

Fisher (*Martes Pennanti*) Habitat in Cedar River Watershed



Tracy
Seimears

Amber
Elliott

John Burk

Outline

- ✱ Literature reviewed/Key habitat attributes.
- ✱ Habitat attributes model/Data limitations.
- ✱ Model application: Developing HS Index.
- ✱ Current suitable habitat: CRW.
- ✱ HSI values/Patch analysis.
- ✱ Population capacity: Current Landscape.
- ✱ Habitat suitability improvement plan: CRW.
- ✱ Literature cited.



Fisher (*martes pennanti*)

- ✿ Found only in North America
- ✿ Solitary except during mating
- ✿ Tree climbers- mostly terrestrial
- ✿ Food- anything that can be caught and overtaken
- ✿ Den in snags
- ✿ Old growth forest



Fisher Associated Habitat Literature Reviewed

Keith B. Aubry; Douglas B. Houston, 1992: Distribution and Status of the Fisher (*Martes pennanti*) in Washington







Keith Aubry and Jeffrey Lewis, 2003: *Extirpation and reintroduction of fishers (Martes pennanti) in Oregon: implications for their conservation in the Pacific states*

William J. Zielinski et al. 1999. *Diet of Fishers (Martes pennanti) at the Southernmost Extent of Their Range*

Jeffery Lewis et al., 2003: Assessment of fisher habitat in Washington State.

Jeffery Lewis and Gerald Hayes, 2004: Feasibility assessment for reintroducing fishers in Washington.

Key Habitat Attributes

-  Stand structural class
-  Elevation (forest type)
-  Percent canopy cover
-  Mean stem DBH
-  Mean snag DBH
-  Mean snag density



Stand Structural Class

Keith B. Aubry; Douglas B. Houston, 1992

- ✱ Prefers dense lowland forest w/ complex physical structure near forest floor.
- ✱ LSR at low-mid elevation is prime habitat.
- ✱ Prefers older and larger stands, sensitive to fragmentation.

Keith Aubry and Jeffrey Lewis, 2003

- ✱ Prefers Late-successional forest structures.
- ✱ Low density use of second-growth forests and extensively fragmented landscapes.
- ✱ Complex forest floor structure.

William J. Zielinski et al. 1999

- ✱ Late-seral mixed conifer-deciduous forest. Conifer LSR= prime.
- ✱ Preferred med to lg tree dominated stands for resting/breeding. Forage in younger stands. Prefers deciduous riparian areas when available.

Elevation (forest type)

Keith B. Aubry; Douglas B. Houston, 1992

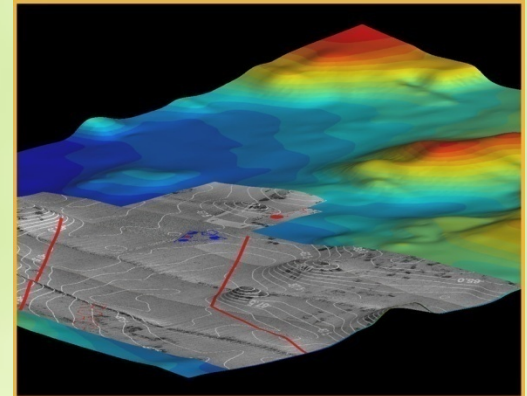
- ✿ Elevation West Cascades: 87% records 100-1000m, 100% < 1800m.
- ✿ Forest Zone, West Cascades: 54% western hemlock, 26% silver fir, 20% Sitka spruce.

Keith Aubry and Jeffrey Lewis, 2003

- ✿ Low to mid-elev. Conifer-dominated forest.
- ✿ Avoids high elevations with soft, deep snowpack.

Jeffery Lewis et al., 2003

- ✿ West Cascades: Upper elevation limit = Pacific silver fir zone.



Percent Canopy Cover

Keith B. Aubry; Douglas B. Houston, 1992

- ✱ Continuous CC

Keith Aubry and Jeffrey Lewis, 2003

- ✱ Relatively continuous canopies.
- ✱ Avoids stands with <40% canopy cover.

Jeffery Lewis et al., 2003

- ✱ Prefers canopy cover from 41-100%



Mean Stem/Snag DBH

Keith B. Aubry; Douglas B. Houston, 1992

- ✱ Natal dens in live trees or snags >6m w/ mean DBH= 51cm.

Keith Aubry and Jeffrey Lewis, 2003

- ✱ >80 cm dbh trees, snags, logs preferred by females (birth, raise litters, resting sites.)

Jeffery Lewis et al., 2003

- ✱ > 20 inch DBH (>18 inch south facing aspects)



Other Applicable Information

Keith Aubry and Jeffrey Lewis, 2003

- ✿ Maximum dispersal distance <100 km in suitable habitat.

William J. Zielinski et al. 1999. *Diet of Fishers (Martes pennanti) at the Southernmost Extent of Their Range*

- ✿ Diet generalist: Opportunistic feeder, switch prey with availability. (Mammals preferred, terrestrial vertebrates and reptiles as available, fish avoided). No profound seasonal shift.

Jeffery Lewis et al., 2003

- ✿ < 200m travel zones (unsuitable habitat).
- ✿ 10 ha suitable habitat too small for bridge.
- ✿ Mean home ranges: Male= 68.2 square kilometers, Female=24.95 square kilometers.

Habitat Attributes Model

✱ **Structural Class** used as a screen. 3+ was go. <3 was no go.

✱ **Stand Elevation** = weighted at 30% of HSI.

✱ 300-2000ft = 100%, 2000-3000ft = 50%, 3000-4000ft = 25%

✱ **Canopy Cover** = weighted at 30% of HSI.

✱ 0-21% = 0, 21-40% = 25%, 40-60% = 50%, 60-80% = 90%, 80-100% = 100%

✱ **Tree DBH** = weighted at 30% of HSI.

✱ <13.5" = 0%, 13.5-20" = 50%, 20-55" = 100%.

✱ **Snag Density** = weighted at 5% of HSI.

✱ Presence of any snag per ha rated at 100%.

✱ **Snag DBH** = weighted at 5% of HSI.

✱ <13.5" = 0%, 13.5-20" = 50%, 20-55" = 100%.



APPLYING THE ATTRIBUTES






MODEL

	B	C	D	E	F	G	H
1	Elevation (ft)	cc	strcls	s1cc	s1dbh	hdsdenha	hdsdbhcm
2	2941.5	63.84695	3	51.47117	23.82464	126.6823	13.63041
3	531	28.45316	6	24.21516	69.63236	5.161156	17.42549
4	763.109375	67.51517	3.769231	58.30588	57.59696	142.2168	35.2106
5	3326	60.32724	3.666667	58.9958	55.17408	411.2211	24.77185
6	1648.688073	74.90359	3.082569	68.30818	42.14306	155.8834	26.99822
7	2180.703704	66.19034	3.148148	61.12178	45.25209	170.7007	27.81007
8	1175.4	58.43889	3.866667	55.20287	61.02763	90.14242	42.44696

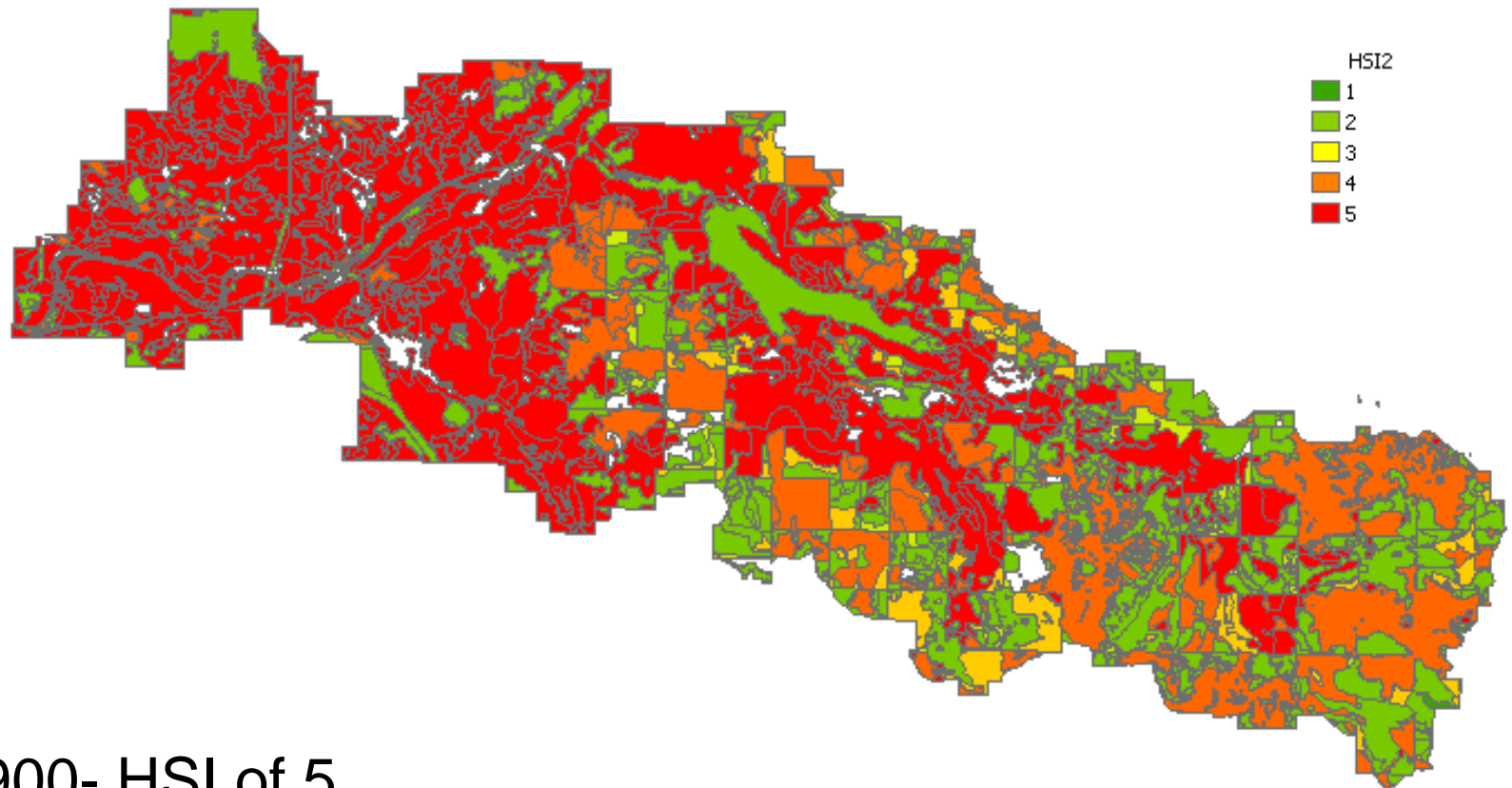
I	J	K	L	M	N	O	P
sfsdenha	sfsdbhcm	elevscrpct	ccscrpct	s1dbhscrpct	sngdbhscrpct	sngdnsscrpct	weighted average
0	0	50	90	0	1	100	47.05
0	0	100	25	100	1	100	72.55
2.01506	0.918237	100	90	100	50	100	94.50
323.6943	10.5115	25	90	100	1	100	69.55
36.71663	3.16704	100	90	50	1	100	77.05
31.1404	1.828988	50	90	50	1	100	62.05
7.338167	1.653881	100	50	100	50	100	82.50

$$fx = \text{VALUE}((0.3 * K10) + (0.3 * L10) + (0.3 * M10) + (0.05 * N10) + (0.05 * O10))$$

Final HIS Value

	1	• 0-20
	2	• 2-39.99
	3	• 4-59.99
	4	• 6-74.99
	5	• 75-100

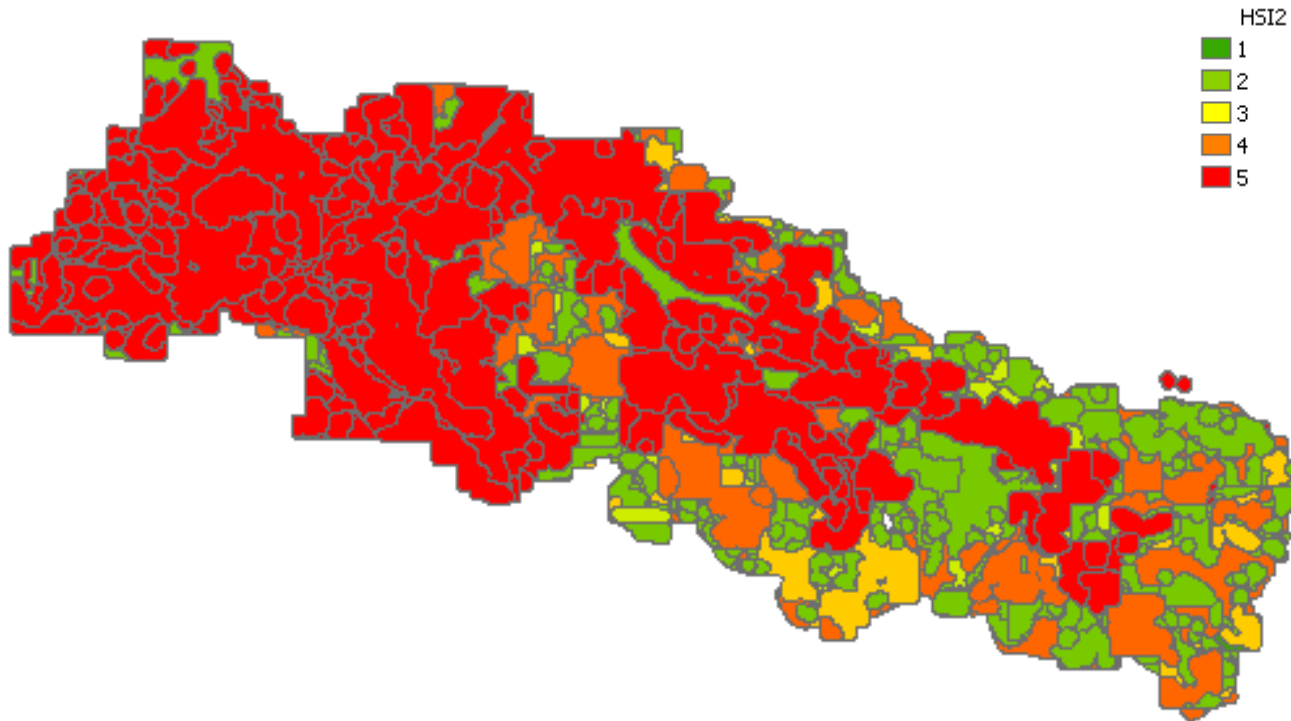
Distribution of Habitat



42900- HSI of 5

17170- HSI of 4

Buffer of Suitable Habitat



Spatial Statistics

Class	Class Area	Total Area	Percent of Total
0	1913422.109	3475002270.135	0.00055062
1	1035343358.134	3475002270.135	0.29849100
2	44581084.793	3475002270.135	0.01282908
3	130416960.111	3475002270.135	0.03753004
4	747867936.249	3475002270.135	0.21521365
5	1514879508.737	3475002270.135	0.43593626



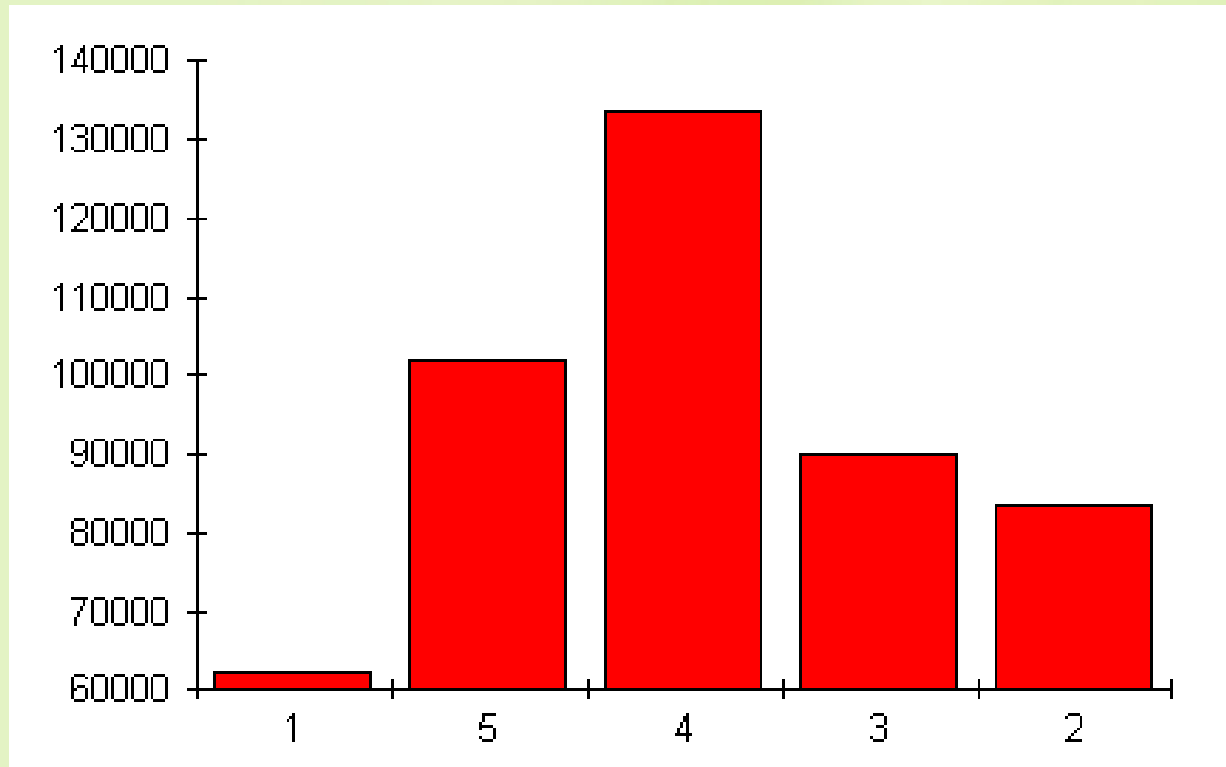
Fisher Home Range

- ❁ Males: 6400-16000 acres
- ❁ Females: 1920-6100 acres
- ❁ Total available area: 60070 acres
- ❁ Minimum: 5
- ❁ Maximum: 15

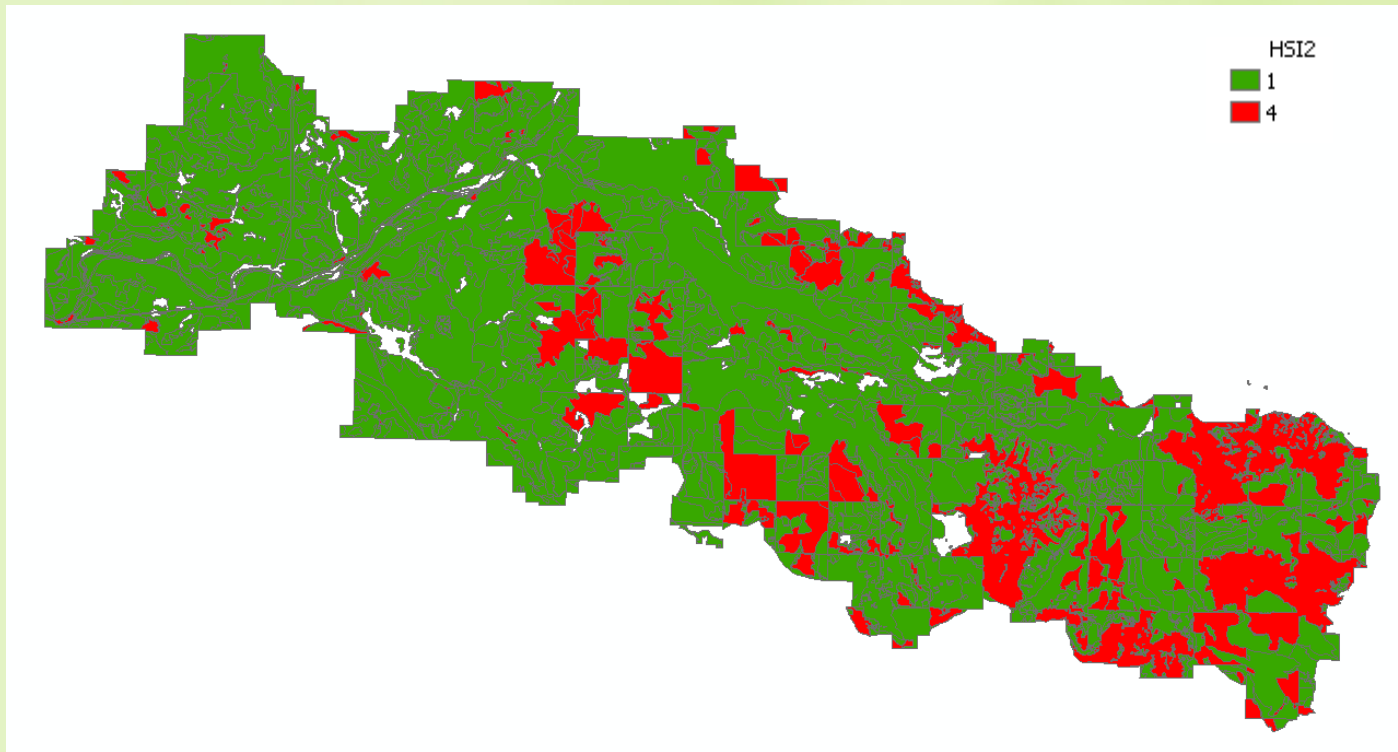


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Mean Patch Edge

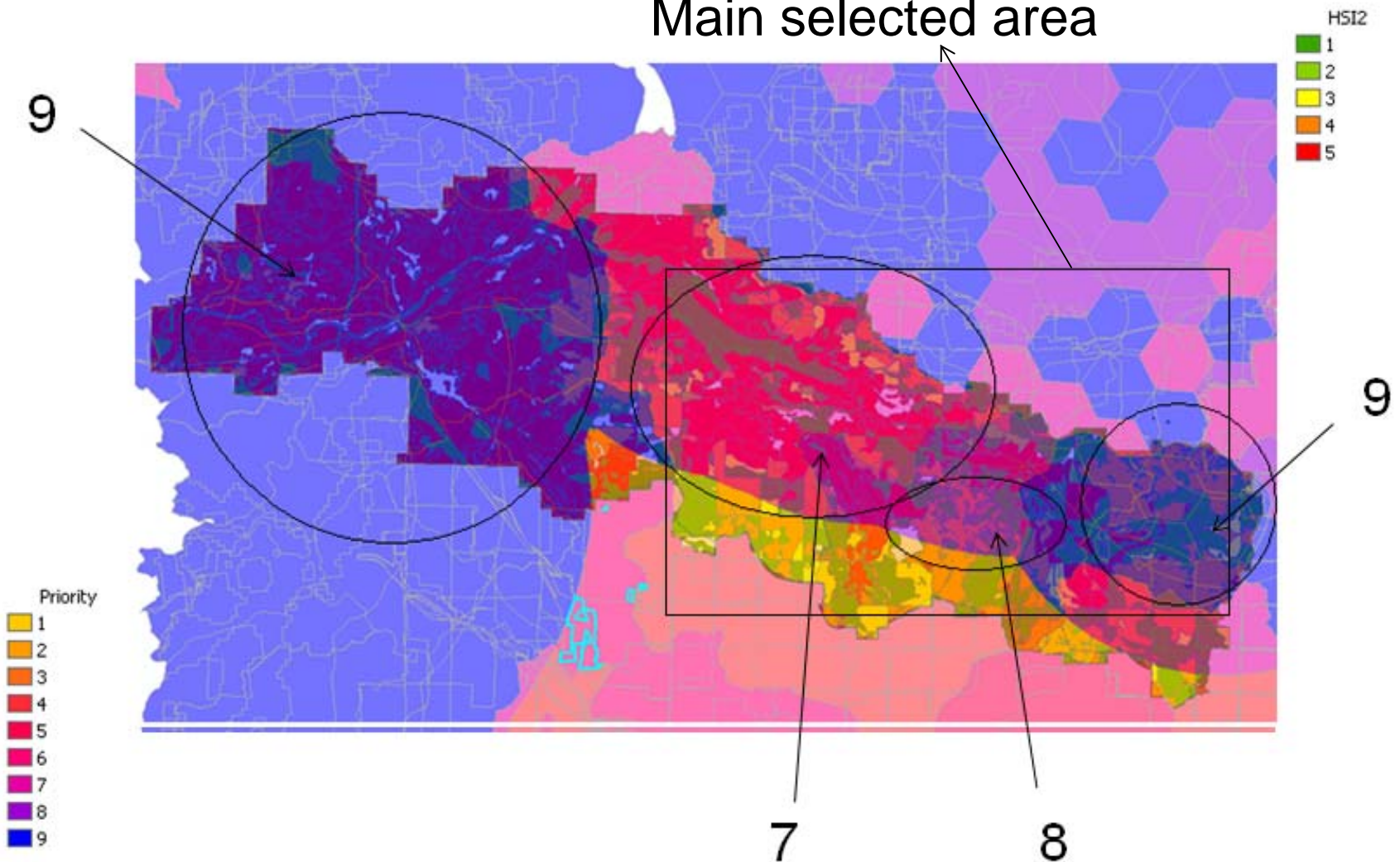


Areas of Interest



Why the selected areas

Main selected area



What Makes these Areas Unsuitable?

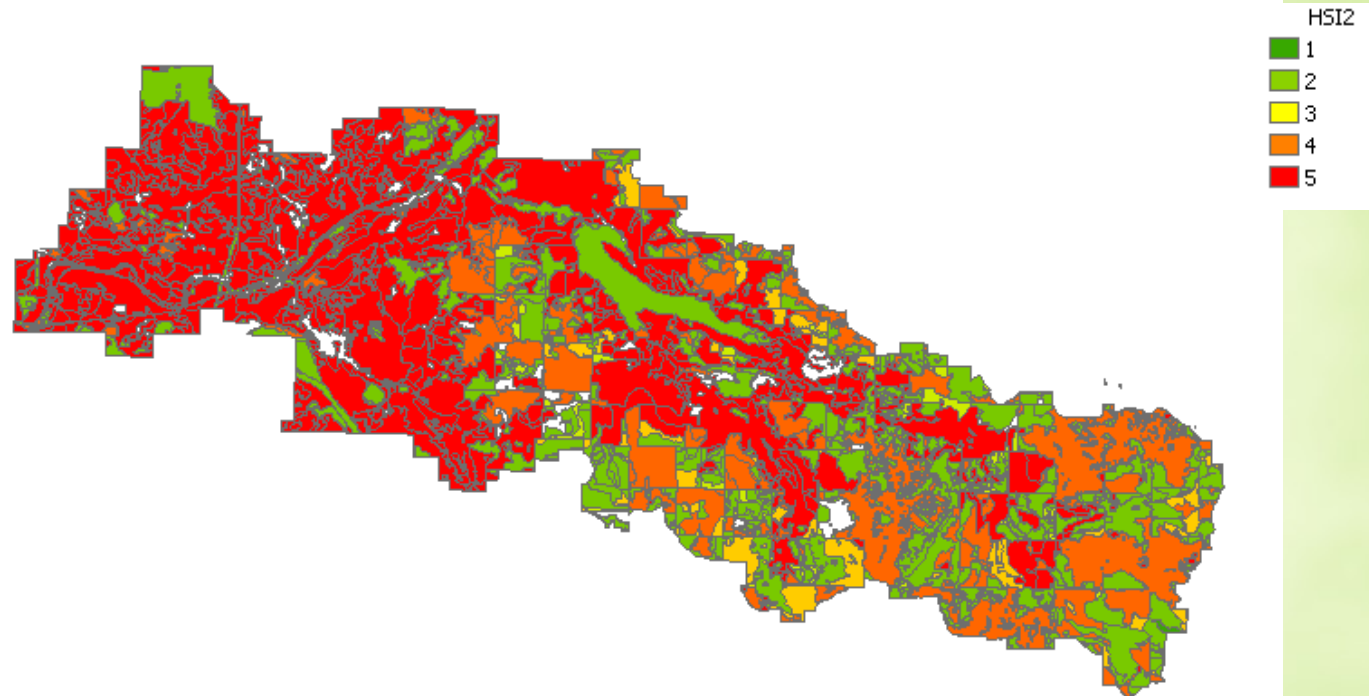
- ✿ **Canopy Cover- 66%- 70%**
- ✿ **Elevation at 2180ft and 4155ft**



Management Techniques

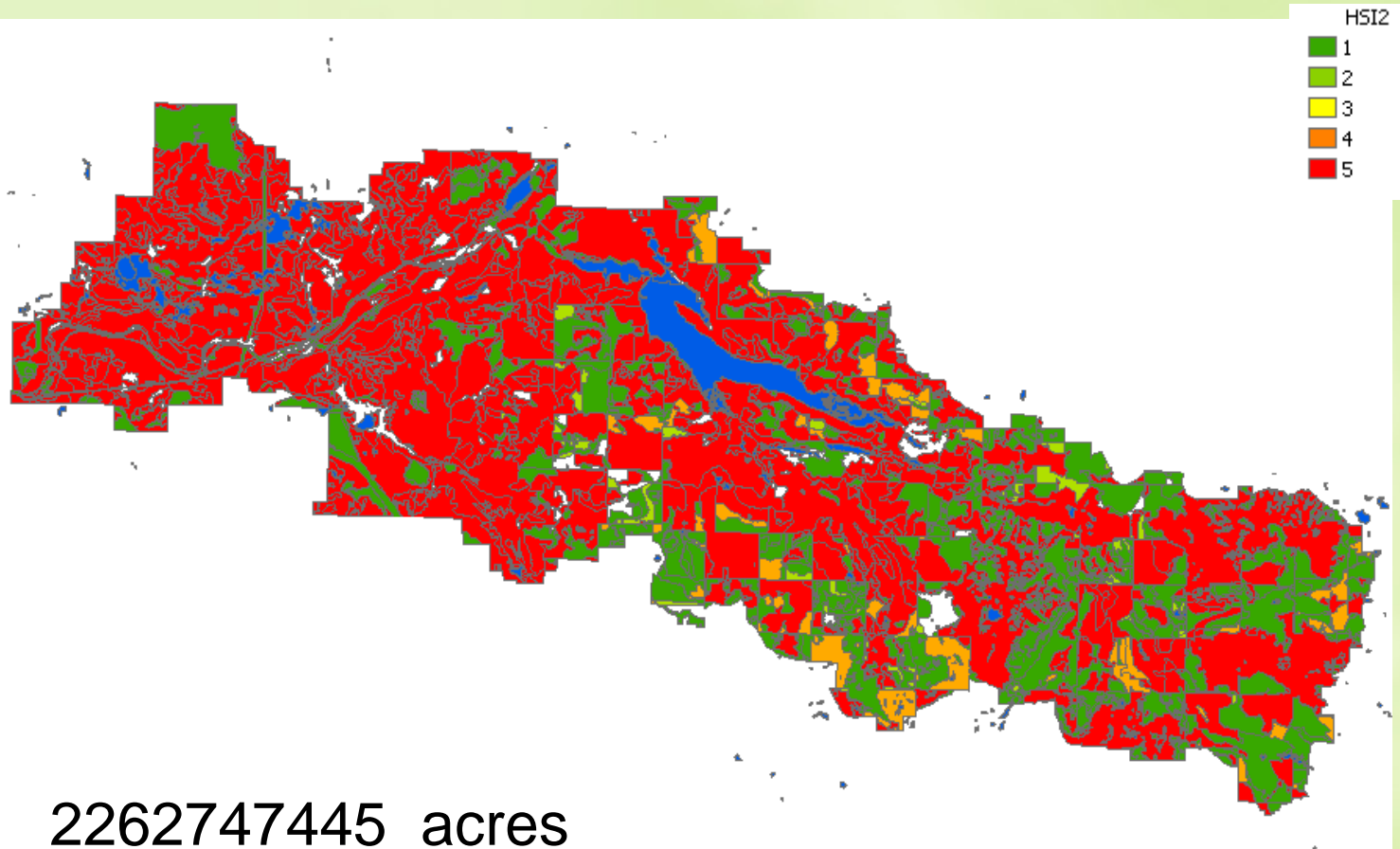
- ✿ Create corridors and larger patches of old growth within the CRW
- ✿ Increase canopy cover
 - possible thinning while leaving the largest and oldest trees
 - more structural classes/integrity

Before Management Changes



747867936.249 acres

.....and after



Additional Management for Current Suitable habitat

- ✿ Managing for old growth forest
 - dense canopy cover
 - large DBH
- ✿ Manage for snag availability
 - ✿ Large DBH
 - ✿ Hardwood if possible

Table 1 Old-growth structural characteristics and corresponding management practices for promoting these characteristics.

Old-Growth Structural Characteristic	Management Practice
Increase the diversity of tree sizes and ages	Harvest single trees or small groups of trees, creating gaps up to 1/4 acre; repeat to create multi-aged stands
Increase the number of snags—large standing dead trees	Girdle (i.e., cut several rings of bark/cambium around the stem to deliberately kill the tree) selected medium- to large-sized trees, including cull trees
Increase number and volume of downed logs	Fell and leave on the ground selected medium- to large-sized trees, including cull trees, which can improve growth of residual trees
Provide for future snags and downed logs	Reserve permanent “legacy trees” within harvested areas (photo, pg. 8)
Increase number of large living trees	Thin woods by removing competing, low-quality trees adjacent to largest, most vigorous trees



Adapted from William Keeton (2005)

Monitoring the Fisher

- ✿ Reintroduction of 5-10 fishers within the CRW-
- ✿ Tag and collar all released fishers






Questions?



Works Cited

- Aubry, D. B. and D. B. Houston. 1992. Distribution and status of the fisher (*Martes pennanti*) in Washington. *Northwestern Naturalist*, 73(3):69-79.
- Aubry, K. B. and J. C. Lewis. 2003. Extirpation and reintroduction of fishers (*Martes pennanti*) in Oregon: implications for their conservation in the Pacific states. *Biological Conservation* 114:79–90
- Lewis, J. C. 2003. Assessment of fisher habitat in Washington State: Tier 1 and tier 2 final report. Washington Department Fish and Wildlife, Olympia. 41 pp
- Lewis, J. C. and G. E. Hayes. 2004. Feasibility assessment for reintroducing fishers to Washington. Washington Department Fish and Wildlife, Olympia. 70 pp.
- Zielinski, J. S., N. P. Duncan, E. C. Farmer, R. L. Truex, A. P. Clevenger and R. H. Barrett. 1999. Diet of fishers (*Martes pennanti*) at the southernmost extent of their range. *Journal of Mammalogy*, 80(3):961-971.

Habitat Literature/Attributes cont.

-  Two Washington Department of Fish and Wildlife documents associated with current fisher reintroduction.
-  Jeffery Lewis et al., 2003: Assessment of fisher habitat in Washington State.
-  Jeffery Lewis and Gerald Hayes, 2004: Feasibility assessment for reintroducing fishers in Washington.

Habitat Literature/Attributes cont.

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-  Diet generalist: Opportunistic feeder, switch prey with availability. (Mammals preferred, terrestrial vertebrates and reptiles as available, fish avoided). No profound seasonal shift.
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- ✿ West Cascades: Upper elevation limit = Pacific silver fir zone.
- ✿ < 200m travel zones (unsuitable habitat).
- ✿ 10 ha suitable habitat too small for bridge.
- ✿ Mid-late seral forests: CC 41-100%, 1-3 layers, > 20 inch DBH (>18 inch south facing aspects) > 50 TPH.

Habitat Literature/Attributes: A Synthesis

Jeffery Lewis and Gerald Hayes, 2004

- ✿ Close association: Low-Mid elevation conifer forests, lg blks of contiguous forest w/ high CC. Lg live trees, lg snags, lg LWD. Complex understory that supports prey.
- ✿ Natal dens 0-10 wks: Lg live trees or snags. In **BC**, cottonwood branch hole= 41.2" DBH and 85' tall. In **CA**, Ponderosa pine snag= 31.2" DBH, live black oak 35" DBH. In **Or**, snags or live trees= 37.2" DBH and 52.5" tall.
- ✿ Maternal dens 8 wks-5 months: Prefers sites closer to ground, >20" DBH hollow logs.


Habitat Literature/Attributes: A Synthesis (cont)


Jeffery Lewis and Gerald Hayes, 2004 (Cont)

- Rest site trees: In **BC**, 18.5" DBH. In **ID**, trees 22.4" DBH and snags and logs >21". In **CA**, hardwood and conifer live trees, snags and logs >35" DBH. Most often found resting in conifers.
- Resource selection: greater variation in tree DBH than CC. Prefers greater CC, larger trees, steeper slopes, large snag in area.

Habitat Literature/Attributes: A Synthesis (cont)

Jeffery Lewis and Gerald Hayes, 2004 (*Cont*)

 Stand level conditions: continuous overhead cover, structurally complex. **ID**, 61%-80% CC resting sites, 21-40% and >80% CC hunting sites. In **CA**, most commonly found by Buck in 40-70% CC and by Zielinski in 60-100% CC. In **BC**, selected conifer cover in winter and deciduous cover in summer >20% CC.

 Foraging site: In **ID**, in summer used higher percentage of >13" trees/snags/logs compared to availability and old growth in proportion to availability. In winter, used young stands of 4.5-13.5" trees in presence of trees >25" DBH. Presence of snags important, high density of understory (yew). In **CA**, CC >80% and understory vegetation from 4.9-9' tall.