	FM7	322	322	3.2	0.0	3.2		
	FM8	581	581	6.2	0.0	6.2		
	FM5	326	326	1.7	0.0	1.7		
	FM9	398	384	3.8	1.8	2.0		
	FM10	314	308	1.6	0.6	1.0		
		2611	2584	24.8	2.4	22.4		
Snake River DPS								
Big Sheep Creek 1706010203	FW10	640	487	4.3	3.4	0.9	>4.7	1.7 - 4.7
	FW6C	43	5	0.3	0.0	0.3		
	FW9	422	210	0.0	0.0	0.0		
	FW11	41	41	0.0	0.0	0.0		
		1146	743	4.6	3.4	1.2		
Meadow Creek 1706010402	FW18	279	124	0.8	0.0	0.8	1.7-4.7	1.7 - 4.7
		279	124	0.8	0	0.8		

*Total road densities for the 5th and 6th level HUCs come from “Road Density Analysis Interagency Implementation Team, Steelhead and Bull Trout BO’s”, Marcia Eguchi, April 29, 1999.

Table BA-16: Road densities for conveyed parcels containing merchantable timber, in 5th level HUCs where steelhead habitat would be conveyed. Road densities are presented in terms of miles/square mile.

Watershed Name and 5th Level HUC	Parcels	Parcel Acres	Miles of Road in Parcel	Existing Road Density for these Parcels Combined
Mid-Columbia DPS				
Beech Creek 1707020109	FM11	64	0.9	3.75
	FM12	236	2.0	
	FM13	317	0.7	
Lower NF John Day River 1707020210	FM18	480	3.2	2.65
	FM17	596	3.7	
	FM19	309	0.7	
	FM20	41	0.3	
	FM21	241	1.7	
	FU27	102	0.4	
	FM15	325	0.0	
	FM16A	246	0.0	
	FM16B	82	0.0	
Strawberry Creek 1707020108	FM4	368	4.1	6.08
	FM6	302	4.2	
	FM7	322	3.2	
	FM8	581	6.2	
	FM5	326	1.7	
	FM9	398	3.8	
	FM10	314	1.6	
Snake River DPS				
Big Sheep Creek 1706010203	FW10	640	4.3	2.57
	FW6C	43	0.3	
	FW9	422	0.0	
	FW11	41	0.0	
Meadow Creek 1706010402	FW18	279	0.8	1.82

Water Rights – The relevance of water rights to fisheries relates to in-stream water being available for fish in sufficient quantities and timing to provide for the life history requirements of fish and their food sources. Over-allocated water resources can leave streams dry or with inadequate flows to support fish during parts of the year, generally during summer and fall. Some key points regarding water rights:

- The official position of the Forest Service as stated by the Chief, Principle 1: Water Uses on Forest Service lands: *“We recognize and respect the authority of states to allocate water available for appropriation. We respect valid, existing water rights and will manage water resources on NFS lands to minimize impacts adversely affecting the exercise of such rights”* (Bosworth 2004).
- Federal reserved water rights will be lost on conveyed property, and will not accompany acquired property.
- Water rights (other than Federal reserved rights) would be transferred with land parcels.
- Specific decisions about changes to water rights, presumed abandoned water rights for example, would not be made early enough in the EIS process to incorporate specifics into this analysis.
- Three streams indicate potential for modeled flow reductions of 5% or more under this project: Joseph Creek, Meachum Creek, and Middle Fork John Day River.

- The Forest Service does not cancel water rights (administration policy). However if presumed abandoned water rights were cancelled that would not necessarily result in an increase in water for streams. The streams involved are generally over adjudicated so additional water freed up by cancelled water rights would go to other existing rights. Presumed abandoned water rights will be acquired as they are and when the Forest Service gets to adjudication there may be an opportunity to put them into instream use. For the other rights, which are substantial, there may be opportunities to work with conservation groups to lease this water for instream uses. However, these specific opportunities are not part of the action under consultation.

Table BA-6 shows that 75 land exchange parcels contain water rights or water developments. Of these, 18 water rights on lands proposed for acquisition and one on a conveyed parcel has been in non-use status for more than five years. Some of these are presumed abandoned for more than 20 years (Bliss 2004).

Table BA-6: Exchange Parcels with Water Developments and/or Water Rights.

National Forest	Parcels	# of parcels
Malheur – conveyed lands	FM2, FM9, FM10, FM15, FM16A, FM17, FM18, FM19, FM21	9
Malheur – acquired lands	PM4, PM5, PM7, PM30	4
Umatilla – conveyed lands	FU3A, FU3C, FU3D, FU30	4
Umatilla – acquired lands	PU1A, PU1B, PU5, PU7B, PU7C, PU9A, PU11B, PU15, PU16C, PU16E, PU16H, PU19, PU20, PU22A	14
Wallowa-Whitman – conveyed lands	FW1D, FW6A	2
Wallowa-Whitman – acquired lands	PW3, PW7B, PW7C, PW8A, PW8B, PW8C, PW10B, PW11, PW12, PW13D, PW14, PW15A, PW15B, PW16C, PW16D, PW19B, PW20B, PW20C, PW21C, PW21D, PW23B, PW24A, PW24C, PW24D, PW24E, PW24H, PW25B, PW25C, PW25E, PW27C, PW30, PW34A, PW34C, PW38, PW39A, PW39B, PW39C, PW40, PW48, PW50, PW51A, PW52	42
Total Number of Parcels		75

This project will result in some changes to water developments, water uses, and water rights that have a low potential to result in effects to instream water that is important to listed fish species. Specific information (not necessarily pertinent to this BA) compiled and located in Appendix BA-4 for each water development, water use, and water right includes:

- **Type of Water Development:** well, reservoir, spring diversion, stream diversion.
- **Water Use or Purpose:** domestic or human consumption, irrigation, mining, stock, stock/wildlife, wildlife, railroad, fire protection, and instream (fish and aquatic life).
- **Diversion Rate:** in terms of cfs, if known.
- **Season of Use**
- **Comments**

The Forest Service would acquire 60 parcels with water developments and/or water rights and would convey 15 parcels with water developments and/or water rights. For specific information on each parcel refer to Appendix BA-4.

Water developments and water rights appurtenant to parcels subject to exchange would pass to the new landowners with the exception of Federal reserved water rights which would not be transferred on conveyed parcels.

Federal reserved water rights that may be appurtenant to any single Federal parcel with reserved status are:

- Water needed for fire protection and control.
- Water needed for constructing and maintaining access roads for timber production and watershed protection activities.
- Water needed for irrigation of tree nurseries, seed orchards, and other facilities devoted primarily to the supply of timber or watershed protection.
- Water needed for maintaining Forest Service riding and packstock used in the administration of the Forest Service.
- Water needed in connection with special uses where the user is engaged in activities carried out for watershed protection or timber production on Forest Service lands.
- Water needed in the form of instream flows sufficient to maintain the stability of stream channels for favorable conditions of waterflow and protection against the loss of productive timber lands adjacent to the stream channels.

Any of the above-listed reserved water rights that may exist on Federal parcels subject to the proposed exchange would become void upon conveyance to private ownership. No Federal reserved water rights would be received from or for acquired lands.

Part or all of 18 water rights on acquired lands and 1 water right on conveyed land have been in non-use status for more than 5 years. Most of these water uses are presumed abandoned for at least 20-40 years. When a water right is not used for more than 5 years, it is subject to a rebuttable presumption of forfeiture [ORS 540.610(1)]. This law allows a landowner to overcome the presumption of forfeiture after successfully using a presumed abandoned right for 15 years [ORS 540.610(2)(f)]. These water rights will likely remain inactive once they are acquired by the Forest Service. However, this will not result in more water in streams since many streams are already over-allocated regardless of the status of these rights that remain in non-use status. There will be no change to in-stream water available to fisheries as a result of changes to these 20 water rights.

The potential effects from water developments and rights on streamflows would be more pronounced in the fall than in the spring due to lower streamflows. Streams that could experience at least a 5% reduction in streamflow at some time of the year are: Big Sheep Creek, Horse Creek, Corral Creek, Dodson Creek, Thorn Creek, Tully Creek, Cow Creek, Joseph Creek, Doe Creek, Chesnimnus Creek, Meacham Creek, Idaho Creek, Olmstead Creek, Deadwood Creek, Swamp Gulch, Big Creek, Deep Creek, Middle Fork John Day River and Deer Creek. Of the developments and rights that could affect at least 10% of streamflow, all appear to have been abandoned except Permit S-49249 for irrigation from Joseph Creek and the domestic development on Doe Creek. Although the modeled effect on stream flow is as high as 100% reduction on some streams, there truly will not be an effect from this project since the water rights involved have been inactive for so long.

ODFW instream water rights were considered in the water rights analysis for comparison with the modeled flow reductions. Only three streams indicated modeled flow reductions of 5% or more: Joseph Creek, Meacham Creek, and Middle Fork John Day River. Joseph Creek is the only stream that would have a streamflow increase if the water right were cancelled; water uses on the other streams appear to have been abandoned.

All of the water developments and/or water rights listed in Appendix BA-4 would require between 1 and 6 individual actions to bring them into compliance with state water law. About 315 individual actions have been identified. Total modeled costs for private and Forest Service would be about \$13,240 plus \$2,680/yr. The cost in time involved in getting acquired water rights into compliance with state water law will likely result in the acquired water rights remaining in non use status.

A potential adverse effect from the exercising of water rights is impairment of fish passage at diversion structures; however, no such structures are known to exist on exchange lands. The only water rights that required a closer look to assess effects to fish passage were parcels PW34A and PW34B on Joseph Creek and PW24A on Big Sheep Creek. The water right on Joseph Creek is for placement of a pump in the Creek, so there would be no obstruction to fish passage. The water right on Big Sheep Creek is too small to adversely affect fish passage.

Probable beneficial effects of exercise of water rights/developments include: 1) water storage in reservoirs that regulates downstream flows later in the year; 2) sediment storage in reservoirs; 3) off-channel water for livestock and wildlife provided by upland spring developments; and 4) cold water return flows from irrigated areas adjacent to streams. The beneficial effects attributed to specific water rights involved in this exchange are impractical to measure because of their minute scale or the unpredictability of their use status in the future.

Diversion and consumptive use of water represents an irretrievable commitment of water resources to out-of-stream uses during the time water is diverted. Storage (in reservoirs) represents an irretrievable commitment because water loss by evaporation is higher than water loss by evapo-transpiration from soil and plants. Instream use is retrievable when water rights are not exercised (and related facilities are decommissioned) or are temporarily transferred to instream uses. All three Forest Plans require compliance with state water rights laws. In order to comply with current Forest Plan direction, the following steps need to occur following this land exchange:

- Request that OWRD add newly acquired water rights to the Forest's Annual Water Use Report, and delete the water rights conveyed.
- Inspect and modify newly acquired water developments as needed to ensure they are developed in accordance with the terms and conditions in the water right permit or certificate.
- Acquire water rights for unauthorized water developments or decommission those developments.
- Correct inaccuracies on water rights permits or certificates.
- Use water at least one year in 5 to avoid forfeiture or inform OWRD that water use has been abandoned.
- Cooperate with OWRD in investigations of presumed abandoned water uses.

These steps will eventually lead to better information and ease of tracking the effects of water rights and developments on in stream water availability.

Effects to listed fisheries are not absolute and are tied to the legal and administrative procedures involved in administering water rights and developments. Assuming that all the requirements of OWRD are implemented, the important point to focus on in regard to water rights and fisheries is that 60 water rights/developments will be acquired by the Forest Service and 15 will be conveyed. In no case will this land exchange result in less water remaining in streams for fish compared to the existing condition. So the effect to instream flow from this project will be negligible in regard to fisheries.

Livestock Grazing – All watersheds in this exchange have some level of grazing by livestock, mostly cattle, but some sheep and horse grazing is permitted. Forest Service rangelands are managed to standards outlined in PACFISH/INFISH and to meet terms and conditions of biological opinions that cover specific allotments. PACFISH and INFISH establish riparian management objectives (RMO) and provide standards and guidelines designed to attain or maintain RMOs. RMOs exist for pool frequency, water temperature, large woody material, substrate sediment, bank stability, lower bank angle, and width to depth ratio. All of these RMO's are directly or indirectly addressed by the matrix indicators, primary constituent elements and essential features discussed in section VII of this BA. Allotment management plans (AMP) are consulted on through the Level I consultation process whereby specific standards and monitoring are agreed to. The standards for range and riparian conditions will not change as a result of this land exchange. Acres will be added and subtracted from allotments, AUM's will be reduced in some allotments, but regardless of these changes the standards agreed to in previous consultations will not change. Therefore, the changes to allotments will be discussed, but do not

necessarily represent changes (positive or negative) to range or riparian conditions. Additionally, any riparian fencing that has been installed to address site specific grazing problems would not be removed or changed as part of this project. Therefore, rest and recovery of enclosed riparian areas on Forest Service lands would continue following implementation of this decision. Riparian enclosures installed on previously privately owned lands under agreements with ODFW would also remain in place following this exchange. Site specific modifications to riparian fencing may be addressed later in project specific analyses. The following list of likely negative effects from grazing have all been either considered and mitigated in existing biological assessments for AMPs or will be when AMPs are updated and taken through Level I consultation.

The most likely negative effects that grazing poses to fisheries habitat are as follows:

1. Retarding development of a shrub layer next to streams caused by cattle “lounging” in riparian areas for too long. This could lead to increases in water temperature as shade is reduced or prevented from developing.
2. Hoof shear and overgrazing of streamside grasses and forbs can contribute to bank instability, changing stream morphology at a localized scale and creating point sources for sediment. These effects can ultimately lead to bank instability, reduced bank angle, and substrate embeddedness, which lead to reduced quality of fish habitat for spawning, foraging, migration and rearing.
3. Intense and focused cattle use in riparian habitat conservation areas (RHCA) degrade riparian habitat through compaction, denuding of vegetation, point sources of nutrients, and establishment of undesirable weeds. Livestock trailing, bedding, salting, loading, and handling facilities are some of the focused uses that result in detrimental effects to RHCA’s. These activities near streams can lead to degraded water quality, sediment and nutrient input to streams, and damage to stream banks that cumulatively decrease fish production and survival.
4. Direct damage to redds can occur if cattle are permitted to graze along spawning streams while fish are spawning or emerging. This occurs when cattle travel in or across streams. There is the potential for direct damage to redds where fish eggs are crushed or knocked loose and flushed downstream. There is also the possibility for cattle to disrupt spawning behavior of fish by keeping males from fertilizing eggs, or by chasing females from redds while in the process of depositing eggs. These effects can result in direct mortality of eggs and reduced production of fish from the affected spawning cycle(s).

Forest Service lands that have permitted livestock grazing are generally maintained in better condition than non-federal lands that are grazed, although examples of degraded rangelands can be found on federal and private lands. This difference is largely due to the standards and guidelines that govern grazing on public lands, and the monitoring and oversight provided by the interested public and regulatory agencies. There are no state laws that govern grazing on privately owned lands. There is also no outside oversight for grazing on private lands. I should qualify that this assertion is based on 11 years of observations in central and northeastern Oregon, and applies mainly to larger landowners who allow grazing on their lands secondary to timber management objectives. For the above stated reasons, lands coming from private to Forest Service are expected to improve over time in regard to RMOs, and Forest Service lands conveyed to private are expected to degrade or maintain over time if subjected to livestock grazing.

In most situations conveyed lands are such a small part of the allotments, there will be no increases in stocking levels. The Forest Service will continue to administer allotments to assure that PACFISH/INFISH standards and guidelines are met and that allotments are meeting or moving toward a satisfactory condition, RMOs in the case of riparian areas. If there is a change in the ability of managers to maintain desired conditions adjustments in stocking will be made through administrative or environmental analysis of allotment management plans. For this reason, it is not automatically assumed that a reduction in AUM’s in an allotment will result in improved range conditions. Appendix BA-2 details changes to allotments in terms of acres and stocking.

VII. MATRIX INDICATORS (Primary Constituent Elements & Essential Features)

The action under consultation (Blue Mountain Land Exchange) will not result in changes to the matrix indicators. Future projects that occur on acquired lands will be consulted on individually and effects to the indicators will be assessed in biological assessments specifically for those projects. Future actions on conveyed lands that could result in “take” of listed species would require the landowner to meet the requirements of section 10 of the Endangered Species Act (incidental take permits and habitat conservation plans). However, a general assessment is provided here on how indicators may be affected through changed management emphasis and indirect effects that may eventually result from this exchange. Potential effects were considered cumulatively at the 5th field HUC, and at the project scale. Since any actual effects to fisheries habitat would occur later in time as a result of changes in management emphasis and regulatory controls, there is no utility in attempting to project site specific effects to each matrix indicator by parcel. However, it is reasonable to predict upward (“restore”), downward (“degrade”) or neutral (“maintain”) trends for the indicators based on net changes in ownership (quantity and patterns). Generally acquired parcels would experience upward or neutral trends, while conveyed parcels would maintain or degrade in regard to many of the indicators. For conveyed parcels the indicators most directly associated with forest management would likely maintain through protections afforded by the Oregon Forest Practices Act, whereas those indicators more influenced by livestock grazing are likely to maintain or degrade.

In addition to matrix indicators, there are other similar parameters used to specifically assess the effects of actions on listed critical habitat for bull trout, steelhead, and Chinook salmon. Critical habitat for steelhead trout and bull trout is assessed through primary constituent elements (PCE) and Chinook salmon critical habitat uses essential features (EF). In order to reduce redundancy, some of the matrix indicators are grouped based on logical categories and each indicator or group of indicators is associated with PCE’s and essential elements. Then a brief determination and rationale for the determination is provided. Appendix BA-10 contains lists of all the PCE’s and EF’s that apply to this project. Appendix BA-10 assigns numbers to the three respective lists (of PCE’s and EF’s) which are referred to below in the discussions of the matrix indicators. Appendix BA-11 is also provided as a summary for how each of the four management categories may effect (in terms of trend) the matrix indicators. The indicators in Appendix BA-11 are listed individually rather than grouped.

1) Subpopulation Size, Growth and survival, Life history diversity and isolation, Persistence and genetic integrity (These matrix indicators are not specifically related to the PCE’s or EF’s)

Determination: This land exchange project will likely have no direct effect on these indicators due to the broad geographic distribution of parcels. However, in some cases where concentrations of stream miles are being acquired (eg. Imnaha River) there may be an upward trend in these indicators as habitat recovers under Forest Service management.

Rationale: Many fifth level HUCs contain miniscule amounts of land in this exchange, which dilutes the potential for effects except at the site specific scale. Indicators that involve subpopulation size, growth, and survival will not likely experience any measurable changes as a result of this project. Exceptions may be where several miles of fisheries habitat is acquired and subsequently managed with threatened species recovery as a primary objective. The Imnaha River (and Big Sheep Creek) is an example of where a substantial amount of fisheries habitat would come under a more protective management regime which could result in an upward trend in these indicators over time (see Appendix BA-9, Maps 6 & 8).

2) Physical barriers (Chinook EF #3, Steelhead PCE #3, Bull trout PCE #6)

Determination: There will be no direct effect to this indicator, however there could be an upward trend for this indicator as culverts are removed or replaced to restore fish passage.

Rationale: There is a high likelihood that culverts posing barriers to fish passage on acquired lands will

be replaced or removed to restore fish passage. These specific actions would be consulted on separately from this exchange project.

3) Chemical contaminants/nutrients (Chinook EF #2, Steelhead PCE #1, 2, & 3, Bull trout PCE #8)

Determination: This project would have no effect on chemical contaminants, but there could be a decrease in levels of point source nutrients in the future.

Rationale: Some of the acquisition parcels on the Imnaha River have cattle handling facilities within or immediately adjacent to RHCA's that are likely sources of high nutrient input to streams. These will decrease following acquisition as the Forest Service abandons use of them and works to restore the vegetation on these sites. Restoration of these facilities would be consulted on separately.

4) Large Wood, Pool frequency and quality, and Large Pools (Chinook EF #1, 2, 5, 6, 8, & 9, Steelhead PCE #2 & 3, Bull trout PCE # 2)

Determination: This land exchange will have no direct effect on the large wood component of streams or the frequency or condition of large pools. An upward trend for these indicators is expected on acquired lands as RHCA's are managed for mature and old growth forest structure which eventually contributes to down wood and large pool development. Conveyed lands would likely maintain through the application of Oregon Forest Practices Act standards.

Rationale: Large wood levels will likely increase over time as wider riparian management areas are applied to acquired lands and forested riparian areas are managed with large wood for streams as a primary objective. In some cases active restoration will occur on acquired lands which will accelerate the recovery of these indicators. Generally the likelihood of active stream restoration is greater on Forest Service lands than on private.

5) Stream Substrate, Percent Bank Stability, Width:Depth Ratio, Off Channel Habitat, RHCA's, Streambank Condition, and Temperature (Chinook EF #2, 4, 5, 6, & 7, Steelhead PCE #1, 2, & 3, Bull trout PCE #1, 2, & 3)

Determination: Most of these matrix indicators involve biophysical conditions of streams, mainly stream morphology and riparian vegetation. Temperature can be a function of riparian vegetation and stream morphology. Although groundwater is a major determinant of water temperature, width to depth ratio, presence of large pools, and riparian vegetation are important for the maintenance of water temperature. None of these indicators would be directly affected by this action. However, an improving trend is expected within the first decade due to improved management of RHCA's and roads on acquired parcels.

Rationale: The BMLEX will not change sediment delivery rates to streams within or downstream from the watersheds containing exchange parcels. Future management activities could result in increases in sediment that could lead to a short-term degradation of this indicator at the site-specific level. Project specific consultations will address the potential for increased sediment delivery to streams. Overall it is expected that the positive effects from improved grazing practices, improved road management and less intense logging on lands acquired by the Forest Service will lead to improvements for these indicators.

6) Floodplain Connectivity, Changes to Drainage Network, & Road Density and Location

(Chinook EF #1, 2, 3, & 9, Steelhead PCE #1, 2, & 3, Bull trout PCE #4, 5, & 6)

Determination: The BMLEX will not directly change the existing connectivity between streams and their floodplains, or the drainage network as it relates to roads and other man-made structures that alter drainage networks. Existing conditions will be maintained at all scales in the short-term but an upward trend is expected within the first decade as draw bottom roads are decommissioned and drainage structures maintained on acquired roads.

Rationale: There is potential for future active management to improve connectivity on streams acquired by the Forest Service through decommissioning of un-needed or poorly located roads. The likelihood of roads being decommissioned to improve water quality and riparian function is greater on Forest Service

lands than on private. Decommissioning of roads in riparian areas will restore drainage networks, reduce road density, and improve floodplain connectivity relative to the existing condition. These efforts will be higher priority near streams that support Federally listed fish, and will go through project specific planning and Level I consultation that addresses specific effects. Oregon Forest Practices Act rules will apply to road work associated with timber management on conveyed lands. These rules are recognized by Oregon DEQ as adequate to maintain state water quality standards.

7) Refugia (Chinook EF #3, 5, 6, & 7, Steelhead PCE #1, 2 & 3, Bull trout PCE #5 &6)

Determination: Refugia represents many aspects of fish habitat at localized and larger scales. Thermal refugia, juvenile refugia, and escapement (predator avoidance) refugia are all meaningful ways of considering this indicator. The BMLEX is likely to lead to an upward trend for all types of refugia habitat within the first decade on acquired streams. This indicator would likely maintain on most conveyed lands, but could degrade where cattle's grazing is not managed for properly functioning riparian conditions.

Rationale: Some types of refugia habitat will increase as large wood is recruited to streams and subsequent large pools develop. Large pools provide depth and turbulence cover used by individuals escaping predation. Large wood also increases the structural complexity of stream habitat offering numerous options for cover to elude predation.

Improved grazing by livestock, recovery of stream banks through PACFISH/INFISH RHCAs, and improved road management will combine to improve several matrix indicators over time that contribute to refugia. As cattle are managed to spend less time in riparian areas bank stability would increase, bank condition would improve, and stream substrate would improve as embeddedness decreases. These areas of recovery will provide refugia in the form of undercut banks and interstitial spaces in the substrate for several smaller age classes of fish. Temperature would also be positively affected through this recovery through increased shade. Recovery of overhanging vegetation also provides cover from predators for fish.

8) Changes to Peak & Base Flows (Chinook EF #1, 3, & 9, Steelhead PCE #1, 2 & 3, Bull trout PCE #4)

Determination: Future actions that result from implementation of the BMLEX are not likely to cause changes in peak and base flows. If changes were to occur, they are not expected to reach measurable levels, nor would minor changes result in adverse effects such as accelerated stream bank erosion or channel scouring.

Rationale: These effects are not expected to reach the magnitude where listed fish or their habitat would be affected and would not be measurable at the 6th field scale. No change in existing condition is expected at the 5th field scale. This determination is based on the relatively small scale of land involved in this exchange in most subwatersheds. The 14 subwatersheds that involve 5% or more of their area in the exchange (see Table BA-4) have the greatest potential to experience changes in peak and base flows, but these changes are dependant on future management. Future projects that could affect peak and base flows would go through Level I consultation or be subject to ESA Section 10 requirements.

9) Disturbance History & Regime

Determination: The combination of management activities (logging, burning, road work, etc.) that may occur following the BMLEX will likely create newly disturbed areas on the landscape. This will add to the aggregate level of disturbance in each of the affected 6th field watersheds. This indicator may be degraded at site-specific scales where land is conveyed and is subject to less stringent environmental regulations. This indicator is likely to improve on lands acquired by the Forest Service where more stringent environmental regulations apply. There will undoubtedly be a wide range of activities occurring on Forest Service and private lands in these watersheds, but there is likely to be a net improvement in the disturbance history/regime indicator due to the net increase of land coming under Federal management. It is likely that this level of disturbance will not be of the magnitude where effects to streams occupied by listed fish would occur, so the existing condition will likely be maintained or improve on Forest Service lands as restoration work proceeds in the future. Similarly, the effect at the 6th field watershed scale is minimal, and no change in baseline condition is expected.

Rationale: Watersheds in the exchange generally involve less than 5% of their area being exchanged (conveyed + acquired), with the exception of 14 subwatersheds (Table BA-4). There are four subwatersheds that contain a substantial percentage of their area that is being conveyed. These are:

- 1) Lower Mud Creek (Lower Snake Basin, 170601060207) with 8.6% of its area being conveyed and 3.6% being acquired for a net reduction in Forest Service land of 5%;
- 2) Butcher Creek (Middle Columbia Basin, 170701030203) with 12.1% of its area being conveyed and 10.4% being acquired for a net reduction in Forest Service land of 1.7%, however, PACFISH RHCA's were removed from conveyed parcels (except 0.05 miles of bull trout FMO habitat in FU1) and will be retained by the Forest Service;
- 3) Bear Creek (John Day Basin, 17070201080) with 20.2% of its area being conveyed and none being acquired; and
- 4) Upper Deer Creek (John Day Basin, 17070202100) with 13.7% of its area being conveyed and 1.4% being acquired for a net reduction in Forest Service land of 12.3%.

The Lower Mud Creek and Butcher Creek are among the four subwatersheds that involve the greatest amount of land being exchanged (conveyed + acquired) with a net reduction of 5% and 1.7% respectively. These amounts and locations of changed ownership are not likely great enough to influence natural disturbance regimes. Localized changes could occur for disturbances such as landslides, small wildfires, or insect and disease outbreaks in conifer stands, but these changes would not be of a magnitude to alter the way disturbances effect water quality or riparian function at the subwatershed scale, nor could these disturbances be attributed to the BMLEX project. Bear Creek and Upper Deer Creek however could experience some changes to natural disturbance regimes as the late/old structural forested stands are logged and younger forested stands dominate the uplands. These two creeks contribute cool, high quality water to downstream fish habitat. It is unknown if the accelerated logging on conveyed parcels (indicated by new landowners through a survey) in these subwatersheds will degrade this indicator, but the likelihood of habitat degradation is higher than if these parcels remained under Forest Service ownership.

VIII. STEELHEAD TROUT, SNAKE RIVER AND MID-COLUMBIA DPSs

Both the Snake River and Mid-Columbia steelhead trout (*Oncorhynchus mykiss*) are listed as threatened under the Endangered Species Act. These two populations represent Distinct Population Segments (DPS), units by which National Marine Fisheries Service (NMFS) tracks status and recovery of listed anadromous fish populations.

Direct Effects

This project would acquire 32.72 miles of steelhead habitat, 7.72 miles in the Mid-Columbia DPS and 25 miles in the Snake River DPS. Likewise, 4.35 and 0.83 miles of steelhead habitat would be conveyed in the Mid-Columbia and Snake River DPSs respectively. These quantities of habitat in the exchange are summarized in Table BA-8 below, and detailed by parcel and watershed in Appendix BA-1. This would result in a net increase in steelhead habitat coming under Forest Service management of 3.37 and 24.17 miles for the Mid-Columbia and Snake River DPSs respectively. To put these figures into perspective, there are 34 fifth level HUCs that contain exchange parcels and steelhead habitat. These thirty-four 5th level HUCs contain nearly 1,400 miles of steelhead habitat. Nearly twenty-eight miles of stream proposed for acquisition represents about 2% of the habitat in the watersheds involved. This represents a negligible amount at the DPS scale, but could represent measurable effects (likely positive) in subwatersheds where a significant amount of habitat is being acquired (eg. Imnaha River). Just over five miles of habitat proposed for conveyance represents a fraction of a percent of available habitat within the two DPSs. Separating the DPSs and calculating the percent of steelhead habitat involved still results in a fraction of a percent for each DPS.

Table BA-8: Net change in Steelhead habitat by DPS.

Steelhead DPS	Miles of habitat acquired	Miles of habitat conveyed	Net change (miles)
Snake River	25.00	0.83	+ 24.17
Mid-Columbia	7.72	4.35	+ 3.37

Appendix BA-1 shows the amount of steelhead habitat by watersheds, and the amounts of steelhead habitat involved in this exchange. Most notable are several 5th level HUCs that involve substantial amounts of steelhead habitat being exchanged.

Strawberry Creek (1707020108) includes conveyance of 3.64 miles of steelhead habitat in the Mid-Columbia DPS on Bear and Hall Creeks, tributaries to the John Day River approximately five miles northwest of Prairie City. Steelhead redd surveys by ODFW in Bear Creek (Appendix BA-9, Map 23) indicate a low but stable spawning population up until approximately six years ago when a downward trend began. No redds have been detected in the Bear Creek index area in five of the last six years. This apparent downward trend does not reflect a similar trend in the balance of the Upper Main John Day River basin, indicating possible site specific changes in spawning within the Bear Creek system. In fact, the development of beaver dams in the lower reaches of Bear Creek may have impeded upstream migration of spawning steelhead resulting in these recent declines. Year to year differences in survey conditions that effect detection rates of redds, or steelhead spawning outside of the index survey area can not be ruled out in explaining this recent downward trend. Bear and Hall Creeks are in relatively poor condition due to the presence of roads within riparian areas, culverts that are barriers to fish passage, and detrimental effects to riparian vegetation and stream banks from grazing by cattle. In 2002 a fish passage device was installed on lower Bear Creek to address a partial barrier posed by an irrigation ditch. Despite the multitude of factors affecting this system, water temperature remains low and capable of supporting the native salmonids that inhabit this system. The coolest water appears to originate from the upper reaches of these creeks within Forest Service lands (Allan Miller 2005). Cool water temperatures are promising from the standpoint of potential to restore fish habitat quality in this system. The problems that exist in these creeks on Forest Service lands appear to have persisted for several decades and there is no evidence that active restoration has been attempted. Riparian fencing is apparent on the lower private reaches of Bear Creek, and they appear to be a combination of exclosures and riparian pastures. If parcels FM4, FM6, FM7 and FM8 are conveyed to private ownership the likelihood of fish habitat restoration occurring is much lower than if they remain under Forest Service management. Additionally, with accelerated logging of the uplands, less road maintenance, and no grazing standards, the rate at which riparian conditions are degraded is likely to increase when FM4, FM6, FM7 and FM 8 are conveyed. It is not possible to predict with any certainty whether changes in ownership of these Bear Creek and Hall Creek parcels will eventually result in the local extirpation of steelhead.

There are four 5th level HUCs that include more than two miles of steelhead habitat that would be acquired by the Forest Service within the Snake River DPS. Lower Big Sheep Creek (1706010204) would acquire 2.86 miles of steelhead habitat, Lower Imnaha River (1706010205) acquires 10.41 miles, Middle Imnaha River (1706010202) acquires 3.87 miles, and Upper Joseph Creek (1706010605) acquires 3.68 miles.

Miles of steelhead habitat being acquired within the Mid-Columbia DPS, by fifth level HUC ranges from 0.15 (Upper NF John Day River, 1707020201) to 1.76 miles (Meachum Creek, 1707010302), representing minor amounts relative to the amount of steelhead habitat in this DPS.

Indirect and Aggregate Effects

The net increase in steelhead habitat coming under Forest Service management would lead to improvements in fisheries habitat through correction of point sources for sediment from poorly designed/located roads, improved

livestock grazing practices near streams, removal of livestock handling facilities within RHCAs, and wider stream buffers in logging areas. These positive effects would represent minor contributions to recovery of steelhead habitat at the DPS scale, but could result in greater hatching rates and fingerling survival in specific streams that involve higher levels of streams being acquired by the Forest Service. Acquisition of stream miles that bring contiguous reaches under Forest Service management improves efficiencies and effectiveness of RHCA management. An example would be the Imnaha River (Middle, and Lower Imnaha) that involves a total of 14.28 miles of steelhead habitat that would be acquired.

Subwatershed 170701030203 (Butcher Creek, Meachum Creek watershed, Mid-Columbia DPS) would convey 12.1% of its area and 10.4% of its area would be acquired for a net change of – 1.7%. However, it is important to note that riparian habitat associated with Butcher and Meachum Creeks is excluded from the convey parcels, so no steelhead habitat would be going from Forest Service to private in the Butcher Creek subwatershed. It should also be noted that steelhead habitat in Meachum Creek that was removed from convey parcels is in extremely poor condition due to the presence of the railroad (and access road) that runs along its length, strongly influencing the stream's morphology, connection to its floodplain, and overall function as fish habitat. Changes in management emphasis on the uplands within the Butcher Creek subwatershed is not likely to result in degradation of steelhead habitat to a degree that recovery would be impaired.

Subwatershed 170702010803 (Strawberry Creek watershed, Mid-Columbia DPS) would convey 20.2% of its area and none would be acquired. The private uplands in the Bear Creek subwatershed have been more intensively logged than neighboring Forest Service lands, contributing to aggregate effects in terms of less snow intercept, higher road densities, and increased potential for sediment to enter streams. Steelhead habitat in the Bear Creek subwatershed would likely continue to degrade, possibly at an accelerated rate once conveyed to private ownership.

Subwatershed 170702021001 (Upper Deer Creek, Lower North Fork John Day River, Mid-Columbia DPS) would convey 12% of its area and 1.4% of its area would be acquired for a net change of – 10.6% (see Appendix BA-9 Map 17). The uplands in the parcels proposed for conveyance are more heavily forested than the surrounding private lands that have been heavily logged. Accelerated logging, increases in road densities, and increased potential for sediment to enter streams could reduce the quality of steelhead habitat downstream in Deer Creek.

Bear Creek and Upper Deer Creek subwatersheds (FM4, FM5, FM6, FM7, FM8, FM9, & FM10) represent the greatest potential for negative effects to steelhead from upland management activities that may occur as management emphasis shifts to accelerated logging following the exchange. The potential for increased logging, road building and over-grazing by livestock could combine to create upslope effects that lead to negative effects in the streams. However, assuming the Oregon Forest Practices Act is followed, the effects would be within an acceptable range to at least minimally protect fisheries resources. The narrower stream buffers are more vulnerable to disturbances that could compromise the effectiveness of their function. Grazing by livestock could be the main factor that leads to habitat degradation on conveyed lands when compared to lands remaining under Forest Service management. However, range conditions along Bear Creek (primarily in FM4 & FM6) and its tributaries on Forest Service lands are currently experiencing detrimental effects from cattle grazing, roads within RHCA's, and culverts that impede fish passage. Although the detrimental effects to Bear Creek are barely distinguishable between private and Forest Service lands currently, the oversight (by regulatory agencies and the public) and likelihood of these issues being addressed would be greater if these parcels remained under Forest Service management than if conveyed to private ownership.

Fifty-six miles of road within 300' of streams would be acquired by the Forest Service, providing opportunities for restoration or mitigation of road effects to water quality. Not all of these roads are adjacent to steelhead habitat, but total miles of road within 300' of streams provides an idea of the quantity of road miles coming under management standards that are more protective of water quality and fisheries habitat.

Sixty parcels with water rights and/or developments would be acquired, and 15 parcels with water rights and/or developments would be conveyed. Approximately 18 of the water rights on acquired parcels and one on a conveyed parcel have been in non-use status for more than five years, and none of the changes to water rights/developments from this project would result in decreases to instream water.

Determination of Effect to Steelhead Trout

The BMLEX project **may effect, and is likely to adversely affect** Mid-Columbia steelhead trout. Although the action represents an overall beneficial effect to steelhead, the action is also likely to cause some adverse effects by conveying 4.35 miles of steelhead habitat. Sixteen of eighteen fifth level HUCs involved represent a potential improvement in habitat quality for steelhead. The most notable exception is Strawberry Creek (1707020108), specifically Bear Creek subwatershed (170702010803), which would experience a decrease of 3.64 miles of steelhead habitat under Forest Service management. There are also net reductions in steelhead habitat under Forest Service management in Beech Creek (1707020109) and Lower North Fork John Day River (1707020210). Although the conveyed streams in these examples will not receive the level of protection/restoration provided by Forest Service standards and guidelines, the potential effects to steelhead would not likely be measurable at the fifth level HUC scale. The potential adverse effects on conveyed steelhead habitat are not discountable, insignificant, or entirely beneficial, therefore a “likely to adversely affect” determination is warranted.

The BMLEX project **may effect, but is not likely to adversely affect** Snake River steelhead trout. The difference between the Snake River DPS and Mid-Columbia DPS is the amount of habitat being conveyed and specific considerations regarding conveyed habitat. A total of 0.83 miles would be conveyed in the Snake River DPS. Meadow Creek (1706010402) fifth field HUC would convey 0.66 of the 0.83 miles along Burnt Corral Creek near Camp Elkanah. This particular stream reach is immediately beside paved county road 244, which has confined Burnt Corral Creek to the very edge of its floodplain, and rendered much of the floodplain unusable for lateral migration of the creek. Additionally, the creek and a substantial portion of its riparian area are within the highway maintenance right-of-way (80’ both directions from road centerline). Within this right-of-way road maintenance by the county would routinely remove logs and trees that fall across the road (and creek), that pose hazards to traffic or could create flooding conditions on the road. These conditions all affect the quality of steelhead habitat in Burnt Corral Creek, and will not change following this land exchange. There is 0.17 miles of steelhead habitat that would be conveyed in the Big Sheep Creek (1706010203) fifth field HUC. There are two parcels (FW10 and FW6C) that contain approximately 0.09 miles of steelhead habitat each. The habitat in FW6C is non-forested and is influenced by a road that occupies part of the floodplain. The conveyance of FW6C would not result in any changes to steelhead habitat from the baseline. This leaves approximately 0.09 miles in FW10 that would be going to a less protective management scenario. There is merchantable timber and an existing road on the south side of the steelhead habitat that would be conveyed in FW10, and a narrow band of sparse timber on the north side of the stream that quickly turns into grasslands upslope. There are no roads on the north side of the stream, and logging costs on the north side would be very costly. There is potential for logging to Oregon Forest Practices standards to occur along these 0.09 miles of steelhead habitat. This effect is so minor as to be insignificant, with the aggregate effect for this DPS being beneficial due to a net increase of over 24 miles of steelhead habitat coming under a more protective management scenario.

Steelhead Critical Habitat

Critical habitat for Snake River and Mid-Columbia steelhead is scheduled to be formalized on January 2, 2006. This project **may effect, and is likely to adversely affect** steelhead critical habitat in the Mid-Columbia DPS for the same reasons stated above in the determination of effects to steelhead in this DPS. This project **may effect, but is not likely to adversely affect** steelhead critical habitat in the Snake River DPS for the same reasons stated above in the determination of effects to steelhead in this DPS.

Appendix BA-5 contains a list of which land exchange parcels contain critical habitat for steelhead, and which 5th field HUC they are located in. Data used in the critical habitat tables (Appendix BA-5) comes from

NOAA National Marine Fisheries Service shape files from their website (<http://www.nwr.noaa.gov/Salmon-Habitat/Critical-Habitat/CH-GIS-Data.cfm>). Some differences exist between the fish distribution data used in the remainder of this analysis and the critical habitat data. These differences may be explained by: 1) minor artifacts of coarse scale GIS mapping; or 2) differences in fish distribution data (ODFW, US Forest Service, NOAA Fisheries) used to generate GIS products.

Primary Constituent Elements (PCEs) have been developed that describe habitat elements needed for continued survival and recovery of threatened steelhead. These elements must be addressed when discussing proposed or ongoing project effects to steelhead Designated Critical Habitat. The Matrix Indicators are a tool by which the PCEs may be discussed, and determinations of effect can be made. Section VII (Matrix Indicators) addresses the PCE's along with similar habitat parameters necessary for assessing effects to Chinook salmon and bull trout critical habitat.

IX. MID-COLUMBIA AND SNAKE RIVER CHINOOK SALMON

Spring/summer and fall Chinook salmon within the Snake River basin are listed as threatened under the ESA. Chinook salmon also occur in the Mid-Columbia basin and are not listed under ESA. However, Chinook habitat in the Mid-Columbia basin is recognized as essential fish habitat (EFH) under the Magnuson-Stevens Fishery Conservation and Management Act, as amended. Effects from this land exchange to Chinook salmon are nearly identical as those discussed for steelhead, but different amounts of habitat are involved. The distribution of fall Chinook is much less expansive than for spring/summer Chinook. Figures of miles of Chinook habitat involved in this exchange are from distribution data for spring/summer Chinook recognizing that fall Chinook is a smaller subset of these data. The majority of fall Chinook habitat in the vicinity of this project is located in the lower Grande Ronde River and Imnaha River.

Direct Effects – This project would acquire 13.96 miles of Chinook habitat in the Snake River DPS and none in the Mid-Columbia DPS. A negligible amount of Chinook habitat would be conveyed in the Snake River DPS, 0.09 miles of the east side of Big Sheep Creek (FW6C). FW6C is largely non-forested and has a road occupying a considerable portion of the floodplain. The quality of Chinook habitat along this portion of Big Sheep Creek is not likely to change as a result of this exchange. There are also five other parcels (FW6A-F) along Big Creek that have small corners overlapping the RHCA, but no actual stream habitat is within the parcels. It is important to note that these Forest Service parcels along Big Sheep Creek in their current arrangement are impractical to manage individually or collectively due to their small size and scattered distribution.

Indirect and Aggregate Effects – The acquisition of nearly 14 miles (Appendix BA-6) of Chinook habitat holds potential for improved management by the Forest Service through more protective standards for forest, range and road management. These improvements could result in increased Chinook production and juvenile survival as degraded riparian habitat recovers, fish passage is restored, livestock is excluded from spawning habitat, and upland forests are restored.

Chinook Salmon Critical Habitat

Critical habitat for Snake River Chinook salmon is essentially all the accessible, occupied habitat within the basin, so the discussion of effects for this species also applies to critical habitat.

Determination of Effect for Chinook Salmon

The Blue Mountain Land Exchange **may effect, but is not likely to adversely affect** Chinook salmon or their critical habitat within the Snake River DPS. This determination is based on the miniscule amount of habitat (0.09 miles in FW6C) being conveyed and nearly 14 miles of habitat being acquired into a more protective management scenario.

Chinook Salmon Essential Fish Habitat (EFH)

The Pacific Fisheries Management Council (PFMC) is one of eight regional fishery management councils established under the Magnuson-Stevens Act. PFMC develops and carries out fisheries management plans for salmon, groundfish and coastal pelagic species off the coasts of Washington, Oregon, and California, and recommends Pacific halibut harvest regulations to the International Pacific Halibut Commission.

As required by the Magnuson-Stevens Act, PFMC described and identified Essential Fish Habitat (EFH) in each of its fisheries management plans. EFH includes “those waters and substrates necessary to fish for spawning, breeding, feeding, or growth to maturity.” All streams, lakes, ponds, wetlands, and other water bodies currently, or historically accessible to salmon in Washington, Oregon, Idaho, and California are designated as EFH for affected salmon stocks with management plans.

The Magnuson-Stevens Act also established an EFH consultation process. Federal agencies are required to consult with NMFS on all actions that may adversely affect EFH. The NMFS interprets the scope of these consultations to include actions by Federal agencies that occur outside designated EFH, such as upstream or upslope, but which nonetheless may have an adverse effect on habitat conditions necessary for the long-term survival of the species within EFH. The NMFS must provide conservation recommendations for any Federal or State activity that may adversely affect EFH. Within 30 days of receiving EFH conservation recommendations from the NMFS, Federal agencies must conclude EFH consultation by responding to NMFS with a written description of conservation measures the agency will use to avoid, mitigate or offset the impact of its action on EFH. If the Federal agency selects conservation measures, which are inconsistent with the conservation recommendations of NMFS, the Federal agency must explain in writing its reasons for not following NMFS recommendations.

The proposed project area in this BA includes areas designated as EFH for spring Chinook salmon, which was deemed not warranted for listing under ESA on March 9, 1998 (63 FR 11482). EFH for spring Chinook salmon is considered to be those habitats occupied at present and those historic habitats in the John Day Basin. This includes main stem streams and most tributaries below natural barriers. The Blue Mountain Land Exchange alternative described in this BA is **unlikely to adversely affect** EFH based on the amount of habitat coming under a more protective management scenario and the fact that no EFH for Chinook would be conveyed to a less protective management scenario. The remainder of EFH involved in this project is the Snake River Chinook salmon habitat already discussed in detail above. This project is also unlikely to have adverse effects on EFH in the Snake River

X. BULL TROUT

Bull trout involved in this project are within the Columbia River Distinct Population Segment (DPS). Effects to bull trout from this land exchange would be similar to those discussed for steelhead and Chinook with some exceptions. Some bull trout habitat is identified that does not support either of the anadromous species discussed thus far. Bull trout spawn at a different time of year than most of the steelhead and Chinook runs in northeast Oregon, leading to different timing considerations for instream work or livestock grazing along spawning and rearing habitat.

Bull trout distribution data is separated into two categories; spawning and rearing (SR) and foraging/migratory/over wintering (FMO).

Direct Effects – This project would acquire 11.50 miles and 1.40 miles of FMO and SR habitat respectively. No SR habitat would be conveyed, and 0.14 miles of FMO habitat would be conveyed. The 0.14 miles to be conveyed are FU1 (0.05 miles) and FW6C (0.09 miles). Six 5th level HUCs include exchange parcels that contain bull trout habitat (Table BA-9).

Indirect and Aggregate Effects - The addition of nearly 13 miles of bull trout habitat to Forest Service management would likely have minor beneficial effects to bull trout through improved management of roads, upland forests, and livestock grazing. The amount of habitat improvement would likely not be great enough to increase reproduction or survival of juvenile fish. However, improved range, forest and stream conditions over time could combine with positive effects from active restoration elsewhere in these watersheds for the benefit of bull trout populations. Since specifics of what management may occur on these lands are not currently known, it is impractical to quantify these benefits and relate them to this land exchange. However, the large majority of acquired habitat is located in the Imnaha River and Big Sheep Creek (a tributary to the Imnaha River), which greatly improves the ownership pattern for administration of roads, grazing allotments, and forest management (see Appendix BA-9, Maps 6 & 8).

Table BA-9: Bull trout habitat by 5th HUC, parcel, and habitat category (FMO or SR).

Watershed (5 th HUC)	Parcels	Miles of FMO		Miles of SR	
		Acquired	Conveyed	Acquired	Conveyed
Meachum 1707010302	PU11	0	0	1.05	0
	PU9A	0	0	0.16	0
	PU9B	0	0	0.08	0
	FU1	0	0.05	0	0
Lower Imnaha 1706010205	PW1	0.10	0	0	0
	PW2A	0.17	0	0	0
	PW2B	0.08	0	0	0
	PW10A	0.53	0	0	0
	PW10B	0.42	0	0	0
	PW13A	0.19	0	0	0
	PW13B	0.32	0	0	0
	PW13C	0.02	0	0	0
	PW13D	0.26	0	0	0
	PW16A	0.31	0	0	0
	PW16C	0.41	0	0	0
	PW16E	0.83	0	0	0
	PW20A	0.49	0	0	0
	PW20C	0.49	0	0	0
Upper Big Sheep Creek 1706010203	PW31	0.88	0	0	0
	FW6C	0	0.09	0	0
Lower Big Sheep Creek 1706010204	PW24A	0.47	0	0	0
	PW24B	0.50	0	0	0
	PW24C	0.57	0	0	0
	PW24D	0.51	0	0	0
Middle Imnaha River 1706010202	PW25A	0.36	0	0	0
	PW25B	0.91	0	0	0
	PW25C	0.96	0	0	0
	PW25D	1.16	0	0	0
	PW27C	0.56	0	0	0
Lostine River 1706010502	PW37	0	0	0.11	0
Totals:		11.50	0.14	1.40	0

Parcel FW6C (43 acres, see Appendix 9, Map #6) involves 0.09 miles of bull trout FMO habitat that would be conveyed to private ownership. FW6C is largely non-forested and has a road occupying a considerable portion of the floodplain. The quality of bull trout habitat along this portion of Big Sheep Creek is not likely to change as a result of this exchange. This, along with five other parcels (FW6A, FW6B, FW6D, FW6E and FW6F), represent isolated parcels along Big Sheep Creek that are surrounded by private land. The other five parcels (approximately 40 acres each) along this reach of Big Sheep Creek have corners that overlap the RHCA, but do not include any actual streamside habitat. It is impractical to manage these isolated parcels due to their scattered arrangement and small size.

Parcel FU1 (0.05 miles of FMO habitat) is a five acre parcel along Meachum Creek, between the railroad track and Meachum Creek. This miniscule piece of riparian habitat is negligible in terms of bull trout production or survival in the Meachum Creek watershed.

Determination of Effect for Bull Trout

The BMLEX **may effect, but is not likely to adversely affect** bull trout. At the DPS scale the long-term benefits of this project outweigh the potential negative effects that could occur on conveyed lands.

Bull Trout Critical Habitat

Bull trout critical habitat for this analysis was retrieved from http://region1ims.r1.fws.gov/imf406_15/imf.jsp?site=updated_OTB_Bulltrout2. The BMLEX would acquire approximately 11.50 miles of bull trout critical habitat within the Upper Big Sheep, Lower Big Sheep, Lower Imnaha, and Middle Imnaha watersheds. All critical habitat being acquired is foraging/migratory/over-wintering habitat. No critical habitat would be conveyed since no Federal lands are currently listed as critical habitat. Table BA-10 contains the parcels by 5th level HUC that contain critical habitat.

No direct effects would occur since no changes to habitat would occur at or near the time and place of the action under consultation. Indirect effects to bull trout critical habitat would include improved grazing practices (including monitoring and oversight by regulatory agencies), removal (and restoration of sites) of cattle handling facilities along the Imnaha River, and road maintenance that reduces sediment input to streams.

The Blue Mountain Land Exchange **may effect, but is not likely to adversely affect** bull trout critical habitat. Based on foreseeable improvements in the management of these acquired lands relative to bull trout habitat, there is likely to be a beneficial effect to bull trout within the first decade following this exchange. Specific actions such as road work, timber management, changes to allotment management plans, etc. will be consulted on individually.

Table BA-10: Bull Trout Critical Habitat

Watershed (5th HUC)	Parcels	Miles of FMO Acquired
Lower Imnaha 1706010205	PW1	0.10
	PW2A	0.17
	PW2B	0.08
	PW10A	0.53
	PW10B	0.42
	PW13A	0.19
	PW13B	0.32
	PW13C	0.02
	PW13D	0.26
	PW16A	0.31
	PW16C	0.41
	PW16E	0.83
	PW20A	0.49
	PW20C	0.49
Lower Big Sheep Creek 1706010204	PW24A	0.47
	PW24B	0.50
	PW24C	0.57
	PW24D	0.51
Upper Big Sheep Creek 1706010203	PW31	0.88
Middle Imnaha River 1706010202	PW25A	0.36
	PW25B	0.91
	PW25C	0.96
	PW25D	1.16
	PW27C	0.56
Total:		11.50

XI. CANADA LYNX

The lynx analysis unit (LAU) is the logical resource unit for addressing effects to Canada lynx (*Lynx canadensis*). This project involves eleven parcels that contain habitat for threatened Canada lynx. Table BA-11 summarizes which parcels are involved, which LAUs they are in, and acreages by habitat suitability at the LAU scale.

Environmental Baseline

Lynx habitat within parcels is delineated from timber stand exam data; however habitat is not classified in some parcels because no data exists. Where habitat suitability is not known a judgment is made based on biophysical conditions and surrounding habitat. For instance, no vegetation data exists for parcel PW35C. However, the parcel is known to meet the elevation and plant community criteria for lynx habitat. Additionally, three sides of this parcel are bordered by denning habitat. From this information one could surmise that the habitat within parcel PW35C is at least potential habitat for lynx, although it could be in an unsuitable condition. Examination of aerial photographs from the late 1990's, and personal communication with ODFW personnel in Enterprise, Oregon indicate that no logging has been done on PW35C that would render it unsuitable. Table BA-13 contains information concerning the patch size in which these parcels are located to help establish the context of the parcels relative to lynx habitat. Appendix BA-7 is a series of maps of the parcels that contain lynx habitat.

Table BA-11: LAU acres summary by habitat suitability category, and percentage of the LAU represented by each category.

LAU (Parcels containing or adjacent to lynx habitat)	Total Forage in LAU	Total Denning in LAU	Total Unsuitable in LAU	Total Lynx Habitat in LAU
Meadow (PU16B)	24,050 (44%)	8,825 (16%)	21,946 (40%)	54,821
NF John Day River (PU13, PW45)	17,634 (47%)	10,830 (29%)	9,192 (24%)	37,656 (+2,451 no data)
Upper Wallowa River (FW13, PW35A-C)	3,845 (21%)	13,111 (73%)	1,027 (6%)	17,983
Upper Imnaha River (PW28)	6,169 (18%)	24,231 (69%)	4,649 (13%)	35,049 (+7,012 no data)
LostineR./Deer Creek Tribs South (FW17A, FW17C, PW37)	1,537 (9%)	15,528 (88%)	624 (3%)	17,689

Suitable Lynx Habitat – Of the five LAUs involved in this project, only one (Meadow, on the Umatilla NF) is deficient in suitable lynx habitat. The Meadow LAU currently contains 60% suitable lynx habitat, 10% less than the minimum recommended in the Lynx Conservation Assessment and Strategy (LCAS) (Ruediger 2000). The large majority of these unsuitable acres are a result of the Tower Fire (1996). The areas burned by the Tower Fire are regenerating predominantly to lodgepole pine, and are on track to recover to foraging habitat by 2010, at which point the Meadow LAU will exceed 70% suitable lynx habitat.

Denning Habitat – All five LAUs exceed the minimum (10%) recommended percentage of denning habitat. The percentages and acres of denning are listed in Table BA-11.

Direct Effects

This project involves an increase of at least 231 acres of denning habitat. No foraging habitat exists on the private land proposed for acquisition. Three Forest Service parcels representing 80 acres of denning and 26 acres of foraging habitat would be conveyed.

No direct changes to lynx habitat would result from this project. Logging on conveyed parcels could render the habitat unsuitable, but the amounts and locations of conveyed parcels are inconsequential relative to the LAUs. Likewise, acquired parcels would increase the amount of lynx habitat under Forest Service management, but represent very minor acreages relative to scales that are meaningful to an analysis of lynx habitat.

Indirect & Aggregate Effects

The only cumulative effects from adjacent state or private activities are reflected in the existing amounts of lynx habitat within LAU's (Table BA-11). Past logging is the primary factor in creating unsuitable habitat conditions for lynx. Associated roading, site prep burning, non-commercial thinning, and increased human access have also contributed to unsuitable conditions for lynx.

This project would result in a 125-acre net increase of lynx habitat (foraging and denning combined) that would come under the management authority of the Forest Service. These are additional acres that would be analyzed and managed according to the LCAS. Also, any projects planned in or around these Forest Service lands would be subject to oversight through public scoping as part of the NEPA process, and through the consultation process with US Fish and Wildlife Service. There is no requirement for private landowners to consider lynx habitat in the management of their lands.

Private lands that are suitable for timber harvest are commonly logged to some degree. This assertion is based on observations and questionnaires from private landowners involved in this exchange. The most reliable source that indicates the degree of logging on private property comes from the Oregon Forest Practices Act, which allows for intensive logging (clear-cut with reserve trees) on the least restrictive end of the management spectrum. The broad range of logging intensities allowed under the Oregon Forest Practices Act and the diversity of private land objectives make it difficult to predict what changes may occur in lynx habitat on conveyed lands. However, the following site-specific information may be helpful in establishing the context of exchange parcels that contain lynx habitat.

PU16B is on the periphery of lynx habitat and contains an unknown, but predictably minor amount of lynx habitat. This parcel is also on the periphery of the elevational and plant community zone necessary for lynx habitat. Past logging, mostly commercial thinning has resulted in unsuitable conditions for lynx on this parcel that will persist as long as timber production is a priority on the property. The minor acreage in PU16B that has potential to develop into suitable lynx habitat is negligible when considering its size and position in relation to the LAU.

PU13 and PW45 are adjacent to one another in the North Fork John Day River LAU. These parcels are also near the periphery of lynx habitat and represent minor acreages relative to the LAU.

PW37 is a 3.54-acre parcel within a 10,709-acre patch of denning habitat. The minute size of this parcel makes it negligible when discussing lynx habitat unless it represents an outstanding feature or important location deserving of more detailed consideration. This parcel contains no outstanding features that make it any more important than other denning habitat within the Lostine River/Deer Creek Tribes South LAU.

PW35A-C are a combination of denning and non-habitat. Extremely steep, rocky slopes and stringers of forest, talus, and avalanche chutes characterize this area. The steepness and difficulty of the ground contribute to high logging costs that would discourage many private landowners from managing the timber on these parcels. Although unlikely, helicopters could be utilized for logging this area.

PW28 is 119 acres of which 28 acres is denning habitat and the balance is non-habitat. Acquisition of this parcel would be a very minor contribution to the Upper Imnaha River LAU.

Table BA-12: Parcels containing lynx habitat.

Parcel # (Total Acres)	Acres & Habitat Category
PU16B (1271)	No specific data, mixture of non-habitat/unsuitable/forage
PU13 (108)	No specific data, unsuitable & forage
PW45 (49)	No specific data, unsuitable & forage
PW37 (4)	4 acres of denning
PW35A (229)	122 acres of denning
PW35B (153)	77 acres of denning
PW35C (76)	No specific data, mixture of non-habitat/unsuitable/forage
PW28 (119)	28 acres of denning
Total	At least +231 acres of denning
FW13 (118)	68 acres of denning, 26 acres of forage
FW17A (10)	10 acres of denning
FW17C (2)	2 acres of denning
Total	-80 denning, -26 forage

FW13 (2 separate parcels totaling 118 ac), FW17A and FW17C represent 80 acres of denning and 26 acres of foraging habitat that would be conveyed and potentially rendered unsuitable through logging in the future.

Appendix BA-7 shows FW17C situated in a patch of “marginal forage” habitat. The marginal forage category was adopted on the Wallowa-Whitman NF for the sole purpose of analyzing the relative quality of lynx foraging habitat. Marginal forage is habitat that meets the forage definition at a minimal level, generally not supporting snowshoe hares, but may support alternate prey species. “Primary forage” and “marginal forage” are considered together when discussing the amount of foraging habitat at the LAU scale.

Determination of Effect

This project **may effect, but is not likely to adversely affect** Canada lynx or their habitat. There is no defensible means to assess what the changes in management control mean to the viability or future recovery of lynx. Also, due to the large number of private landowners involved and the potential for re-sale of parcels, there is little reliable information that allows for an analysis of reasonably foreseeable actions that could contribute to aggregate effects.

The best and worst-case scenarios for lynx habitat do not represent a measurable benefit or detriment to lynx or lynx habitat. This finding is based on: 1) the minute acreages involved over five LAUs; 2) the fact that most of these acres are on the periphery of core lynx habitat; and 3) because none of the lynx habitat involved represent outstanding features or important locations deserving of more detailed consideration.

Although a minor amount of lynx habitat could be rendered unsuitable, the effects are not great enough to compromise the potential for lynx to re-colonize these LAU’s at some point in the future. Nor are the effects great enough to negatively affect lynx that may currently exist within these LAU’s.

Table BA-13: Parcels with lynx habitat, context of parcels relative to surrounding habitat.

Parcel #	LAU	Denning	Foraging	Unsuitable	Non-Habitat
PU16B	Meadow Creek		Adjoins 246 acre patch	Small amount	Mostly non-habitat
PU13	NF John Day River		Adjoins 382 & 79 acre patches	Contains an undetermined amount	Contains an undetermined amount
PW45	NF John Day River		Adjoins 365 acre patch	Contains an undetermined amount	Contains an undetermined amount
FW13	Upper Wallowa River	Contains 68 acres, adjoins 4,673 acre patch	Contains 26 acres, adjoins 222 & 49 acre patches		25 acres
PW37	LostineR./Deer Creek Tribs South	Contains 3.54 acres, part of 10,709 acre patch			
FW17A	LostineR./Deer Creek Tribs South	Contains 10.23 acres, part of 10,709 acre patch			
FW17C	LostineR./Deer Creek Tribs South		Contains 2.42 acres, part of 37.53 acre patch		
PW35A	Upper Wallowa River	122 acres			108 acres
PW35B	Upper Wallowa River	77 acres			Minor inclusions
PW35C	Upper Wallowa River	Mostly denning			Minor inclusions
PW28	Upper Imnaha River	28 acres			91 acres
Total		-78/+230	-28/+unk.		

Critical habitat for Canada lynx has been proposed, but none is proposed in the state of Oregon. Therefore this project will have no effect on critical habitat for lynx, nor will this project preclude future designations of critical habitat within the project area.

XII. BALD EAGLE

Bald eagles in the lower 48 states were first protected in 1940 by the Bald Eagle Protection Act and then were Federally listed as endangered in 1978. In 1995, the bald eagle was reclassified as threatened in all of the lower 48 States. The bald eagle was proposed for delisting on July 6, 1999; a decision on whether to delist the bald eagle is pending (64 FR 36453). No critical habitat has been designated for the bald eagle.

Environmental Baseline

The entire state of Oregon is within the Seven State Pacific recovery area, and the Blue Mountain Land Exchange project is within Management Zone 9. The Pacific Bald Eagle Recovery Plan outlines goals by management zone that will be used to measure recovery.

Management Zone 9 has a recovery population goal of eight nesting pairs, producing at least 1.0 young per nest for a five-year average (USFWS 1986). Nesting success in 2003 for Management Zone 9 was five occupied sites with 1.62 young per site (Isaacs 2003). At least one new nest site was identified in 2004 in Zone 9 (Shaw Reservoir), but there are no land exchange parcels within several miles of this nest.

Records from the Oregon Department of Fish and Wildlife, Oregon Department of Forestry, Frank Isaacs (Oregon Cooperative Fish and Wildlife Research Unit), and Forest Service were queried to identify known bald eagle roosts and nests within the vicinity of the Blue Mountain Land Exchange. Approximately 74 roosts and five nests are located within the minimum convex polygon that defines the area of the land exchange. The next step was to identify parcels within one mile of a known nest or roost. One nest and three roosts are within a mile of at least one parcel. Table BA-14 contains details on which parcels, nests and roosts are involved. Appendix BA-8 is a series of maps showing the eagle nest and roosts that are within one mile of land exchange parcels.

Direct Effects

There would be no direct effects to bald eagles or their habitat from this project. The acreages involved in this exchange and how they relate to known roosts or nests are discussed in Indirect and Aggregate Effects below.

Table BA-14: Bald eagle roosts and nests within a mile of parcels.

Roosts	Nests	Parcel Number	Parcel Acres		Distance
	Dry Creek (628)	FU27	102		< 0.75 mile
Wenaha River		PU1B	521		1 mile
Horse Canyon		PU16F	343		0.25 mile
Bear Creek (BLM)		FM10	314		0.50 mile
Total:			864* ac acquired	416* ac conveyed	

*These totals represent acreages of parcels that have at least a portion of their area within 1 mile of a known roost or nest. The total areas provided are for the entire parcels and some of these acres are further than a mile from roosts or nests.

Indirect and Aggregate Effects

The Dry Creek nest tree is very near the border of a private land parcel (formerly PU26B which was dropped from the preferred alternative). The private parcel adjacent (to the west of the nest) has been heavily logged and will not provide suitable structures for roosting, nesting or perching for several decades (Vanwinkle 2003). PU24 is greater than one mile from the Dry Creek nest and is not expected to contribute to the viability of this nest site. Parcel FU27 is approximately 0.75 miles from the Dry Creek nest and represents the best quality replacement habitat in case the existing nest stand is lost (fire, wind, insects, trespass logging, etc.). FU27 is

connected to other Forest Service land on one side, but is surrounded by private on three sides. This ownership pattern contributes to FU27 functioning somewhat like an island of potential habitat for bald eagles. This parcel would likely be logged following conveyance, and it is far enough away from the Dry Creek nest to not be subject to requirements of OARs for bald eagle nests. It is unknown what the effect of conveyance and subsequent logging of FU27 would have on bald eagles, but potentially important replacement bald eagle resources would be lost on conveyed parcel FU27.

There is a slight chance that some potential replacement roost, perch or nest trees could be lost to logging on PU16F if the parcel remains in private ownership, but the risk to eagles would be low. This low risk is based on the location of the highest quality roost trees within a riparian management area for a “large, type F” stream (North Fork John Day River). Also, ample options for roosts, perches and nest trees exist along the NF John Day River, many of which are located on Forest Service and ODFW (Bridge Creek Wildlife Area) lands.

FM10 contains some suitable replacement roost trees if the Bear Creek roost were to be lost. The Bear Creek roost is located on BLM land and receives the same considerations under the Endangered Species Act as it would if it were located on National Forest land.

The three roost sites within a mile of parcels would be protected in the short-term (estimated 20 years) whether this exchange occurs or not. OARs protect roosts on private lands and ESA requirements ensure protection for eagle sites on Forest Service lands. The primary difference between protections afforded roosts on private versus Forest Service ownerships is that long-term protection is more likely under federal ownership since OARs do not provide for replacement roosts in case existing ones are lost.

There are no timber sale operations in the vicinity of the Dry Creek nest or the Bear Creek, Horse Canyon or Wenaha River roosts that would contribute to aggregate or cumulative effects of this land exchange. Ongoing recreation, road maintenance, and fire suppression activities are considered in the management of known bald eagle sites on Federal lands, and will not contribute to adverse cumulative effects of this exchange.

Determination of Effect

The BMLEX **may effect, but is not likely to adversely affect** bald eagles. This project would be negligible in terms of short-term effects to known bald eagle sites. There would be a potential long-term effect in losing replacement nest and roost trees on parcels FM10 and FU27. However, this potential negative effect would not likely be important enough to influence the rate at which recovery goals are achieved in Management Zone 9.

XIII. REFERENCES

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Appendix BA-1: Steelhead Habitat Tables.

Miles of steelhead habitat on the **Malheur National Forest** by fifth level HUC, that contain land exchange parcels. Miles of steelhead habitat only reflects the miles within the Malheur Forest boundary in watersheds that overlap Forest boundaries.

Watershed Name and 5 th Level HUC	Total Miles of Steelhead Habitat	Miles of Steelhead Habitat		
		Parcel	Acquired	Conveyed
Beech Creek 1707020109	40.53	FM11 FM12 PM8B	0.08	0.09 0.37
Big Creek 1707020303	26.34	PM5	0.76	0
Camp Creek 1707020302	18.41		0	0
Cottonwood Creek 1707020209	8.50		0	0
Laycock Creek 1707020110	39.09	PM20	1.15	0
Long Creek 1707020304	11.52		0	0
Lower NF John Day River 1707020210	21.45	FM18	0	0.25
Murderer's Creek 1707020104	32.74	PM21	1.22	0
Strawberry Creek 1707020108	26.31	FM4 FM6 FM7 FM8	0	1.19 1.02 0.69 0.74
Upper John Day River 1707020106	10.54		0	0
Middle SF John Day River 1707020103	8.79		0	0
Totals:	244.22		3.21	4.35

Appendix BA-1: Steelhead Habitat Tables continued

Miles of steelhead habitat on the **Umatilla National Forest** by fifth level HUC, that contain land exchange parcels. Miles of steelhead habitat only reflects the miles within the Umatilla Forest boundary in watersheds that overlap Forest boundaries.

Watershed Name and 5 th Level HUC	Total Miles of Steelhead Habitat	Miles of Steelhead Habitat		
		Parcel	Acquired	Conveyed
Big Creek 1707020303	5.99	PU20	0.57	0
Birch Creek 1707010306	5.17		0	0
Lower Camas Creek 1707020206	12.98		0	0
Meachum Creek 1707010302	58.31	FU2 FU3A FU3B PU11 PU9A PU9B	1.08 0.57 0.11	0
NF John Day R/Big Creek 1707020203	17.04	PU16D PU16E PU16F	0.19 1.16 0.71	0
NF John Day R/Potamus Cr. 1707020207	35.48	PU21	0.44	0
Upper Camas Creek 1707020205	38.98	PU15	0.66	0
Upper NF John Day River 1707020201	27.53	PU13	0.15	0
Wall Creek 1707020208	31.02	PU22B	0.93	0
Totals:	232.50		6.57	0

Appendix BA-1: Steelhead Habitat Tables continued

Miles of steelhead habitat on the **Wallowa-Whitman National Forest** by fifth level HUC, that contain land exchange parcels. Miles of steelhead habitat only reflects the miles within the W-W Forest boundary in watersheds that overlap Forest boundaries.

Watershed Name and 5 th Level HUC	Total Miles of Steelhead Habitat	Miles of Steelhead Habitat		
		Parcel	Acquired	Conveyed
Bear Creek 1706010504	26.65		0	0
Big Sheep Creek 1706010203	56.65	FW10 FW6C PW31 PW32	1.03 0.56	0.09 0.09
Chesnimnus Creek 1706010604	78.94	PW51A PW51C PW51D	0.50 0.25 0.32	0
Grande Ronde R/Five Points 1706010404	98.93		0	0
Grande Ronde R/Mud Creek 1706010602	69.08		0	0
Lower Big Sheep Creek 1706010204	54.86	PW24A PW24B PW24C PW24D PW24H PW25D	0.52 0.49 0.64 0.54 0.55 0.12	0
Lostine River 1706010502	28.08		0	0
Lower Imnaha River 1706010205	101.18	PW1 PW10A PW10B PW13A PW13B PW13C PW13D PW16A PW16C PW16E PW19B PW19C PW20A PW20C PW2A PW2B PW3 PW48	0.10 0.67 0.31 0.20 0.32 0.24 0.22 0.30 0.37 0.97 1.17 1.13 0.67 0.15 0.20 0.11 1.85 1.43	0
Lower Wallowa River 1706010506	36.57		0	0
Meadow Creek 1706010402	136.43	FW18 PW44A PW44B PW46	0.35 0.25 0.92	0.66
Middle Imnaha River 1706010202	66.13	PW25A PW25B PW25C PW25D PW27C	0.36 0.92 0.98 1.00 0.61	0
Middle Wallowa River 1706010503	15.11		0	0
Upper Imnaha River 1706010201	57.47		0	0
Upper Joseph Creek 1706010605	78.13	PW34A PW34B PW34C	1.00 1.30 1.38	0
Upper Wallowa River 1706010501	32.02		0	0
Totals:	936.23		25.00	0.84

Appendix BA-1: Steelhead Habitat Tables continued

Summary Steelhead Table

Watersheds (5 th Level HUC)	HUC number	Steelhead Habitat (miles)	Acquired (miles)	Conveyed (miles)
Mid-Columbia DPS				
Beech Creek	1707020109	40.53	0.08	0.46
NF JD R/Big Creek	1707020303	32.33	1.33	
Camp Creek	1707020302	18.41		
Cottonwood Creek	1707020209	8.50		
Laycock Creek	1707020110	39.09	1.15	
Long Creek	1707020304	11.52		
Lower NF J.D.River	1707020210	21.45		0.25
Murderer's Creek	1707020104	32.74	1.22	
Strawberry Creek	1707020108	26.31		3.64
U. John Day River	1707020106	10.54		
Middle SF JD River	1707020103	8.79		
Birch Creek	1707010306	5.17		
Lower Camas Creek	1707020206	12.98		
Meachum Creek	1707010302	58.31	1.76	
NF JD R/Potamus Creek	1707020207	35.48	0.44	
Upper Camas Creek	1707020205	38.98	0.66	
Upper NF JD River	1707020201	27.53	0.15	
Wall Creek	1707020208	31.02	0.93	
Mid-Columbia DPS Totals:		459.68	7.72	4.35
Snake River DPS				
Bear Creek	1706010504	26.65		
Big Sheep Creek	1706010203	56.65	1.59	0.17
Chesnimnus Creek	1706010604	78.94	1.07	
GR River/Five Point Creek	1706010404	98.93		
GR R/Mud Creek	1706010602	69.08		
Lower Big Sheep Creek	1706010204	54.86	2.86	
Lostine River	1706010502	28.08		
Lower Imnaha River	1706010205	101.18	10.41	
L Wallowa River	1706010506	36.57		
Meadow Creek	1706010402	136.43	1.52	0.66
M Imnaha River	1706010202	66.13	3.87	
M Wallow River	1706010503	15.11		
U Imnaha River	1706010201	57.47		
U Joseph Creek	1706010605	78.13	3.68	
U Wallowa River	1706010501	32.02		
Snake River DPS Totals:		936.23	25.0	0.83
TOTAL:		1,395.91	32.72	5.18

Appendix BA-2: Changes to Grazing Allotments.

Malheur National Forest	
Bear Valley Ranger District	
Aldrich	No change in management
Murderers Creek	No change in management
Long Creek Ranger District	
Beech Creek	No change in management. Loss of NFS lands on one pasture, adjust term on/off permit to reflect changes in land ownership. No change in stocking.
Blue Mountain	No change in management
Deer Creek	Adjust allotment boundary to exclude conveyed and include acquired parcels. No change in stocking.
Dixie	Adjust allotment boundary reduce permit by 257 AUM.
Hamilton	1/2 of western pastures lost. Potential change in allotment boundary.
King	Loss of all NFS lands on allotment cancel term on/off permit loss of the 3 AUM authorized through the on portion of the permit.
Long Creek	No change in management
Mt. Vernon/John Day	No change in management
Roundtop	No change in management
Prairie City Ranger District	
Hot Springs	No change in management
Sullens	No change in management
Umatilla National Forest	
Heppner Ranger District	
Coalmine	No change in management
Hardman	No change in management
Tamarack Monument	No change in management
North Fork John Day	
Cooper Creek	Loss of all NFS land cancel term on/off permit identifying 62 AUM authorized through the on portion of the permit.
Cunningham	No Change in Management
Hutchison	Loss of all NFS land on allotment cancel term on/off permit loss of 18 AUM authorized through the on portion of the permit.
Indian Creek	No change in management
Klondike	No change in management
Lucky Strike	No change in management
McDonald Spring	Loss of all NFS land cancel term on/off permit for 6 AUM. Loss of one trough no value
Trout Meadows	No change in management
Walla Walla Ranger District	
Butcher Creek	Loss of all NFS land on 2 pastures, gain private on rest of allotment cancel term on/off permit increase term permit. There will be a total loss of 158 AUM (sheep) from the on portion of the permit. Loss of two ponds no value.
Eden	No change in management
Wallowa-Whitman National Forest	
La Grande Ranger District	
Dark Ensign	No change in management
Five Points	No change in management
McCarty	No change in management
Starkey	Loss of most NFS land on one pasture remove from allotment. Pasture removed from rotation. No change in stocking.

HCNRA Ranger District	
Cayuse	No change in management
Cow Creek	No change in allotment management but improvement in administration. There is a private feeding facility on PW48. The permanent facilities will remain and livestock not authorized within until further analysis is completed.
Dodson-Haas	No change in allotment management but improvement in administration. There are private feeding facilities on PW10A & B and PW13B. Permanent facilities will remain and livestock not authorized within until further analysis is completed..
Grouseline	No change in management
Log Creek	No change in management. There are private feeding facilities on PW20C. Permanent facilities will remain and livestock are not authorized within until further analysis is completed.
Lone Pine	No change in management
Middlepoint	No change in allotment management but improvement in administration. There is private winter feeding facilities on PW24C. Permanent facilities will remain and livestock not authorized within until further analysis is completed.
Toomey	No change in management
Pine Ranger District	
Goose Creek	No change in management
Snake River	No change in management
Unity Ranger District	
Bullrun	No change in management
Wallowa Valley Ranger District	
Al-Cunningham	No change in management. There are private feeding facilities on PW34C. The permanent facilities will remain and livestock not authorized within until further analysis is completed.
Big Sheep	No change in management
Buck Creek	No change in management. There are private feeding facilities on PW39B&C. The permanent facilities will remain and livestock not authorized within until further analysis is completed.
Carrol Creek	Loose all NFS land west of Carol Creek. Cancel 42 AUM from term grazing permit. New owner does not intend to continue grazing.
Chesnimnus	No change in management
Divide	Loose most NFS land in one pasture. Cancel 64 AUM from term grazing permit. New owner does not intend to continue grazing.
Doe Creek	No change in management
Needham Butte	No change in management
North Powwatka	Loss of most NFS lands cancel term on/off permit for a loss of 113 AUM from the on portion of the permit. The private owner plans to continue grazing.
South Powwatka	No change in management. Though this parcel is the only federal land within a private land pasture. It is so small no capacity is given to it. Forest Service will no longer manage pasture.

Appendix BA-3: Forest Structure by Watershed.

Watershed HUC Number	Watershed Name	Conveyed Stand Initiation, Acres	Conveyed Mid & Late Structure, Acres	Conveyed Merchantable Timber, % of Watershed	Acquired Stand Initiation, Acres	Acquired Mid & Late Structure, Acres	Acquired Merchantable Timber, % of Watershed
1705020107	SNAKE RIVER/INDIAN CREEK		0	0.0%	0	7	0.0%
1705020202	SOUTH FORK BURNT RIVER	4	38	0.1%		0	0.0%
1705020310	UPPER EAGLE CREEK		0	0.0%	0	291	0.2%
1706010104	SNAKE RIVER/DIVIDE CREEK		0	0.0%	0	0	0.0%
1706010201	UPPER IMNAHA RIVER		0	0.0%	0	15	0.0%
1706010202	MIDDLE IMNAHA RIVER	0	57	0.1%	0	385	0.4%
1706010203	BIG SHEEP CREEK	38	771	0.9%	0	8	0.0%
1706010204	LOWER BIG SHEEP CREEK	0	0	0.0%		0	0.0%
1706010205	LOWER IMNAHA RIVER	0	17	0.0%	0	778	0.5%
1706010402	MEADOW CREEK	0	124	0.1%	0	231	0.2%
1706010404	GRANDE RONDE RIVER/FIVE POINTS CREEK	0	57	0.1%	0	378	0.4%
1706010501	UPPER WALLOWA RIVER	0	407	0.3%	0	424	0.3%
1706010502	LOSTINE RIVER	0	12	0.0%	0	4	0.0%
1706010503	MIDDLE WALLOWA RIVER	0	20	0.0%		0	0.0%
1706010504	BEAR CREEK	0	20	0.0%		0	0.0%
1706010506	LOWER WALLOWA RIVER	11	49	0.0%		0	0.0%
1706010601	GRANDE RONDE RIVER/RONDDWA		0	0.0%	0	322	0.3%

Watershed HUC Number	Watershed Name	Conveyed Stand Initiation, Acres	Conveyed Mid & Late Structure, Acres	Conveyed Merchantable Timber, % of Watershed	Acquired Stand Initiation, Acres	Acquired Mid & Late Structure, Acres	Acquired Merchantable Timber, % of Watershed
1706010602	GRANDE RONDE RIVER/MUD CREEK	98	876	0.6%	0	379	0.2%
1706010603	WENEHA RIVER		0	0.0%	0	891	0.5%
1706010604	CHESNIMNUS CREEK		0	0.0%	0	652	0.5%
1706010605	UPPER JOSEPH CREEK		0	0.0%	0	226	0.2%
1707010302	MEACHAM CREEK	154	2707	2.4%	0	1705	1.5%
1707010306	BIRCH CREEK	19	164	0.1%		0	0.0%
1707010309	UPPER BUTTER CREEK	266	618	0.3%		0	0.0%
1707010401	UPPER WILLOW CREEK	13	192	0.2%		0	0.0%
1707010403	RHEA CREEK	13	154	0.1%		0	0.0%
1707020101	UPPER SOUTH FORK JOHN DAY RIVER		0	0.0%	0	3	0.0%
1707020103	MIDDLE SOUTH FORK JOHN DAY RIVER		0	0.0%	0	724	0.6%
1707020104	MURDERERS CREEK		0	0.0%	0	1109	1.3%
1707020106	UPPER JOHN DAY RIVER	0	113	0.1%		0	0.0%
1707020108	STRAWBERRY CREEK	0	2638	1.8%	0	112	0.1%
1707020109	BEECH CREEK	0	387	0.5%	0	1787	2.5%
1707020110	LAYCOCK CREEK		0	0.0%	593	878	0.8%
1707020111	FIELDS CREEK		0	0.0%	0	184	0.2%
1707020201	UPPER NORTH FORK JOHN DAY RIVER		0	0.0%	0	77	0.1%

Watershed HUC Number	Watershed Name	Conveyed Stand Initiation, Acres	Conveyed Mid & Late Structure, Acres	Conveyed Merchantable Timber, % of Watershed	Acquired Stand Initiation, Acres	Acquired Mid & Late Structure, Acres	Acquired Merchantable Timber, % of Watershed
1707020203	NORTH FORK JOHN DAY RIVER/BIG CREEK		0	0.0%	1636	2399	2.3%
1707020205	UPPER CAMAS CREEK		0	0.0%	0	533	0.5%
1707020206	LOWER CAMAS CREEK	402	1166	0.7%	0	139	0.1%
1707020207	NORTH FORK JOHN DAY RIVER/POTAMUS CREEK	42	151	0.1%	0	159	0.1%
1707020208	WALL CREEK		0	0.0%	1720	416	0.3%
1707020209	COTTONWOOD CREEK	0	196	0.1%	0	381	0.3%
1707020210	LOWER NORTH FORK JOHN DAY RIVER	38	2054	1.8%	0	608	0.5%
1707020302	CAMP CREEK		0	0.0%	0	112	0.1%
1707020303	BIG CREEK		0	0.0%	0	428	0.4%
1707020304	LONG CREEK		0	0.0%	0	12	0.0%
1707020401	LOWER JOHN DAY RIVER/KAHLER CREEK		0	0.0%	0	122	0.1%

Appendix BA-4: Water Rights and Water Developments, by Forest.

Streamflow augmentation is occurring if a water right is in non-use status or already transferred to instream use). Streamflow reduction may be occurring where a water right is being exercised. Consumptive water rights may be used to augment streamflow with a temporary or permanent transfer to instream use if they have been used in the past 5 years.

Most water diverted at springs for livestock purposes is returned to the streams as surface water and/or groundwater. Reservoirs fill during rain and snowmelt events, unless they are excavated into groundwater or are constructed on or below a perennial water source. Evaporation losses from reservoir surfaces in our area is about 24 to 36 inches per year.

In small streams, the amount of water listed in the water rights may only be available during peak snowmelt stream flow periods; stream flow is usually much lower than the water right during the summer. A hydrologist would have to measure bankfull and low streamflow conditions to determine the effect of non-use of the water right on streamflow.

SOURCE, TRIBUTARY TO: Perennial = P Intermittent = I Ephemeral = E Fish-bearing = FB Non-Fish-bearing = NFB	PARCEL CODE (*) indicates diversion is on parcel	DIVERSION RATE (Quantity: cfs or af) (Rate in cfs/ac) (Duty in af/ac/mo or af/ac/yr)	USE Irrigation = IR Mining = MI Livestock = ST Wildlife = WL Fire Protect = FP Domestic = DO	SEASON OF USE	COMMENTS
Malheur NF – Conveyed					
John Day River Thompson Gulch (I, NFB)	FM2	0.36 cfs	IR 14.4 ac	4/1 – 9/30	The diversion and 130 feet of stream below the diversion are on NF land. 1967 priority date. Stream is perennial NFB at diversion and intermittent below due to diversion of water into the ditch. FS would retain discretionary control.
Bear Creek (P, FB) Intermittent stream (I), trib of Bear Cr; Toad Spr (P), trib of Bear Cr; A spring (P) trib of Bear Cr; Intermittent stream (I), trib of Bear Cr;	FM10 * FM9 * FM9 * FM10 *	0.4 af (1 filling/yr) 0.005 cfs 0.005 cfs 0.4 af (1 filling/yr)	ST ST ST ST	Year long Year long Year long Year long	The two spring developments and two reservoirs have a small effect on the perennial streamflow of Bear Creek, but have a large localized effect on the developed springs and intermittent streams.
North Fork John Day River Deer Creek (P, FB), Runoff, springs, and intermittent streams , tribs of E Fk Deer Cr.	FM15 * FM17 * FM21	?? af, 4 reservoirs ?? af, 5 reservoirs ?? af, 1 res, 1 trough	ST, WL ST, WL ST, WL	Year long Year long Year long	Ten (10) reservoirs and one (1) spring development in the Hamilton Allotment have a small effect on the perennial streamflow of East Fork Deer Cr.
Runoff, springs, and intermittent streams , tribs of W Fk Deer Cr.	FM16A * FM18 * FM19 *	?? af, 4 reservoirs ?? af, 3 res, 1 trough ?? af, 2 reservoirs	ST, WL ST, WL ST, WL	Year long Year long Year long	Nine (9) reservoirs and one (1) spring development in the Deer Creek Allotment have a small effect on the perennial streamflow of West Fork Deer Cr. These developments have a localized effect on developed springs and intermittent streams.
Malheur NF – Acquired					
Bridge Creek N Fk Bridge Cr (P, FB)	PM4 *	1.0 cfs	MI	Year long	Natural streamflow has been reestablished. (Condition of diversion(s), ditch(es), field(s) and stream(s) suggest long-term non-use).
Deep Creek Big Cr tribs (Deadwood Cr, Swamp Cr)	PM5 PM5 *	5.0 cfs from all sources	MI MI	2/1 – 11/30	Natural streamflows have been reestablished. Cert 25223 was cancelled. (Condition of diversion(s), ditch(es), field(s) and stream(s) suggest long-term non-use).
Long Creek Spgs (P), tribs of S Fk Long Cr	PM7 *	0.50 af (1 filling/yr)	ST, WL, FP	Year long	3 reservoirs reduce streamflow locally due to capture of peak streamflows and evaporation from the water surface.
Murderer's Creek	PM30	1 reservoir	ST, WL	Yearlong	ODFW reservoir.
Umatilla NF – Conveyed					
Umatilla River Meacham Cr (P, FB), trib of Umatilla R	FU3C	Amount used benefi.	Railroad	Year long	Natural streamflow has been reestablished. (Special use permit terminated 15 years ago, presumed abandoned).
Unnamed streams (Meacham Cr tribs)	FU3A *	0.32 af (1 filling/yr)	ST, WL	Year long	4 reservoirs - reduce streamflow locally due to capture of peak streamflows and evaporation from the water surface.

North Fork John Day River USA Spring, trib to Snipe Cr, Camas Cr	FU30 *	?? cfs	ST, WL	Year long	1 reservoir, captures spring runoff. Minor localized effects.
Umatilla NF – Acquired					
John Day River (below North Fork) Unnamed streams, tribs of Wilson Cr and Rock Cr	PU22A *	0.30 af (1 filling/yr)	ST, WL	Year long	5 reservoirs - reduce streamflow locally due to capture of peak streamflows and evaporation from the water surface.
North Fork John Day River (abv Camas Cr) springs & runoff, trib of Camp Cr springs & runoff, trib of Texas Bar Cr springs & runoff, tribs of Nye Cr springs & runoff, unnamed NFJDR trib	PU16C * PU16E * PU16H * PU16B	0.1 af – Res 61 0.1 af – Res 57 0.3 af – Res 58, 59 0.1 af –	ST, WL ST, WL ST, WL ST, WL	Year long	5 reservoirs - reduce streamflow locally due to capture of peak streamflows and evaporation from the water surface. Camp Cr - water right would allow user to take 100% of stream flow during the low flow period. Diversion on PU16B, pipeline crosses PU16C, use is on FS land for mining claim. This arrangement would likely not change, but discretionary control would exist with FS.
North Fork John Day River Camas Creek Unnamed str, trib of Lane Cr, Unnamed str, trib of Bear Wallow Cr Unnamed str, trib of Owens Cr	PU15 * PU15 * PU19 *	0.36 af - Res 25 0.32 af - Res 24 0.08 af - Res 37	WL ST WL	Year long Year long Year long	3 reservoirs - reduce streamflow locally due to capture of peak streamflows and evaporation from the water surface.
Middle Fork John Day River Stream (I or P ?), trib of Indian Creek	PU20 *	?? af	ST, WL	Year long	1 reservoir - reduces streamflow locally due to capture of peak streamflow and evaporation from the water surface.
Umatilla River Meacham Creek Runoff, unnamed Butcher Cr trib Spgs & runoff, unnamed Butcher Cr trib unnamed Meacham Cr trib unnamed Meachem Cr trib Spgs & runoff, trib to Kondike Cr Runoff, unnamed Butcher Cr tribs	PU11B * PU11B * PU7C * PU7B * PU5 * PU11B * PU19A	0.22 af - Res 17 0.98 af - Res 16 0.90 af - Res 25 0.90 af - Res 26 0.23 af - Res 27 1.01 af – Res 12, 13	ST, WL ST, WL ST, WL ST, WL ST, WL ST, WL ST, WL	Year long Year long Year long Year long Year long Year long Yearlong	7 reservoirs - reduce streamflow locally due to capture of peak streamflows and evaporation from the water surface.
Wenaha River, trib of Grande Ronde R Unnamed stream (P) (same stream) Unnamed stream (I) Unnamed stream (E) Unnamed spring (P), trib of unamed str	PU1B * PU1B * PU1B * PU1B * PU1B * PU1A *	1.00 af - Res 22 0.12 af - Res 20 0.10 af - Res abv 22 2.56 af - Res 21 0.11 af - Res 19 0.07 cfs - trough	WL WL WL WL WL WL	Year long Year long Year long Year long Year long Year long	5 reservoirs -
Wallowa-Whitman NF – Conveyed					
Fence Creek Cottonwood Cr a reservoir a spring	FW1D * FW1D *	?? af - dev #35 ?? cfs – dev #20	ST, WL ST, WL	Year long Year long	Not a water right, no change from baseline condition.
Prairie Creek (Wallowa R)	FW12	0.005 cfs	DO	Yearlong	Diversion on FW12, point of use on private, no change from current.
Wallowa-Whitman NF – Acquired					
Eagle Creek, trib of Powder River Torchlight Spring	PW38 *	0.002 cfs	ST Developed spr.	Year long	Small localized effects. Insignificant effect.
Grande Ronde River Mud Creek Unnamed intermittent stream 1 Unnamed intermittent stream 1 Unnamed intermit stream 2 Unnamed intermit stream	PW39A * PW39B * PW39B * PW39B * PW39B * PW39B *	0.1 af – Res 6 0.1 af – Res 5 0.1 af – Res 4 ?? cfs 0.1 af – Res 3 ?? cfs	ST ST ST ST ST ST	Year long Year long Year long Year long Year long Year long	11 reservoirs (stock ponds) have little effect on stream flow, because they are high on the ridge. Effects are localized. Most developments are not locatable on photos. Is it there? Buck Cr Allot development #425 Is it there? Buck Cr Allot development #424 Is it there? Buck Cr Allot development #421

Spring Kuhn Canyon cr / unnamed intermit str Kuhn Canyon cr / Spring Buck Creek Unnamed intermittent stream 3 Unnamed intermittent stream 3 / Spring Unnamed intermittent stream 4 Unnamed intermittent stream 4 / Spring Unnamed intermittent stream 5	PW39B * PW39B * PW39B * PW39B * PW39C *	0.25 af – Res 1 ?? cfs 0.1 af – Res 2 ?? cfs 0.1 af – Res 7	ST ST ST ST ST	Year long Year long Year long Year long Year long	Shown on topo map. Buck Cr Allot development #423 Is it there? Buck Cr Allot development #422 Buck Cr Allot development #420
Buck Creek Unnamed Interm str 3 (abv) ; Spg (P)	PW39B*	?? cfs ? well	DO	Year long	Purported contaminated culvert well, unable to locate on parcel during field reconnaissance.
Mud Creek Kuhn Canyon cr / Ditch Creek tribs	PW40	abt 1 af in 5 Res	ST	Year long	5 reservoirs - reduce streamflow locally due to capture of peak streamflows and evaporation from the water surface.
Grande Ronde River Joseph Creek - PODs 1, 2, 3	PW34A*	0.763 cfs	I	4/1 – 10/31 ?	This water right (0.933 cfs) is 27% of OWRD-modeled natural stream flows for September at 80% exceedence. Will not be used after exchange since only 1 acre of point of use will remain private. Beneficial effect.
Springs 1 (P) , trib of intermittent stream Springs 4 (P) , trib of intermittent stream	PW34A PW34C	?? cfs ?? cfs	ST ST	Year long Year long	3 spring developments have little effect on stream flow because unused water is returned to streams.
Chesnimnus Cr Devils Run Cr:/ Berland Spring	PW30	0.29 af - Berland Res	ST	Year long	1 reservoir – captures flow from spring area, so substantially reduces streamflow in intermittent channel at reservoir, overflow re-enters stream.
Unnamed intermittent stream	PW30	0.03 af - Fence Res	ST	Year long	1 reservoir - reduces streamflow locally due to capture of peak streamflows and evaporation from the water surface.
Vance Draw Spring , in a trib 1 of Vance Draw	PW52 PW51A	0.2 af – Res 4 0.1 af – Res 1	ST ST	Year long Year long	2 reservoirs - reduce streamflow locally due to capture of peak streamflows and evaporation from the water surface.
Vance Draw	PW52	0.2 af – S R Res 3	ST	Year long	1 reservoir - reduces streamflow locally due to capture of peak streamflows and evaporation from the water surface.
Trib 1 of Vance Draw	PW51A	0.1 af – S R Res 1	ST	Year long	1 reservoir
Tamarack Gulch/ intermittent stream SF Thomason Mdw Cr / Interm stream	PW50 PW50	0.2 af – Res 42 0.7 af – Res 43 to 46	ST ST	Year long Year long	5 reservoirs - reduce streamflow locally due to capture of peak streamflows and evaporation from the water surface.
Thomason Meadow Cr / Intermi str s	PW21D	0.34 af – 1 res	ST	Year long	1 reservoir - reduces streamflow locally due to capture of peak streamflows and evaporation from the water surface. Another reservoir to west?
Imnaha River – above Big Sheep Cr POD – T1N, R48E, Sec 28	PW25B,C *	0.15 cfs	IR	Year long	Natural streamflow has been reestablished. (Condition of diversion(s), ditch(es), field(s) and stream(s) suggest long-term non-use).
Imnaha River – above Big Sheep Cr Tract 2 – POD 1, east side of river Tract 2 – POD 2, west side of river Dead Horse Cr - Tract 3 POD	PW27C PW25E PW25E PW25E	0.263 cfs 0.094 cfs 0.131 cfs 0.188 cfs	IR IR IR IR	4/1 – 10/15 4/1 – 10/15 4/1 – 10/15 4/1 – 10/15	Tracts 1, 2, and 3 - Natural streamflow has been reestablished. (Condition of diversion(s), ditch(es), field(s) and stream(s) suggest long-term non-use). Insignificant effect.
Dead Horse Cr	PW25E	0.012 af – Res 10	ST	Year long	No evidence of reservoir found
Big Sheep Creek (off channel pit ponds)	PW24E * PW24C *	0.08 af – Res 1 0.08 af – Res 2	ST ST	Year long Year long	Used. Negligible effect on streamflow.
(Big) Sheep Cr – POD Tract 1 (Big) Sheep Cr – POD Tract 3 Camp Cr – POD Tract 2	PW24C * PW24D * PW24H	0.090 cfs 0.098 cfs 0.675 cfs	IR, ST IR, ST IR, ST	4/1 – 10/15 4/1 – 10/15 4/1 – 10/15	Tracts 1 & 3 - IR Helps restore natural streamflow. ST – (Condition of diversion(s), ditch(es) and field(s) suggest long-term non-use). Tract 2 - IR Another ditch on the north side of the creek diverts all streamflow. ST not abandoned (y(Condition of diversion(s), ditch(es) and field(s) suggest long-term non-use, year long). No Effect.

(Big) Sheep Cr (below Camp Cr)	PW24A	0.51 cfs	IR	4/1 – 10/15	IR - Big Sheep Cr – Only POD & ditch are on parcel
Log Cr – POD Tract 1 Log Cr, Kettle Cr, SF Packsaddle Cr, Packsaddle Cr, Buck Cr – PODs Tract 2 Fall Cr – POD Tract 3 Packsaddle Cr – POD Tract 4	PW21C PW20B PW20C PW23B * PW20C	0.143 cfs 0.394 cfs 0.413 cfs 0.090 cfs 0.094 cfs	IR IR IR IR IR	4/1 – 10/15 4/1 – 10/15 4/1 – 10/15 4/1 – 10/15 4/1 – 10/15	Natural streamflow has been reestablished. (Condition of diversion(s), ditch(es), field(s) and stream(s) suggest long-term non-use). No change from baseline.
Log Cr & Kettle Cr	PW20B	0.18 cfs	IR	4/1 – 10/15	Natural streamflow has been reestablished. (Condition of diversion(s), ditch(es), field(s) and stream(s) suggest long-term non-use).
Packsaddle Cr, SF Packsaddle Cr, and Buck Creek (cfs from all sources)	PW20B *	0.15 cfs	IR	4/1 – 10/15	Natural streamflow has been reestablished.; some PODs in parcel. (Condition of diversion(s), ditch(es), field(s) and stream(s) suggest long-term non-use).
Imnaha River – below Big Sheep Cr POD (T3N, R48E, Sec 23)	PW13D	0.113 cfs	IR	4/1 – 10/15	Natural streamflow has been reestablished. (Condition of diversion(s), ditch(es), field(s) and stream(s) suggest long-term non-use).
Imnaha River – below Big Sheep Cr POD (T3N, R48E, Sec 13)	PW10B	0.188 cfs	IR	4/1 – 10/15	Natural streamflow has been reestablished. (Condition of diversion(s), ditch(es), field(s) and stream(s) suggest long-term non-use).
Corral Cr Dodson Cr	PW15B, A PW15A *	0.525 cfs 0.675 cfs	IR IR	4/1 – 10/15 4/1 – 10/15	Natural streamflow has been reestablished. (Condition of diversion(s), ditch(es), field(s) and stream(s) suggest long-term non-use).
Thorn Cr (Section Spring) Inter str (Powerline Sp) (T3N, R48E, S35) Intermittent stream 2 (T3N, R48E, Sec26) Intermittent stream 3 (T3N, R48E, Sec13)	PW14 * PW16D * PW16C * PW11 *	?? cfs ?? cfs ?? af – Res B ?? af – Res A	ST ST ST ST	Year long Year long Year long Year long	2 spring developments have little effect on stream flow because unused water is returned to streams. 2 reservoirs - reduce streamflow locally due to capture of peak streamflows and evaporation from the water surface.
Thorn Cr (& N Fk Thorn Cr)	PW12	0.713 cfs	IR	4/1 – 10/15	Natural streamflow has been reestablished. (Condition of diversion(s), ditch(es), field(s) and stream(s) suggest long-term non-use).
Tully Cr S Fk Tully Cr N Fk Tully Cr	PW10B PW7C *, 8C PW7B *, 7C	0.156 cfs ?? cfs 0.03 cfs IR + DO, ST	IR IR IR, DO, ST	4/1 – 10/15 4/1 – 10/15 4/1 – 10/15	Natural streamflow has been reestablished. (Condition of diversion(s), ditch(es), field(s) and stream(s) suggest long-term non-use). Natural streamflow has been reestablished. – Decree map errors. (Condition of diversion(s), ditch(es), field(s) and stream(s) suggest long-term non-use). IR & DO not used. Natural streamflow reestablished. ST use valid. (Condition of diversion(s), ditch(es), field(s) and stream(s) suggest long-term non-use).
Inter str (Johnson Sp 1) (T3N, R48E, Sec1) Inter str (Johnson Sp 3) (T3N, R48E, Sec1)	PW8A * PW8B *	?? cfs – dev D ?? cfs	ST ST	Year long Year long	Both springs developments are presumed to have been used in past 5 years. Coming to FS, will not be exercised.
Horse Cr	PW19B *	0.54 cfs	IR	4/1 – 10/15	Natural streamflow has been reestablished. (Condition of diversion(s), ditch(es), field(s) and stream(s) suggest long-term non-use).
Cow Cr POD 1 – SE NE Sec 34 POD 2 – NW NE Sec 34 POD 3 – NW SE Sec 21	PW48 PW48 PW3 *	0.413 cfs 0.075 cfs 0.083 cfs	IR IR IR	4/1 – 10/15 4/1 – 10/15 4/1 – 10/15	Natural streamflow has been reestablished. (Condition of diversion(s), ditch(es), field(s) and stream(s) suggest long-term non-use).
Cow Cr Spring (P)	PW48*	0.02 cfs ?	DO	Year long	May have been used in recent years. Large perennial spring connects to Cow Creek. Coming to FS, will not be exercised.

Appendix BA-5: Steelhead Critical Habitat continued

Mid-Columbia DPS Watershed Name and 5 th Level HUC Number	Total Miles of Steelhead Critical Habitat	Miles of Steelhead Critical Habitat		
		Parcel	Acquired	Conveyed
Beech Creek 1707020109	46.35	FM11 FM12 PM12	0.45	0.11 0.34
Lower NF John Day River 1707020210	65.23	FM18 FM19	0	0.78 0.52
Murderer's Creek 1707020104	68.08	PM21 PM25 PM26	1.07 1.17 0.86	0
Strawberry Creek 1707020108	109.21	FM6 FM7 FM8	0	0.70 0.68 0.71
Big Creek 1707020303	92.08	PU20 PM5	0.78 0.76	0
Lower Camas Creek 1707020206	129.90	PU19 FU23 FU20B	0.01	0 0.76 0.06
Meachum Creek 1707010302	80.39	PU11A PU11 PU9A PU9B PU12	0.57 1.88 0.57 0.13 0.16	Steelhead habitat was removed from conveyed parcels
NF John Day R/Big Creek 1707020203	85.31	PU16D PU16E PU16F	0.19 1.14 0.69	0
NF John Day R/Potamus Cr. 1707020207	146.62	PU21	0.47	0
Upper Camas Creek 1707020205	95.75	PU15 PU14	0.65 1.58	0
Upper NF John Day River 1707020201	81.74	PU13 PW45	0.61 0.19	0
Wall Creek 1707020208	110.40	PU22B PU23 PU22A	1.48 1.32 1.67	0
Totals:	1,111.06		18.40	4.66

Appendix BA-6: Chinook salmon habitat by DPS, watershed, and parcel.

Watershed Name	Watershed Number	Miles of Chinook Habitat	Parcels	Acquire (miles)	Convey (miles)
SNAKE RIVER DPS					
UPPER BIG SHEEP CREEK	1706010203	24.23	FW6C PW31	1.03	0.09
GRANDE RONDE R/MUD CR	1706010602	3.45		0	0
LOWER BIG SHEEP CREEK	1706010204	6.97	PW24A PW24B PW24C PW24D PW24H	0.52 0.49 0.64 0.54 0.55	
LOSTINE RIVER	1706010502	24.80		0	0
LOWER IMNAHA RIVER	1706010205	28.92	PW1 PW10A PW10B PW13A PW13B PW13C PW13D PW16A PW16C PW16E PW19B PW20A PW20C PW2A PW2B	0.10 0.67 0.31 0.20 0.32 0.24 0.22 0.30 0.37 0.97 1.17 0.67 0.15 0.20 0.11	
LOWER WALLOWA RIVER	1706010506	23.66		0	0
MIDDLE IMNAHA RIVER	1706010202	26.02	PW25A PW25B PW25C PW25D PW27C	0.32 0.92 0.98 1.00 0.61	
UPPER WALLOWA RIVER	1706010501	23.53		0	0
GRANDE RONDE R/FIVE POINTS CR	1706010404	6.04		0	0
MEADOW CREEK	1706010402	10.43	PW44A	0.35	
MEACHAM CREEK	1707010302	1.13		0	0
Snake River DPS totals:		179.11		13.96	0.09
MID-COLUMBIA DPS					
UPPER JOHN DAY RIVER	1707020106	10.88		0	0
BIG CREEK	1707020303	9.14		0	0
Mid-Columbia DPS totals:		20.02		0.0	0
TOTALS:		199.13		13.96	0.09

Appendix BA-10: Matrix Indicators, Primary Constituent Elements, and Essential Features

Matrix Indicators (Bull trout, Mid-Columbia and Snake River Steelhead trout, and Snake River Chinook)

1. Subpopulation size, growth and survival, life history diversity and isolation, Persistence and genetics
2. Physical barriers
3. Chemical contaminants/nutrients
4. Large Wood, Pool frequency and quality, and Large Pools
5. Stream substrate, Percent bank stability, Width:Depth ratio, Off channel habitat, RHCA's, Streambank condition, and Temperature
6. Floodplain connectivity, Changes to drainage network, Road density and location
7. Refugia
8. Changes to peak and base flows
9. Disturbance history & regime

Bull Trout Critical Habitat PCE's

1. Water temperature
2. Complex stream channels
3. Substrates of sufficient amount, size, and composition
4. Natural hydrograph within historic ranges
5. Springs, seeps, groundwater, and subsurface water connectivity
6. Migratory corridors with minimal barriers
7. Abundant food base
8. Permanent water having low levels of contaminants

Snake River and Mid-Columbia Steelhead Trout Critical Habitat PCE's

Only three of the six PCE's are applicable to this project since the remaining three elements involve estuarine, nearshore marine, and off shore marine areas.

1. Freshwater spawning sites with water quantity and quality conditions and substrate supporting spawning, incubation and larval development.
2. Freshwater rearing sites with water quantity and floodplain connectivity to form and maintain physical habitat conditions and support juvenile growth and mobility; water quality and forage supporting juvenile development; and natural cover such as shade, submerged and overhanging large wood, log jams and beaver dams, aquatic vegetation, large rocks and boulders, and side channels.
3. Freshwater migration corridors free of obstruction 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.

Chinook Salmon Essential Features

1. Water quantity
2. Water quality
3. Free/safe passage
4. Forage/food
5. Cover/shelter
6. Riparian vegetation
7. Substrate
8. Space
9. Water velocity

Appendix BA-11: Summary of trends for Matrix Indicators as influenced by future management actions at the project scale (considering a net increase of fisheries habitat for all listed species).

Indicators	Logging	Roads	Water Rights	Grazing
Subpopulation size	Maintain	Maintain	Maintain	Maintain
Growth & Survival	Maintain	Maintain	Maintain	Restore
Life History Diversity & Isolation	Maintain	Restore	Maintain	Restore
Subpopulation Trend	Maintain	Maintain	Maintain	Restore
Persistence & Genetic Integrity	Maintain	Restore	Maintain	Maintain
Temperature	Restore	Maintain	Maintain	Restore
Sediment	Restore	Restore	Maintain	Restore
Chemical Cont./Nutrients	Maintain	Maintain	Maintain	Restore
Physical Barriers	Maintain	Restore	Maintain	Maintain
Substrate Embeddedness	Restore	Restore	Maintain	Restore
Large Wood	Restore	Restore	Maintain	Maintain
Pool Freq. & Quality	Restore	Restore	Maintain	Maintain
Large Pools	Restore	Restore	Maintain	Maintain
Off-channel habitat	Restore	Maintain	Maintain	Restore
Refugia	Restore	Maintain	Maintain	Restore
Width:Depth	Restore	Maintain	Maintain	Restore
Streambank condition	Restore	Restore	Maintain	Restore
Floodplain connectivity	Restore	Restore	Maintain	Maintain
Changes to peak & base flows	Maintain	Restore	Maintain	Maintain
Changes to drainage network	Restore	Restore	Maintain	Maintain
Road density & location	Maintain	Restore	Maintain	Maintain
Disturbance history	Restore	Restore	Maintain	Restore
RHCA's	Restore	Restore	Maintain	Restore
Disturbance regime	Restore	Maintain	Maintain	Maintain

