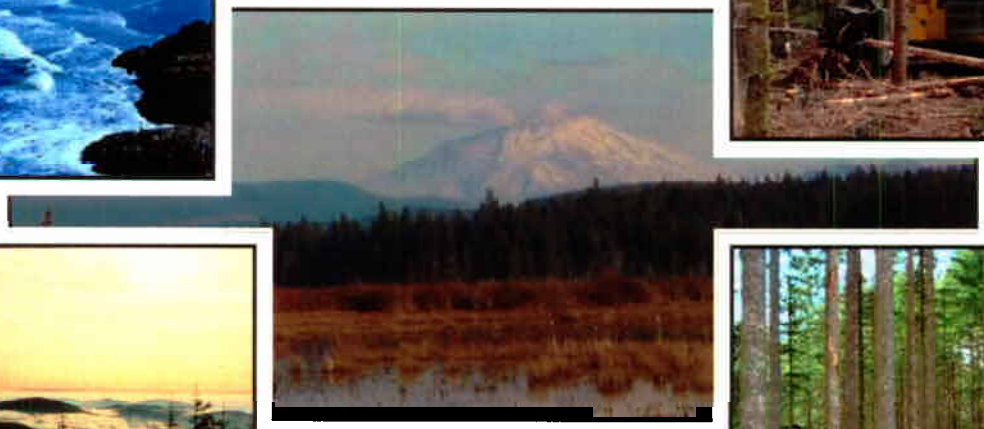
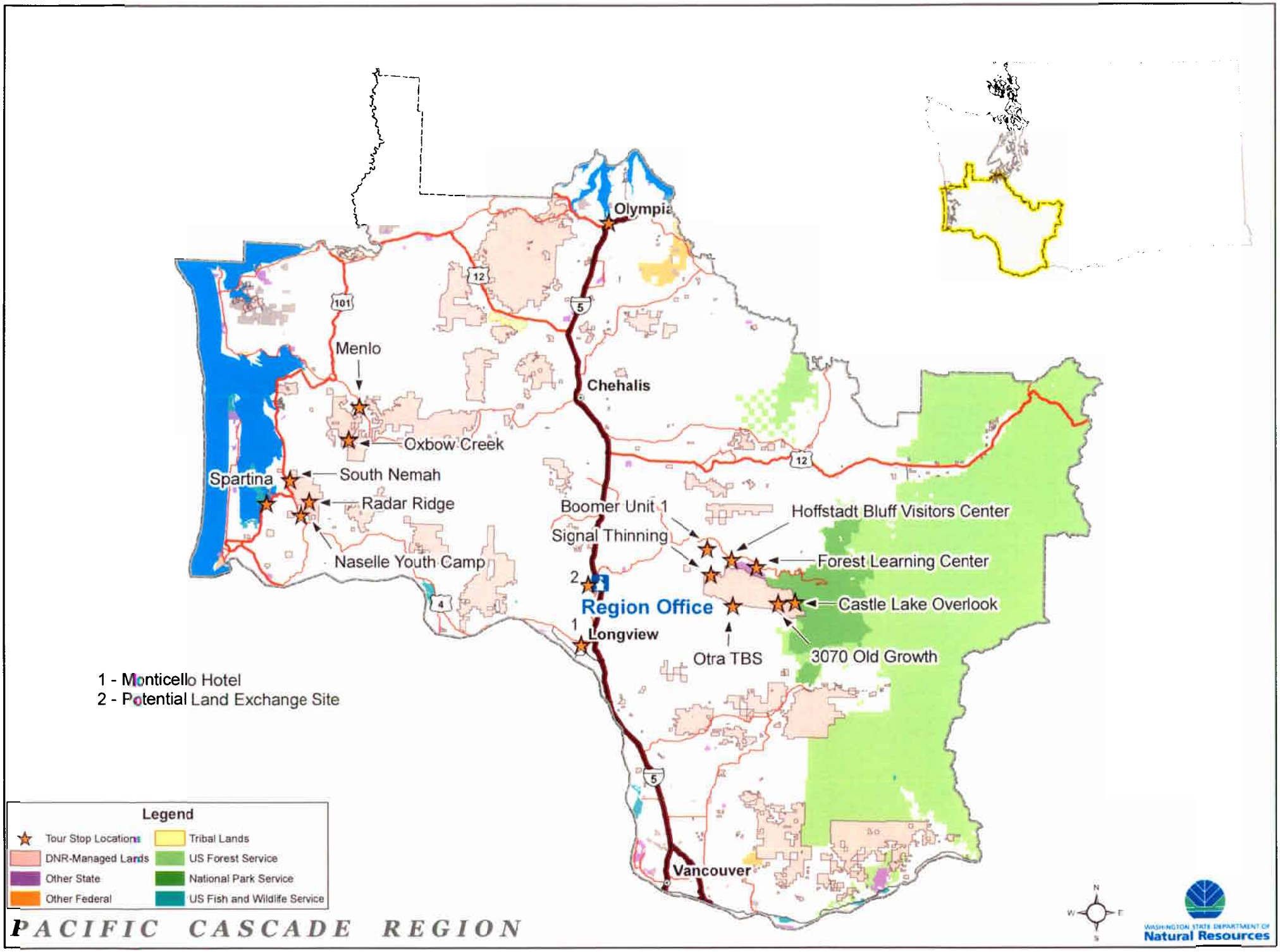
Board of Natural Resources

Tour 2005

Pacific Cascade Region




Olympia
Chehalis
Menlo
Oxbow Creek
South Nemah
Spartina
Radar Ridge
Naselle Youth Camp
Boomer Unit 1
Signal Thinning
Hoffstadt Bluff Visitors Center
Forest Learning Center
Castle Lake Overlook
Region Office
Longview
Otra TBS
3070 Old Growth
Vancouver
1 - Monticello Hotel
2 - Potential Land Exchange Site
Legend
Tour Stop Locations
DNR-Managed Lands
Other State
Other Federal
Tribal Lands
US Forest Service
National Park Service
US Fish and Wildlife Service
PACIFIC CASCADE REGION
Washington State Department of Natural Resources

WASHINGTON STATE DEPARTMENT OF
Natural Resources

Board of Natural Resources August Retreat

August 24 & 25, 2005, Pacific Cascade Region, Castle Rock

Annual Board Tour

AGENDA . DAY ONE 8/24

8:00	**DNR staff leave from NRB to Castle Rock (Luggage van to Monticello Hotel and check in)**
9:00	**Potential Aquatics Land Exchange - City of Castle Rock**
9:45	**Pacific Cascade Region Office – restrooms, coffee & refreshments**
10:00	**Depart to Toutle Ridge Ownership Block**
11:05	**Otra Timber Sale** ❖ Recent Harvest with old, remnant residual trees
12:25	**Castle Lake Overlook/Mount St. Helen's View Point (Lunch)** ❖ Visual strategies (500,000 tourists per year on SR 504) ❖ Public access demands on State landscapes ❖ True fir Bough Sales
1:25	**3070 Road - Old Growth Stand**
3:15	**View Active Timber Sale** ❖ 2700 Road CC & Thinning timber sale ❖ Signal Thinning timber sale
4:15	**Boomer Timber Sale** ❖ Discuss criteria used to index Older Forests ❖ Transportation planning to reestablish a road system destroyed in 1980 volcanic flood damage
5:40	**Hoffstadt Bluffs Visitor Center** ❖ Observation Platform – Wrap-up Tour, aesthetics management
6:00	**Outdoor Buffet Dinner: Board Members, Staff and Local Officials**
7:00	**Visit the Forest Learning Center (Hosted by Ross Graham, Weyerhaeuser Co)**
9:00	**Arrive at Monticello Hotel, Longview (Luggage waiting)**

The retreat presentations are planned for the benefit of the members of the Board of Natural Resources, and the Board's questions will be given priority in order to keep to the schedule. Other questions may be entertained as time permits.

NOTE: ALL TIMES ARE ESTIMATES TO ASSIST IN SCHEDULING AND MAY BE CHANGED SUBJECT TO THE BUSINESS OF THE DAY AT THE BOARD'S DISCRETION

Updated: August 19, 2005 Next Meeting: September 6 NRB, Olympia Washington Contact: Sasha Lange, Board Coordinator 360.902.1103
While at Retreat please call 360.280.6866

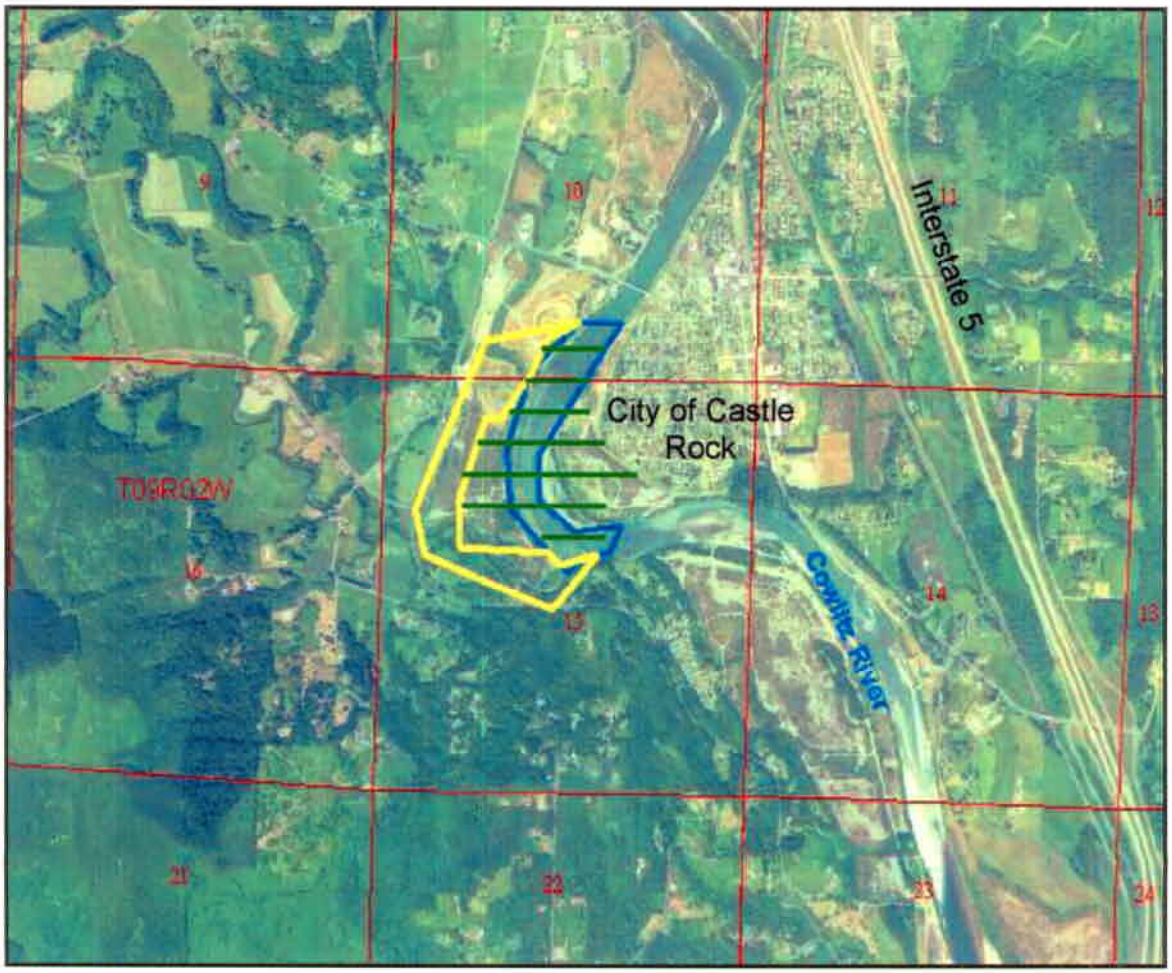
Potential Land Exchange – Aquatics

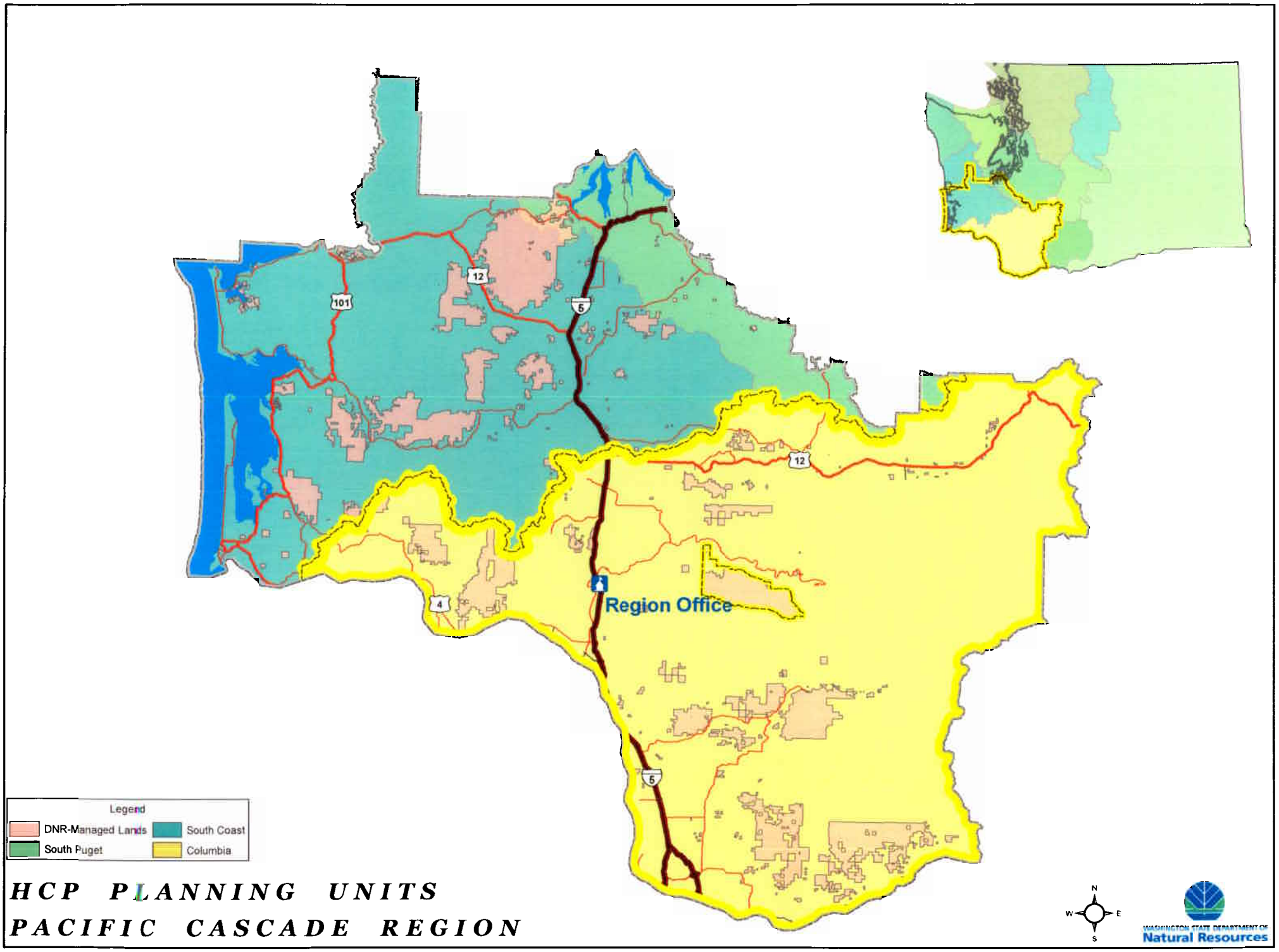
Between DNR and City of Castle Rock

Background:

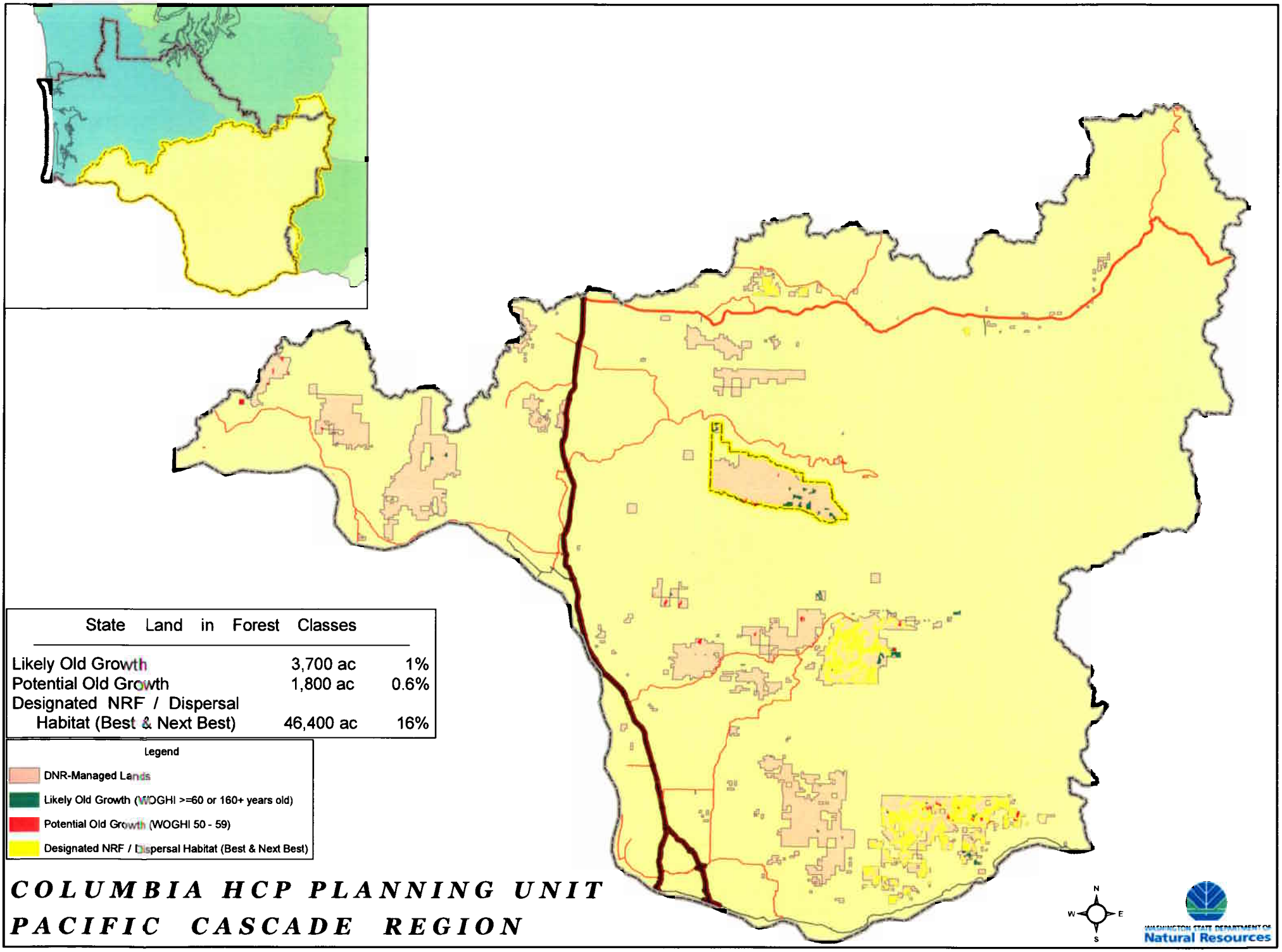
- The state owned the bed lands and the shore lands of the Cowlitz River (outlined in yellow) until a flood in 1933 completely destroyed six city blocks and routed the river into its current location (outlined in blue).
- Now state ownership is a dry riverbed (outlined in yellow) with upland characteristics.
- The city is interested in a trade to further its recreation opportunities in the city.

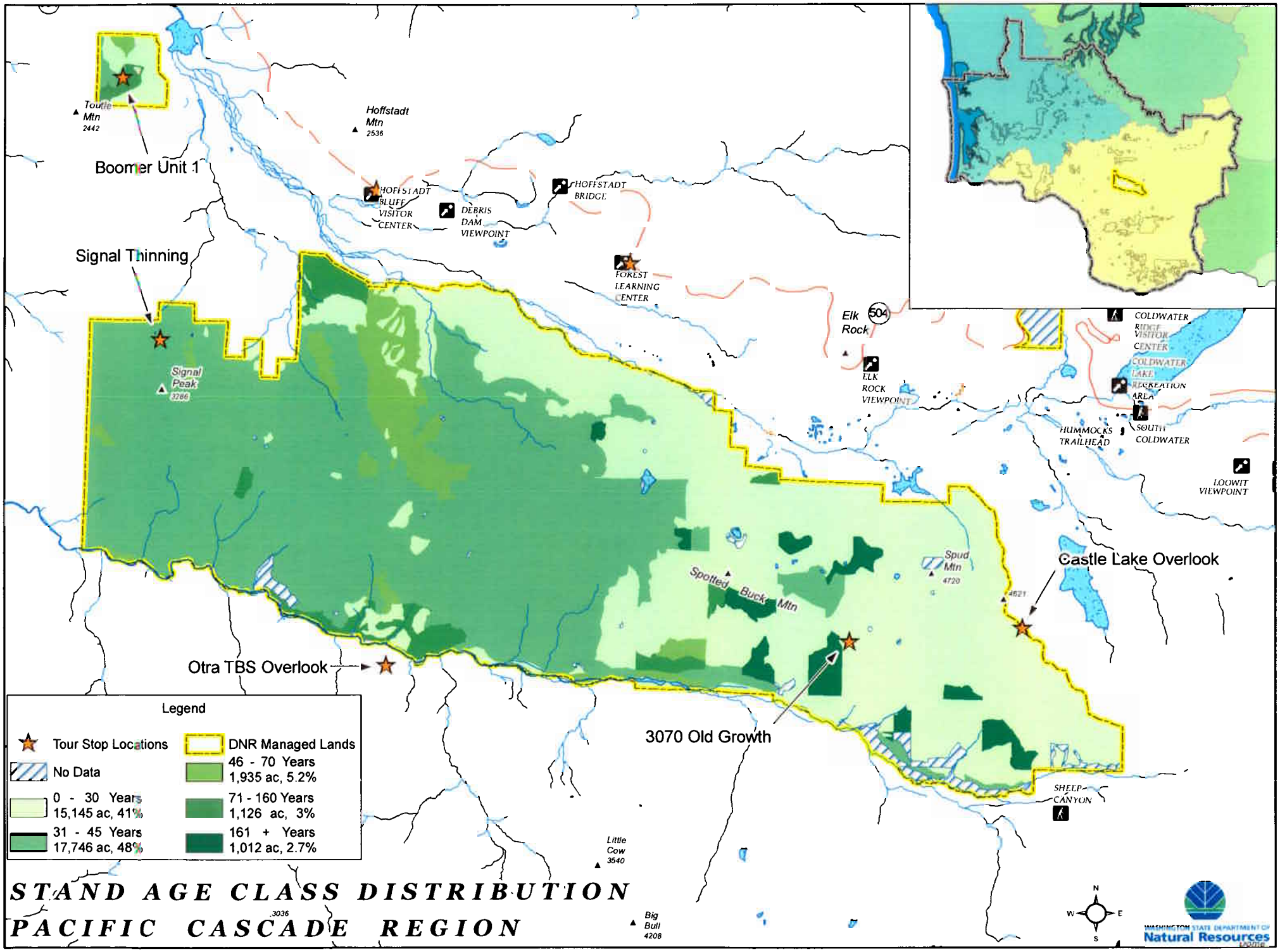
City of Castle Rock Ownership
State Ownership to trade (53 acres)
City Ownership to trade (30 acres)





HCP PLANNING UNITS
PACIFIC CASCADE REGION


State Land in Forest Classes
Likely Old Growth 3,700 ac 1%
Potential Old Growth 1,800 ac 0.6%
Designated NRF / Dispersal Habitat (Best & Next Best) 46,400 ac 16%
Legend
DNR-Managed Lands
Likely Old Growth (WOGHI >=60 or 160+ years old)
Potential Old Growth (WOGHI 50 - 59)
Designated NRF / Dispersal Habitat (Best & Next Best)
COLUMBIA HCP PLANNING UNIT
PACIFIC CASCADE REGION
N
W
E
S
Washington State Department of Natural Resources



STAND AGE CLASS DISTRIBUTION
PACIFIC CASCADE REGION

Otra Timber Sale

Sold: **FY 2004**

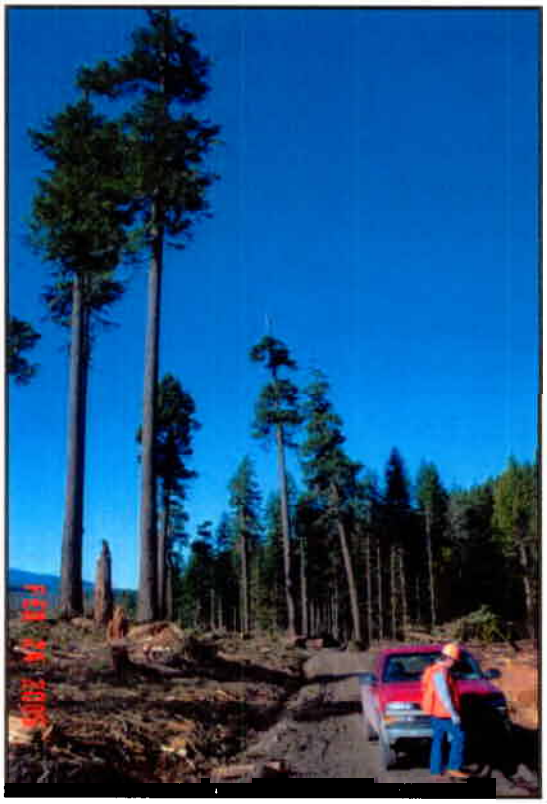
Logged: **CY 2004**

Volume: **6181 mmbf (5 Units)**

Value: **$1,822,095**

Leave Trees: 1,125 (8.7 TPA)

- Example of very large diameter leave trees selected to meet HCP requirements for structurally unique trees
- This was an approximate 100yr old fire origin stand with 600-700 years old remnant residuals.
- Some salvage logging occurred to ensure plantable spots.



- Sale facilitated construction of 2 bridges destroyed in winter storms of 1996 and provided access to 2,560 acres of commercial thinning age timber.
- Worked with L&I on maintaining safety around reserve trees.
- Removed and/or replaced 3 RMAP fish blockages with this sale.

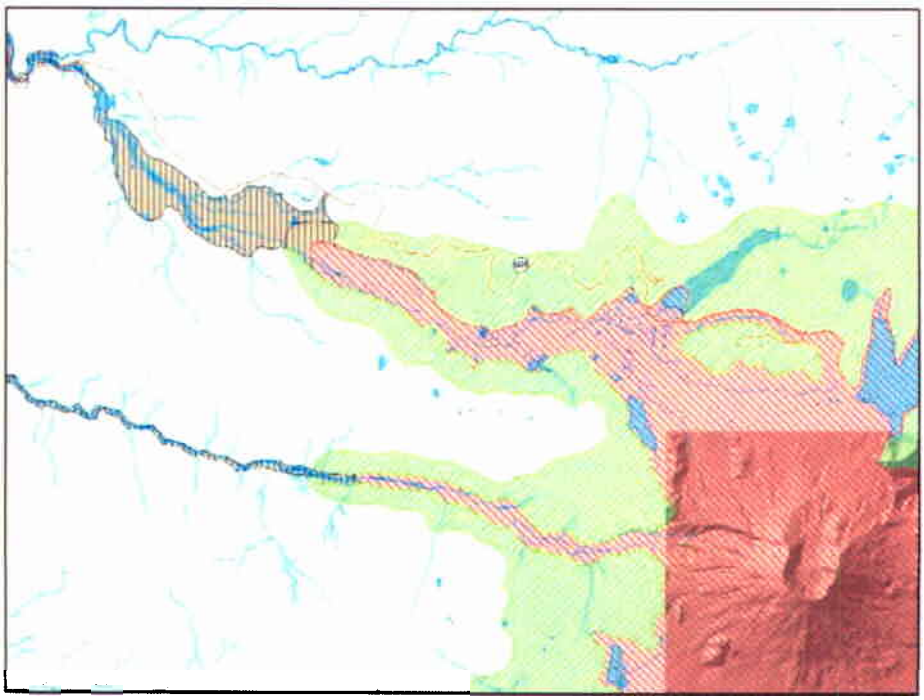
Toutle Ownership Block History

- Comprises approximately 37,600 acres
- Elevation Range 750 – 4,160 ft
- 79% is in Rain-on-Snow Zone

Courtesy of USGS

<u>1980 Mt St Helens Eruption -</u>

- Federal Monument Creation and Land Exchange
- Adjacent landowners USFS & Weyerhaeuser
- Transportation system damaged and/or destroyed
- Current Inventory - Age Class distribution
  - Young stands – Blast zone (Bough Sales) 43%
  - Second Growth – (Commercial Thinning / Regeneration) 50%
  - Older Stands – Native, fire origin (Regeneration) 4%
  - Old Growth – (Deferred) 3%
- Public Access – controlled by Weyerhaeuser
- SR 504 & Aesthetic Challenges



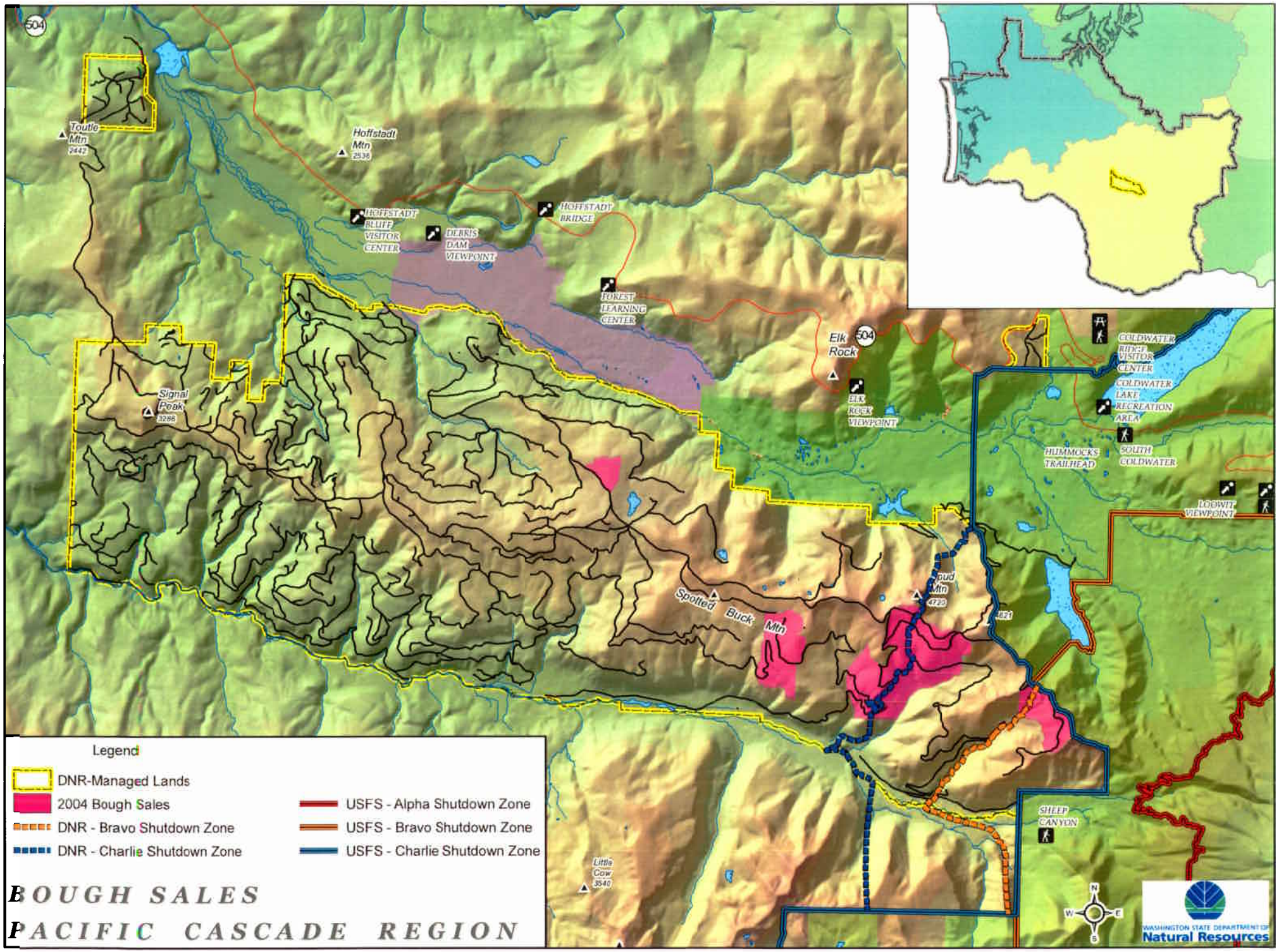
Lahar Flows

Castle Lake Overlook

Mount St. Helen's View Point

- Visual strategies SR 504
  - 500,000 tourists visiting Mt St Helens each year
  - 14,100 acres visible from SR 504
- Pacific Cascade Region - Volcanic Event Response Plan
- Public access demands on State Trust Land
- Age class distribution

- Bough Sales Program
  - 2004 sold 4 sales
  - Advertised: 1,791,000 lbs.
  - $264,000
  - 2004 removals: 991,380 lbs. @ 14.7 cents/pound
  - 2005 removals: Fall


504
Toutle Mtn
8442
Hoffstadt Mtn
2536
HOFFSTADT BLUFF VISITOR CENTER
DEBRIS DAM VIEWPOINT
HOFFSTADT BRIDGE
FOREST LEARNING CENTER
Elk Rock
ELK ROCK VIEWPOINT
COLDWATER RIDGE VISITOR CENTER
COLDWATER LAKE RECREATION AREA
HUMMOCKS TRAILHEAD
SOUTH COLDWATER
LOOWIT VIEWPOINT
Signal Peak
3288
Spotted Buck Mtn
Pud Mtn
4725
821
SHEEP CANYON
Little Cow
3540
Legend
DNR-Managed Lands
2004 Bough Sales
DNR - Bravo Shutdown Zone
DNR - Charlie Shutdown Zone
USFS - Alpha Shutdown Zone
USFS - Bravo Shutdown Zone
USFS - Charlie Shutdown Zone
BOUGH SALES
PACIFIC CASCADE REGION
N
W
E
S
WASHINGTON STATE DEPARTMENT OF
Natural Resources

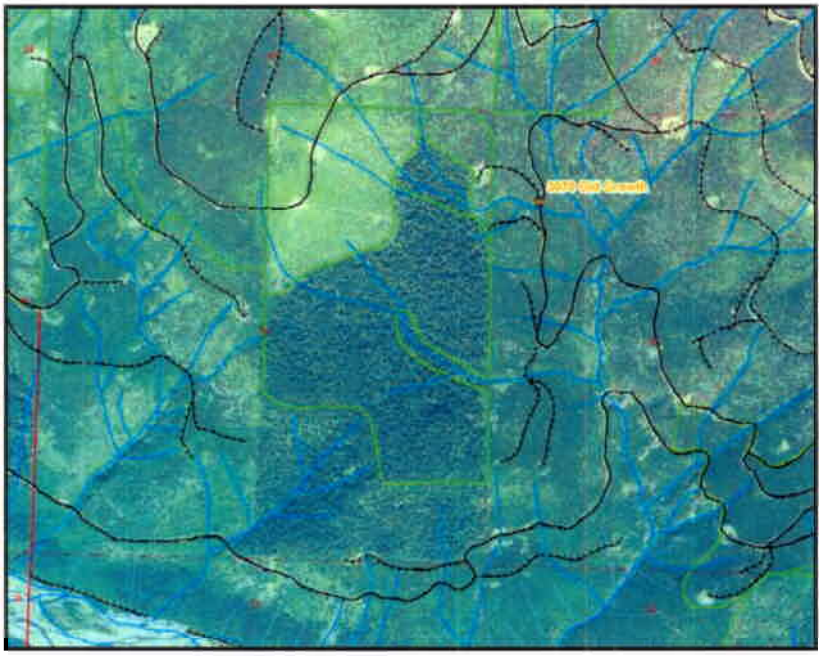
3070 Old Growth Stand

Statistics –

- 225 acres
- Elevation 3,000ft
- Age 400 – 500 years
- WOGHI >60

Structure and Function –

- Discuss what landscape context means in terms of identifying suitable structurally complex forests to manage for older forest targets (at the Boomer stop with maps).
- Example of an Old Growth stand with a Weighted Old Growth Habitat Index greater than 60
- Example of structure characteristics that identify old growth
- Younger stands create edge effect



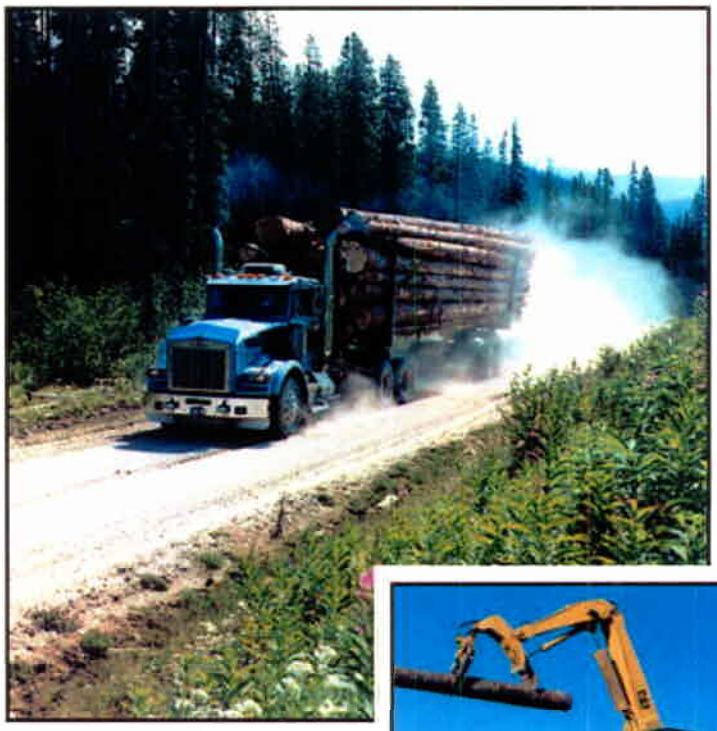
2700 Road CC & Thinning Timber Sale

Active Harvest Operation –

- 9,700 mmbf Scale Sale
- Value: $2,085,000
- Combination Regeneration Harvest & Thinning

Planning –

- SR 504 Visual Aesthetic – Mitigation Design using GIS tools such as *Envision*
- Age class distribution
- Rain-on-Snow Procedure
- Planning re-entry 25 – 30 years



Signal Thinning Timber Sale

Active Harvest Operation –

- 260 Acre weight scale sale
  - 80 Acres in RMZ
- 13 Units
  - Pre-harvest: 200 basal area per acre
  - Goal: 140 – 190 trees per acre residual
- 3000 mmbf
- Value: $290,000
- Originated from the Columbus Day storm in 1962

Boomer Timber Sale

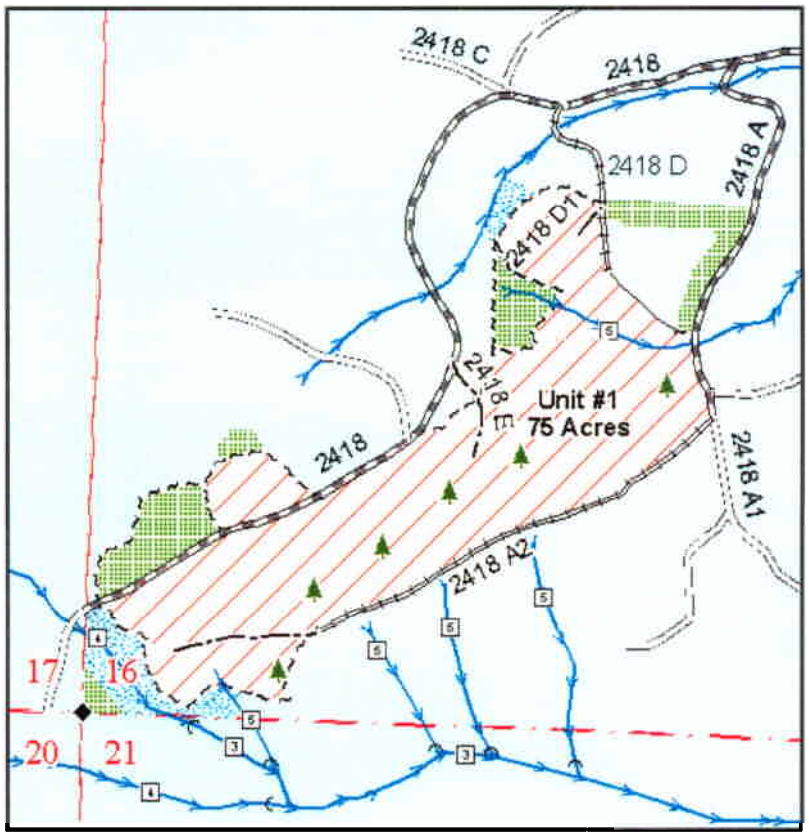
Sold: June 2005

Volume: 11,094 mmbf scale sale

Value: $6,692,348

Size: 133 acres total (7 units)

WOGHI: 66



Sale History –

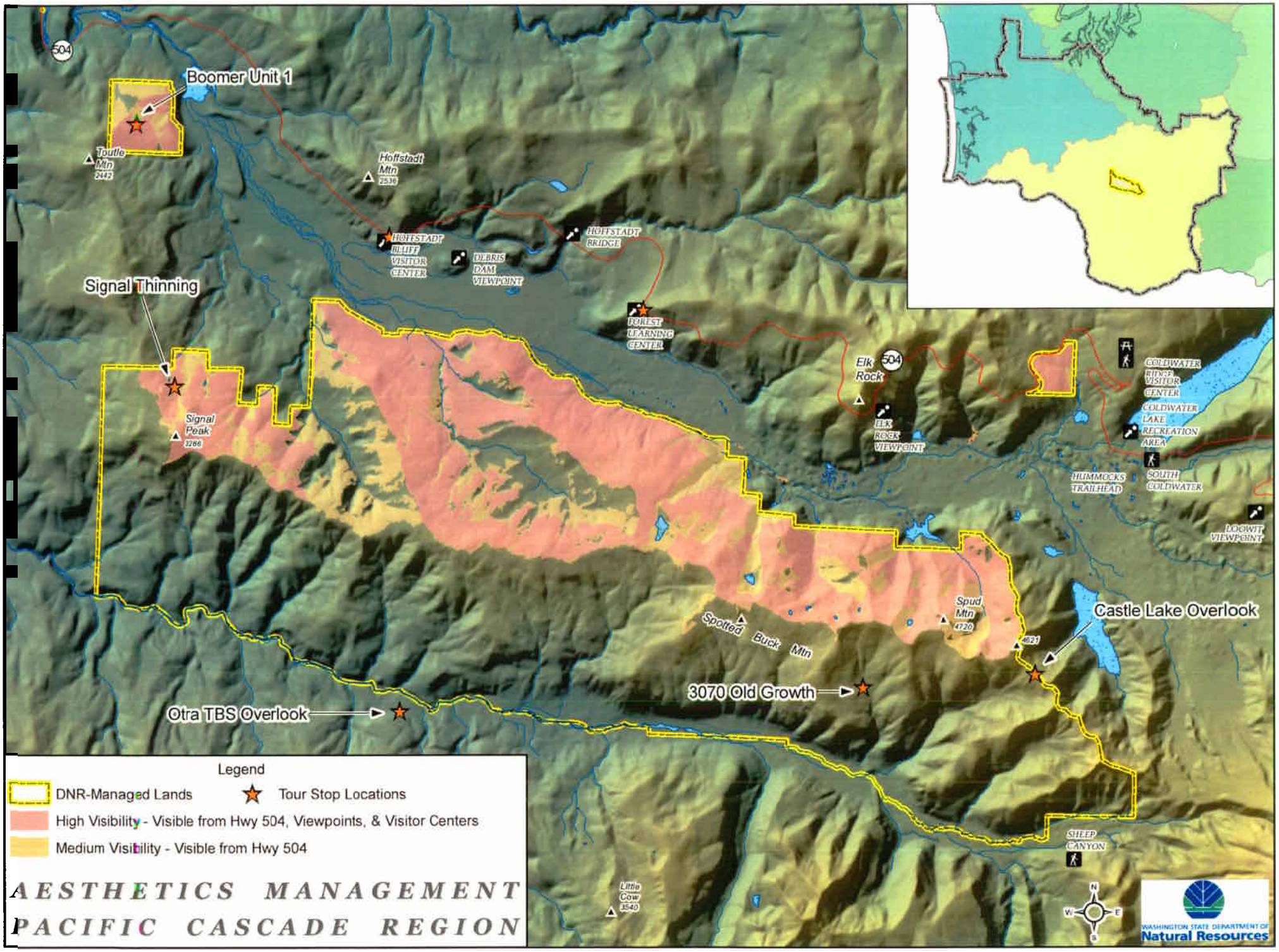
- Discuss what landscape context means in terms of identifying suitable structurally complex forests to manage for older forest targets.
- Discuss the criteria used to index Old Growth, compare to the 3070 stand
- Large Residual Retention – Marked to leave
- Example of structurally complex (non Old Growth) stand
- Post Mt St Helens transportation system reestablishment

Hoffstadt Bluffs Visitor Center

The Hoffstadt Bluffs Visitor Center is owned by Cowlitz County. The lodge-style building offers excellent views of the mountain as well as full-service dining, lounge, and gift shop. Helicopter tours of Mount St. Helens depart hourly during the summer months.

Forest Learning Center

The Forest Learning Center is located inside the blast zone of the May 18, 1980 eruption of Mount St. Helens along Highway 504. It was completed in 1995 from a partnership between Weyerhaeuser Company, Washington State Department of Transportation, and the Rocky Mountain Elk Foundation. The center is open to the public from May to October free of charge. Exhibits explain recovery, reforestation, and conservation of forest resources.


Boomer Unit 1
Signal Thinning
Castle Lake Overlook
3070 Old Growth
Otra TBS Overlook
504
Toutle Mtn 2442
Hoffstadt Mtn 2530
HOFFSTADT BLUFF VISITOR CENTER
DEBRIS DAM VIEWPOINT
HOFFSTADT BRIDGE
FOREST LEARNING CENTER
Elk Rock
ELK ROCK VIEWPOINT
COLDWATER RIDGE VISITOR CENTER
COLDWATER LAKE RECREATION AREA
HUMMOCKS TRAILHEAD
SOUTH COLDWATER
LOOWIT VIEWPOINT
Signal Peak 3266
Spotted Buck Mtn
Spud Mtn 4720
4621
SHEEP CANYON
Little Cow 3540
Legend
DNR-Managed Lands
Tour Stop Locations
High Visibility - Visible from Hwy 504, Viewpoints, & Visitor Centers
Medium Visibility - Visible from Hwy 504
AESTHETICS MANAGEMENT
PACIFIC CASCADE REGION
N
W
E
S
WASHINGTON STATE DEPARTMENT OF
Natural Resources

2700 Thinning – Visual Impact Planning

2004 Pre-treatment (45yrs old)

2004 Post-treatment (0years old)

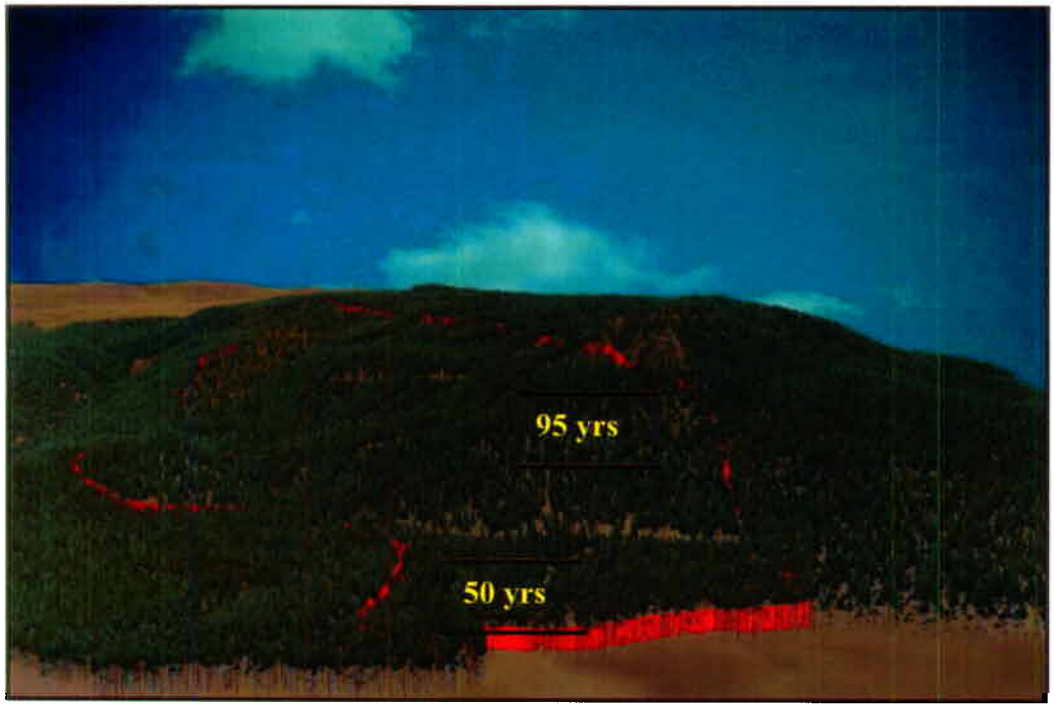
2700 Thinning – Visual Impact Planning

2030 Pre-treatment

2030 Post-treatment

2700 Thinning – Visual Impact Planning

2055 Pre-treatment



2055 Post-treatment (*Regeneration* Harvest in 2080 @ 75 yrs old)

WASHINGTON STATE DEPARTMENT OF
Natural Resources

Board of Natural Resources August Retreat

August 24 & 25, 2005, Pacific Cascade Region, Castle Rock

Annual Board Tour

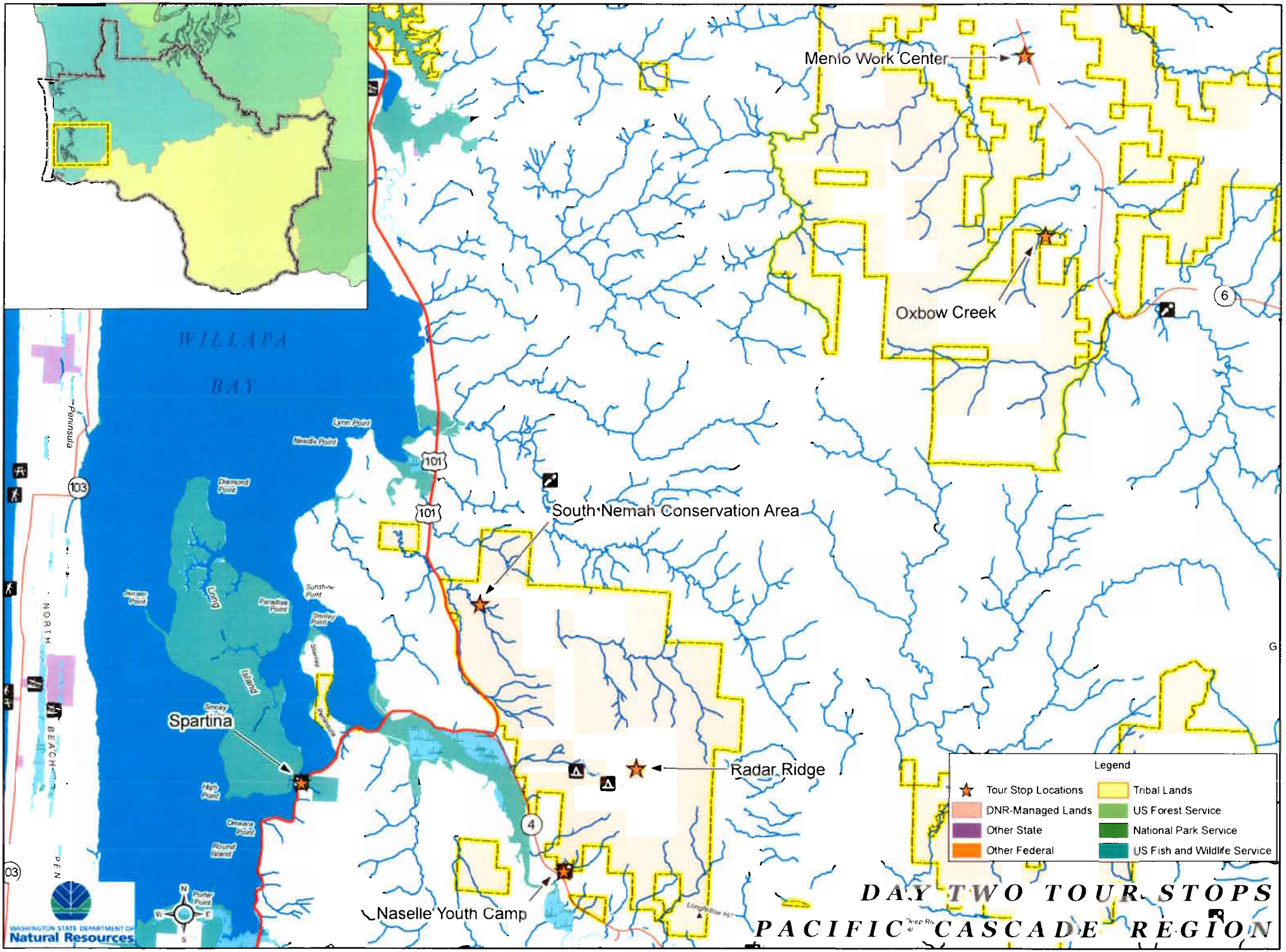
AGENDA . DAY TWO 8/25

7:00	**Breakfast at Monticello Hotel**
7:30	**Depart from Monticello Hotel (Luggage will be delivered to NRB)**
9:00	**Spartina Management Operations – Boat Trip for BNR Members w/DNR Aquatics staff (restrooms)**
(10:00)	**Radar Ridge Site (All other tour members)** ❖ Land management in coastal areas ❖ Communication sites ❖ Wind farms
11:30	**LUNCH - Naselle Youth Camp (Both groups rendezvous)** ❖ Brief description and history of camp
12:45	**Conservation Area – South Nemah** ❖ Management plans and options
2:30	**Menlo Work Center – restrooms & refreshments**
3:00	**Oxbow Road** ❖ Ownership blocks and small parcel land purchases ❖ RMAP Abandonment/repairing fish blockages
4:00	**Rest Stop at Butte Creek Campground**
5:30	**Arrive at the NRB (Luggage waiting)**

The retreat presentations are planned for the benefit of the members of the Board of Natural Resources, and the Board's questions will be given priority in order to keep to the schedule. Other questions may be entertained as time permits.

NOTE: ALL TIMES ARE ESTIMATES TO ASSIST IN SCHEDULING AND MAY BE CHANGED SUBJECT TO THE BUSINESS OF THE DAY AT THE BOARD'S DISCRETION

Updated: August 19, 2005 Next Meeting: September 6 NRB, Olympia Washington Contact: Sasha Lange, Board Coordinator 360.902.1103
While at Retreat please call 360.280.6866


Menlo Work Center
Oxbow Creek
South Nemah Conservation Area
Spartina
Radar Ridge
Naselle Youth Camp
WILLAPA BAY
Legend
Tour Stop Locations
DNR-Managed Lands
Other State
Other Federal
Tribal Lands
US Forest Service
National Park Service
US Fish and Wildlife Service
DAY TWO TOUR STOPS
PACIFIC CASCADE REGION
Natural Resources

Spartina in Willapa Bay – Aquatics

Willapa Bay:

- Approximately 7,000 acres at the start of 2004 season
- Approximately 5,000 acres at the start of 2005 season

How does Spartina spread:

- Seeds and laterally by vegetative shoots
- Seelings, then isolated circular patches (clones)
- Clones can spread >1m per year, coalesce into meadows
- Plants typically flower after 2-3 years, seed production variable
- Wind pollinated but some selfing occurs
- Seeds viable for about 1 year
- Rhizomes may break off and move via wind and water currents

Left alone, Spartina can quickly colonize thousands of acres of mudflat. This area is in the southern-most part of Willapa Bay

DNR Control Efforts:

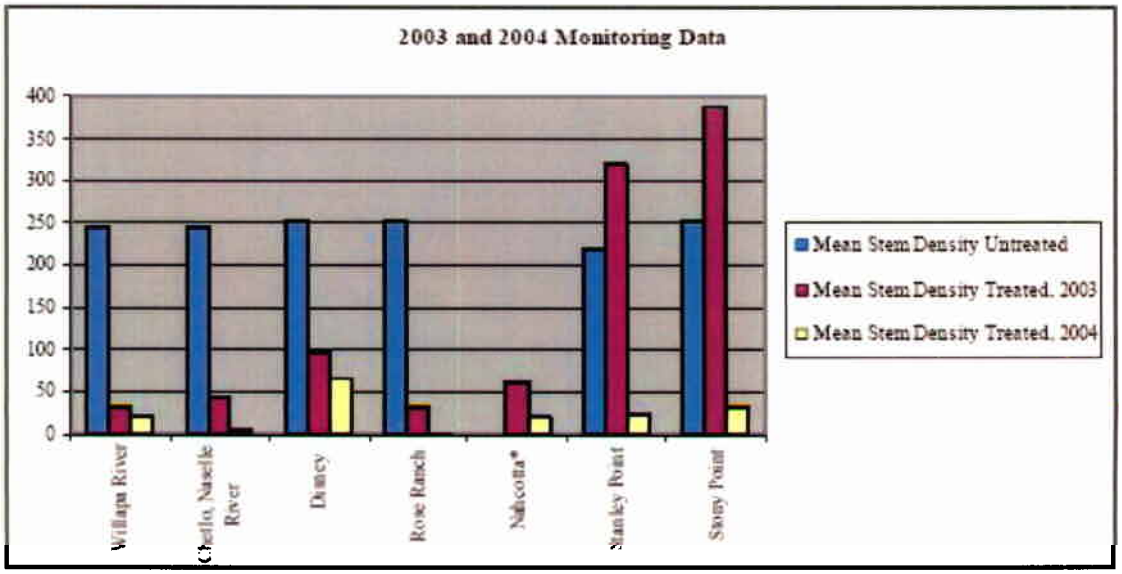
- Part of larger bay-wide effort – WSDA, WDFW, USFWS, UofW
- Chemical and mechanical control
- Tools – airboat, marsh master, handheld and broadcast spraying, backpack spraying, aerial spraying from helicopter
- Work in south part of bay and natural area preserves
- Assist other agencies and oyster growers with control work
- Aerial photography database (GIS layers)
- Monitoring to assess effectiveness of control

Spartina in Willapa Bay – Aquatics

Continued

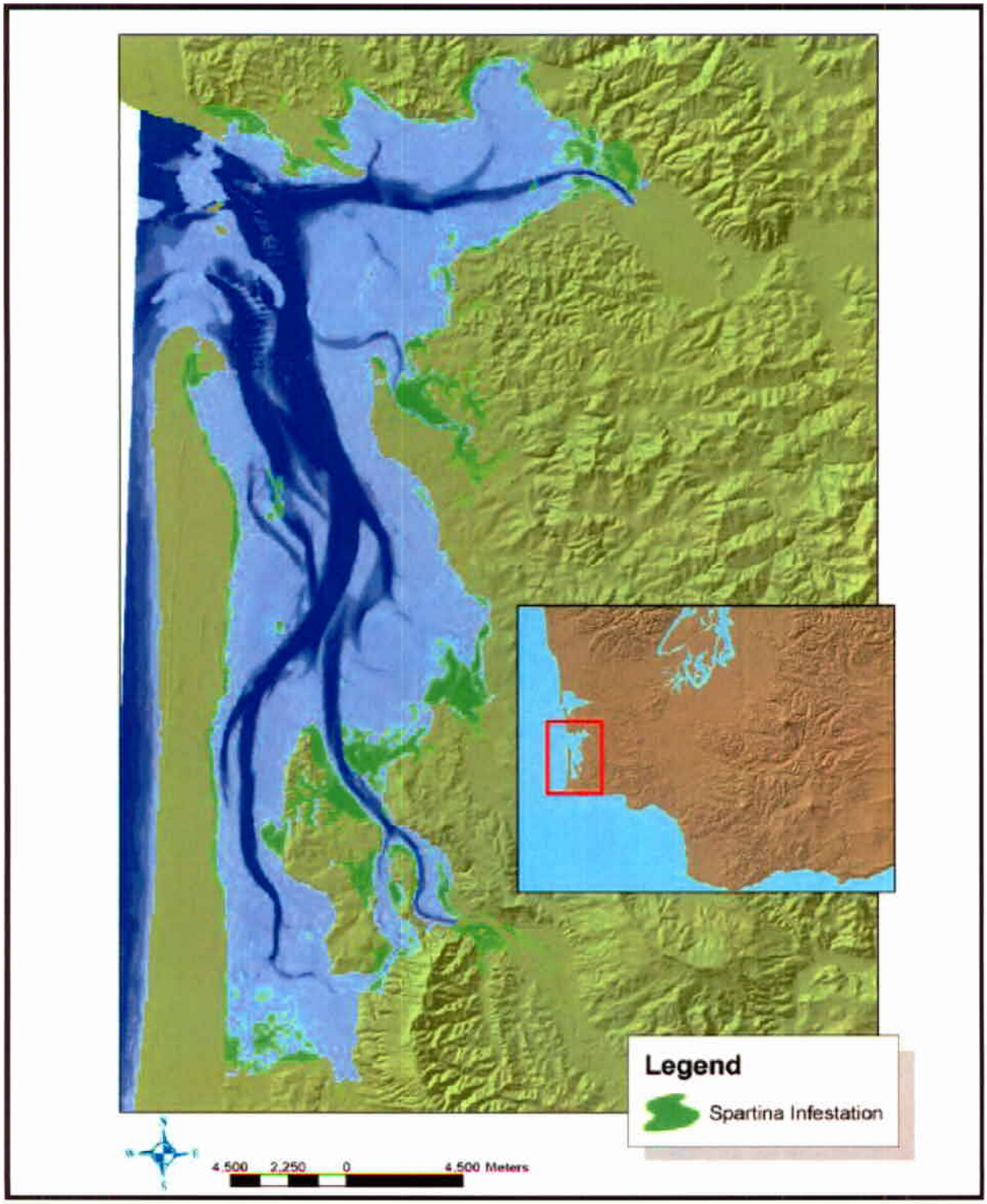
North Nemah River meadow, July 15, 2004 (not yet treated)

North Nemah River meadow, May 25, 2005. Photo taken one year after site was sprayed from a helicopter



Spartina in Willapa Bay – Aquatics

Continued



Radar Ridge –

(For those not on the Spartina Boat Tour)

History:

- Taken by Federal Government in 1956
- Used by US Air Force from 1956 to 1972
- DNR began Communication Site Leases in 1972

Current Information:

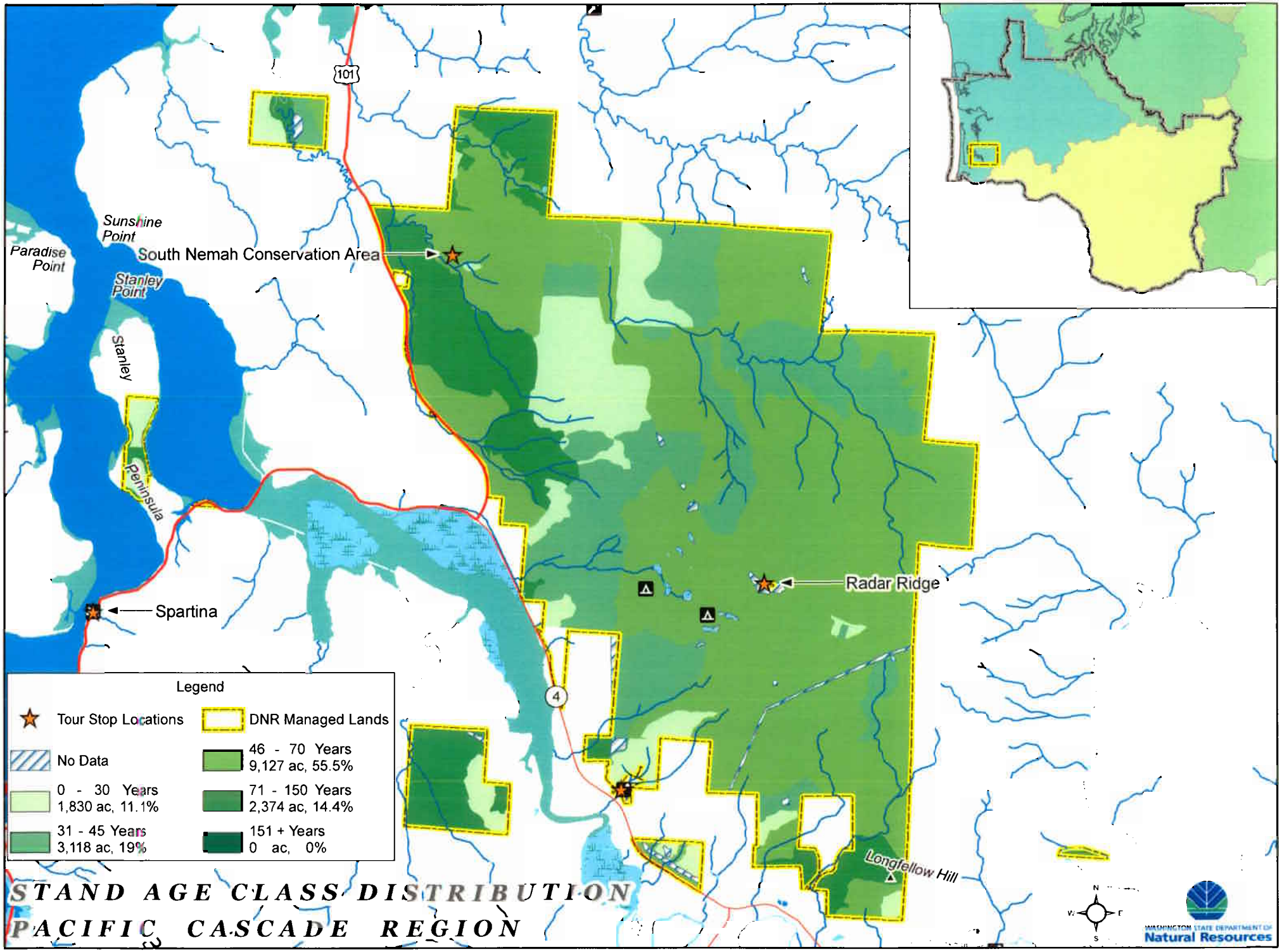
- Several Land Leases as well as 2 DNR owned buildings
- 18 Agreements Including:
  - Homeland Security, WSP, DOT, FAA, NOAA, US Cell, and Others
- Current Annual Income: $75,948.79

Pacific Cascade Region Communication Site Information:

- 17 Sites
- 98 Agreements
- Current Annual Income: $681,828.42

Other Ridge Considerations:

- Harvest Planning in homogeneous stands
  - Species composition leaning towards high volume but low value
- Road Maintenance and Transportation System Planning
- Wind Power Proposal


101
Sunshine Point
Paradise Point
South Nemah Conservation Area
Stanley Point
Stanley
Peninsula
Spartina
Radar Ridge
4
Longfellow Hill
Legend
Tour Stop Locations
DNR Managed Lands
No Data
46 - 70 Years
9,127 ac, 55.5%
0 - 30 Years
1,830 ac, 11.1%
71 - 150 Years
2,374 ac, 14.4%
31 - 45 Years
3,118 ac, 19%
151 + Years
0 ac, 0%
STAND AGE CLASS DISTRIBUTION
PACIFIC CASCADE REGION
N
W
E
S
WASHINGTON STATE DEPARTMENT OF
Natural Resources

Proposed Radar Ridge Wind Project

Proponent: Energy Northwest

Initial Project:

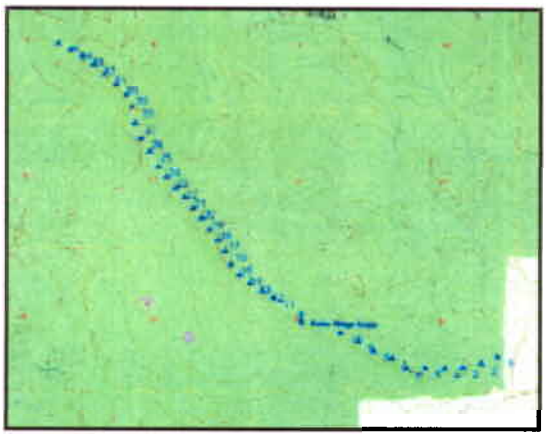
- 6 temporary Meteorological Towers – 1 year study to determine wind potential

Based on favorable findings, Completed Proposal would consist of:

- 15 to 35 Wind Turbines along ridgeline
- Substation, Distribution, Transmission Facilities, and Maintenance/Office

Impact to State Land:

- Ridgeline corridor 500' Wide by approximately 4 Miles long.
- 240 Acres cleared and taken out of production
- Construction or Use of approximately 11 miles of road
- Potential development of on site rock source
- 12,000 sq. ft. Substation
- 60'x80' Maintenance/Office Building



Questions and Issues:

- HCP, FRP, and LHZP plans
- Marbled Murrelet Strategy
- Status 1 Owl Circle
- Rain on Snow
- Soil Stability
- Frequency Interference with Communication Site
- Social/Political Impacts and Issues
- View shed Issues

South Nemah –

Natural Resource Conservation Area

Description - This area is highly regarded as one of the last stands of mature forest in the Willapa Hills. Comprising 2,440 acres, it contains patches of 300-year old western red cedar and Sitka spruce and habitat for marbled murrelets and spotted owls. Elk and deer trails cross the site, and the South and Middle Nemah Rivers support important fish and amphibian populations.

Rare Species and Communities Protected:

Animal Species: Chum Salmon, Coho Salmon, Winter Steelhead, Fall Chinook, Resident Cutthroat, Sea-run Cutthroat, Vandyke's Salamander, Northern Spotted Owl, Columbia Torrent Salamander, Marbled Murrelet, Dunn's Salamander, Roosevelt Elk.

Plant Communities: Sitka Spruce/Sword fern, Sitka Spruce/Oregon Oxalis

Primary Management Issues:

- Tree Theft- Theft of old growth red cedar and spruce.
- Exotic Plants- English ivy, Himalayan blackberry, Japanese Knotweed.
- Road Issues/Restoration- RMAP work in progress. Restoring salmon habitat and replanting culverts.
- Education- Encourage more use by school groups and scientists.
- Murrelet/ Spotted Owl conservation strategy- HCP

Selected Coastal Natural Areas

Chehalis River Surge Plain NAP **County:** Grays Harbor **Acres:** 2570

Reason for Establishment: This large wetland area spreads out at the lower end of the Chehalis River just upstream from where it empties into Gray's Harbor. Sitka spruce and western red cedar thrive in the wet soils where fresh and salt water mingle on this 2,643 acre site. This preserve contains the largest and best quality tidal surge plain wetland in the state. The site protects sloughs, which are important for sheltering young salmon and other fish. The surge plain also supports osprey, bald eagles, a federally Threatened species, and Olympic mudminnows, a state Sensitive species.

Elk River NRCA **County:** Grays Harbor **Acres:** 4229

Reason for Establishment: Totaling 4362 acres, this area is the largest, highest quality estuarine system remaining in Washington or Oregon. It includes diverse habitats, ranging from tideflats and sloughs, saltmarsh and freshwater wetlands, to forested uplands. Identified as critically important waterfowl and shorebird habitat, it also includes a nesting site for bald eagle and significant habitat for elk, bear, beaver, river otter and other mammals. One population of a Washington state monitor plant species, Henderson's checker- mallow, occurs within the tidal portion of the estuary system.

Ellsworth Creek NRCA **County:** Pacific **Acres:** 557

Description/Reason for Establishment: This site is composed of a diverse forest community that ranges in age from young to old growth (>200 yrs old) stands. The site contains portions of Elkhorn Creek and Smith Creek and is dominated by western red cedar, western hemlock, and sitka spruce. In portions of the site, very large (up to 8 feet in diameter) western red cedar and sitka spruce are common. The old growth forests of this site and an adjacent preserve have some of the highest diversity of amphibians of any location in Washington. The preserve also provides important breeding habitat for the federally threatened marbled murrelet. Natural forests, like those at Ellsworth Creek NRCA, are extremely rare in Willapa Hills of southwest Washington.

Bone and Niawiakum River NAPs: **County:** Pacific **Acres:** Bone River-2565 Niawikum-837

Reason for Establishment: These sites protect rare, intact tidal river systems that contains some of the highest quality salt marsh vegetation remaining in Willapa Bay and some of the best along the entire Washington/Oregon coast. The diverse habitats support a wide variety of wildlife, including Bald Eagles, great blue herons, elk, kingfishers and many others. It is an area of critically important waterfowl habitat, and supports bald eagles and marbled murrelets. The Niawiakum River NAP was used as a research site in an important study on historic tsunamis.

Pacific Cascade Region - Coastal Natural Areas

Oxbow Road

- Installation of fish passable structures
- Partially funded by grants
- Road Maintenance and Abandonment Planning
- Purchasing easements to eliminate high maintenance roads

Acknowledgements

BNR TOUR 2005:

The following people compiled the tour book, coordinated the agenda, and handled the logistics of this year's tour.

Region Host:

- Region Mgr – Eric Schroff

Board Coordinator:

- Sasha Lange

Planning Section:

- Eric Wisch – Manager
- Shawn Bushnell – Graphics and Image support

Logistics Section:

- Jim Shank – Manager
- Randy Kirk – Field Equipment
- Rick Smith – Naselle Lunch Host
- Scott Sargent – Driver
- Ronn Schuttie – Driver
- Kirk Willis – Driver

Field Coordinators:

- Bob Johnson – Day 1
- Colin Robertson – Day 2

Resource Topic Spokespersons:

- Clay Sprague
- Tami Riepe
- Steve Ogden
- Scott Robinson
- Larry Leach
- Zoanne Aylesworth
- Florian Deisenhofer
- Carlo Abbruzzese
- Greg Johnson

Board of Natural Resources

2005 Annual Tour – Pacific Cascade Region

Aquatics Region – Rivers District

RCW 79.90.450…

State-owned aquatic lands are a finite natural resource of great value and an irreplaceable public heritage.

Board of Natural Resources 2005 Tour - Aquatics

Aquatics Program - Rivers District

District Facts

- 28 Counties
- includes 404,550 acres of state-owned aquatic land (SOAL) plus the Columbia River
- 1200 agreements in place
- 1 million dollars generated in fiscal year 2004

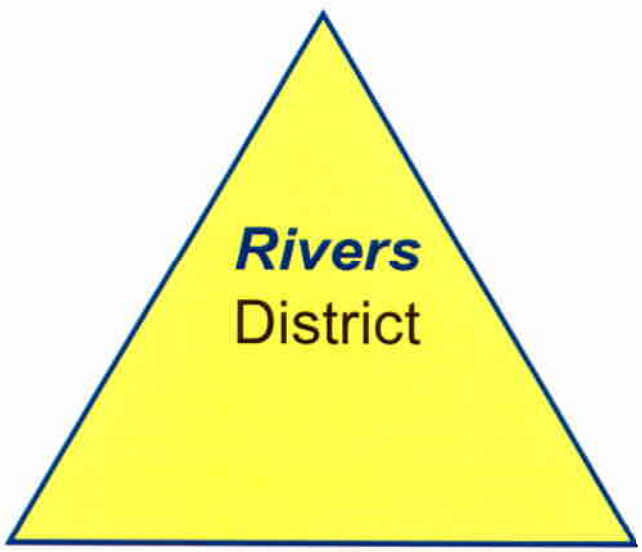
Board of Natural Resources 2005 Tour - Aquatics

Aquatic Region - *Rivers* District

05-07 Biennium

FOCUS

- Unauthorized Use & Occupancy
- Aquaculture
- Material Sales
- Restoration



COHESIVENESS

- Synergy
- Good Communications
- Providing Back-up
- Choosing Good Team Members

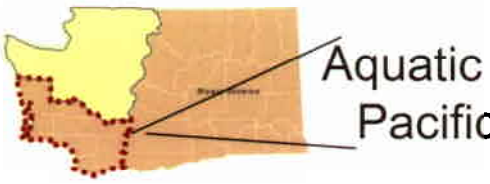
ACCOUNTABILITY

- We are all Responsible for Successes and Failures
- Honesty
- How can we do better?

Board of Natural Resources 2005 Tour - Aquatics

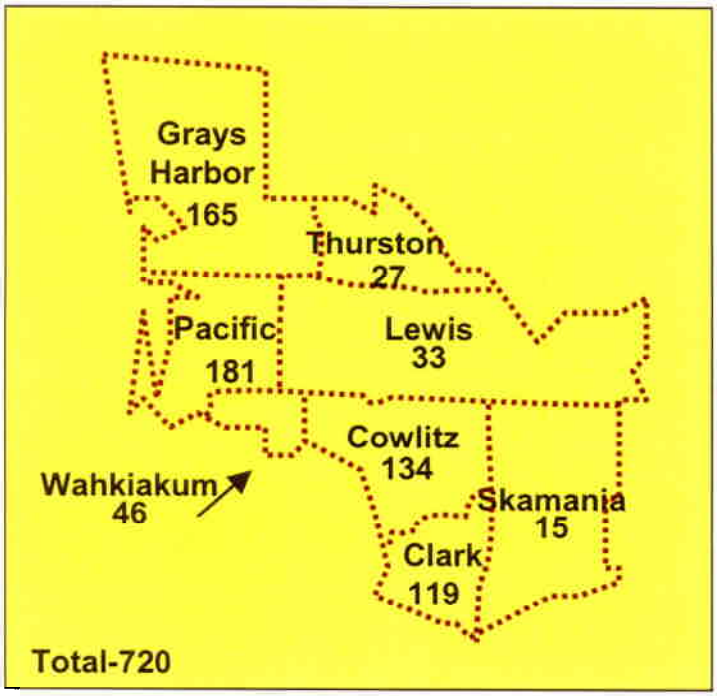
Management Guidelines:

- Ensure environmental protection
- Encourage Public Use and Access
- Manage aquatic lands for all generations
- Foster water dependent use
- Consider the natural values of state-owned aquatic lands
- Generate revenue consistent with the above guidelines



Aquatic Activities within the Pacific Cascade Region

Aquatic Agreements per County

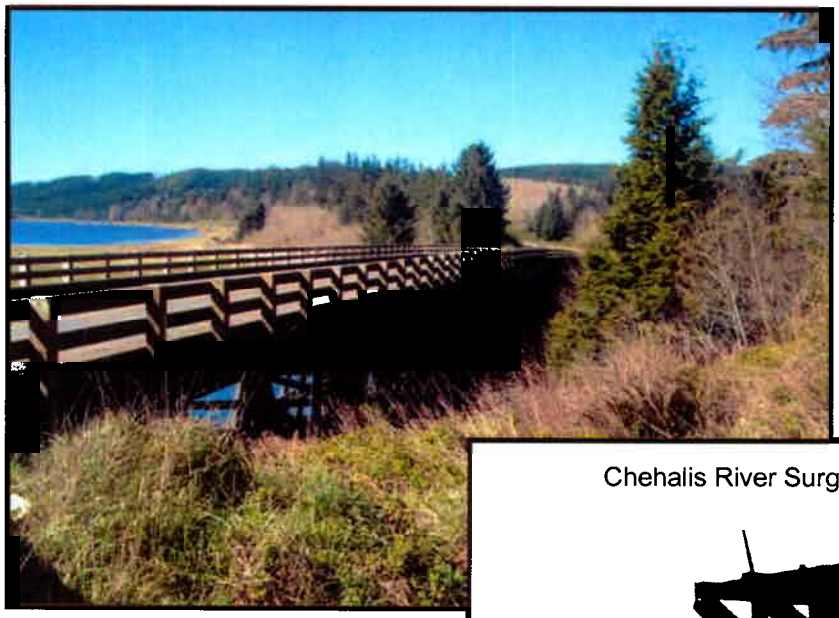


Types of Agreements in the PC Region

- Easements (transmission lines, fiber optic cables, etc) -373
- Dredging Placement-5
- Sand and gravel sales-11
- Marinas / houseboats-37
- Outfalls-31
- Aquaculture / shellfish-78
- Leases - 131
- Ports – 15
- Recreation / Public Access- 39

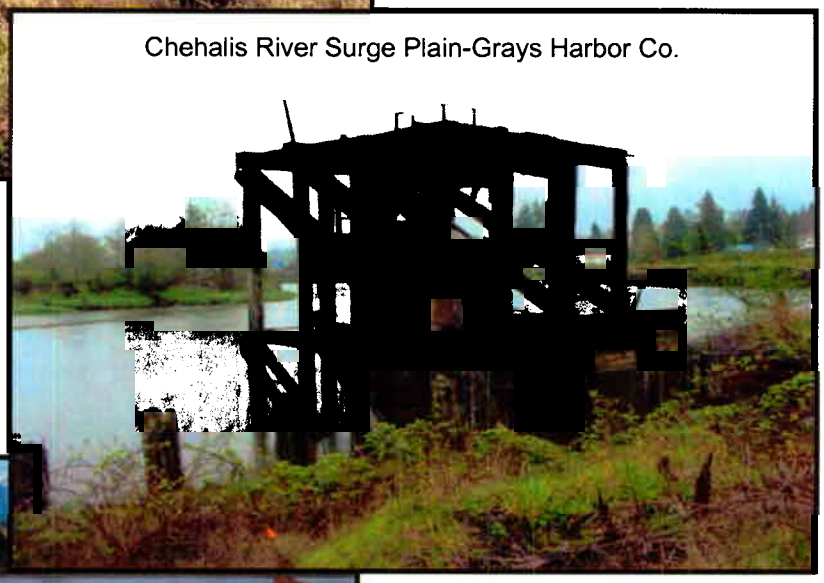
Board of Natural Resources 2005 Tour - Aquatics

What we do……



Ensure bridges, transmission lines, and the like have an agreement with the state when crossing SOAL.

Chehalis River Surge Plain-Grays Harbor Co.



Look for opportunities to conduct restoration projects on SOAL using grant funds and partnerships.

Partner with other agencies and government entities to provide public access to SOAL in the form of boat ramps, docks and parks.

Board of Natural Resources 2005 Tour - Aquatics

We also……

Work Cooperatively with local ports such as the Port of Grays Harbor.

Ensure individual floating homes are in compliance with signed agreements.

Ensure vessels moored on SOAL have proper authorization.

Eruption Summary -

May 18, 1980 Eruption of Mount St. Helens

-- Table compiled by Lyn Topinka, USGS/CVO, 06/17/97 - From: Brantley and Myers, 1997, Mount St. Helens -- From the 1980 Eruption to 1996: USGS Fact Sheet 070-97 and Tilling, Topinka, and Swanson, 1990, Eruption of Mount St. Helens - Past, Present, and Future: USGS General Interest Publication

Volcano

Elevation of Summit: 9,677 feet before; 8,363 feet after; 1,314 feet removed
Volume removed (based on uncompacted deposits): 0.67 cubic miles (3.7 billion cubic yards)
Crater dimensions: 1.2 miles (east-west); 1.8 miles (north-south); 2.084 feet deep
Crater floor elevation: 6,279 feet

Eruption

Date: May 18, 1980
Time of initial blast: 8:32 a.m. PDT
Eruption trigger: A magnitude 5.1 earthquake about 1 mile beneath the volcano

Landslide (Debris Avalanche)

Area and volume (volume based on uncompacted deposits): 23 square miles; 0.67 cubic miles (3.7 billion cubic yards)
Depth of deposit: Buried North Fork Toutle River to average depth of 150 feet (maximum depth 600 feet)
Velocity: 70 to 150 miles per hour

Lateral Blast

Area covered: 230 square miles; reached 17 miles northwest of the crater
Volume of deposit (based on uncompacted deposits): 0.046 cubic miles (250 million cubic yards)
Depth of deposit: From about 3 feet at volcano to less than 1 inch at blast edge
Velocity: At least 300 miles per hour
Temperature: As high as 660 degrees F (350 degrees C)
Energy release: 24 megatons thermal energy (7 by blast, rest through release of heat)

Trees blown down: 4 billion board feet of timber (enough to build about 300,000 two-bedroom homes)
Human fatalities: 57

Lahars

Velocity: About 10 to 25 miles per hour (over 50 miles per hour on steep flanks of volcano)
Damaged: 27 bridges, nearly 200 homes. Blast and lahars destroyed more than 185 miles of highways and roads and 15 miles of railways.
Effects on Cowlitz River: Reduced carrying capacity at flood stage at Castle Rock from 76,000 cfs (cubic feet per second) to less than 15,000 cfs
Effects on Columbia River: Reduced channel depth from 40 to 14 feet; stranded 31 ships in upstream ports

Eruption Column and Cloud

Height: Reached about 80,000 feet in less than 15 minutes
Downwind extent: Spread across U.S. in 3 days; circled Earth in 15 days
Volume of ash (based on uncompacted deposits): 0.26 cubic miles (1.4 billion cubic yards)
Ash fall area: Detectable amounts of ash covered 22,000 square miles
Ash fall depth: 10 inches at 10 miles downwind (ash and pumice); 1 inch at 60 miles downwind; 1/2 inch at 300 miles downwind

Pyroclastic Flows

Area covered: 6 square miles; reached as far as 5 miles north of crater
Volume and depth (volume based on uncompacted deposits): 0.029 cubic miles (155 million cubic yards); multiple flows 3 to 30 feet thick; cumulative depth of deposits reached 120 feet in places
Velocity: Estimated at 50 to 80 miles per hour
Temperature: At least 1,300 degrees F (700 degrees C)

Other

Wildlife: The Washington State Department of Game estimated nearly 7,000 big game animals (deer, elk, and bear) perished as well as all birds and most small mammals. Many burrowing rodents, frogs, salamanders, and crawfish, managed to survive because they were below ground level or water surface when the disaster struck.
Fisheries: The Washington Department of Fisheries estimated that 12 million Chinook and Coho salmon fingerlings were killed when hatcheries were destroyed. Another estimated 40,000 young salmon were lost when forced to swim through turbine blades of hydroelectric generators as reservoir levels along the Lewis River were kept low to accommodate possible mudflows and flooding.