High Level Indicators of Oregon's Forest Conditions

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State of Oregon
Department of
Environmental
Quality

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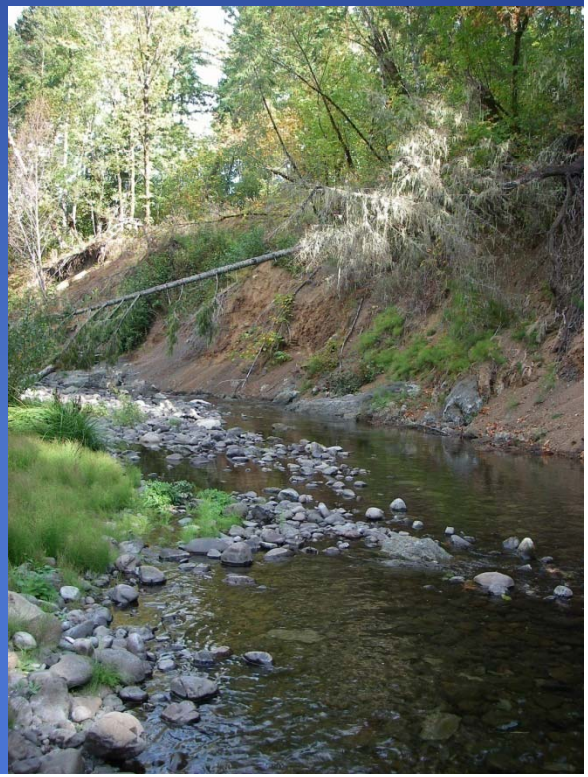
Background

- Oregon Indicators of Sustainable Forest Management
- Strategies for measuring and discussing sustainable forest management
  - Environmental
  - Economic
  - Social



Oregon Indicators of Sustainable Forest Management

- Strategy D: Protect, maintain, and enhance the soil and water resources of Oregon's forests
  - Water quality
  - Biological integrity
  - Forest road risks
    - Not assessed in this report

Objectives

- Assess the status of water quality and macroinvertebrates on forested lands in Oregon
- Reporting units
  - Statewide
  - 3rd field HUCs
  - Ownership
- Report back to Board of Forestry and public
  - Maintaining or improving forest streams over time
  - This report = baseline

Sites included in analyses

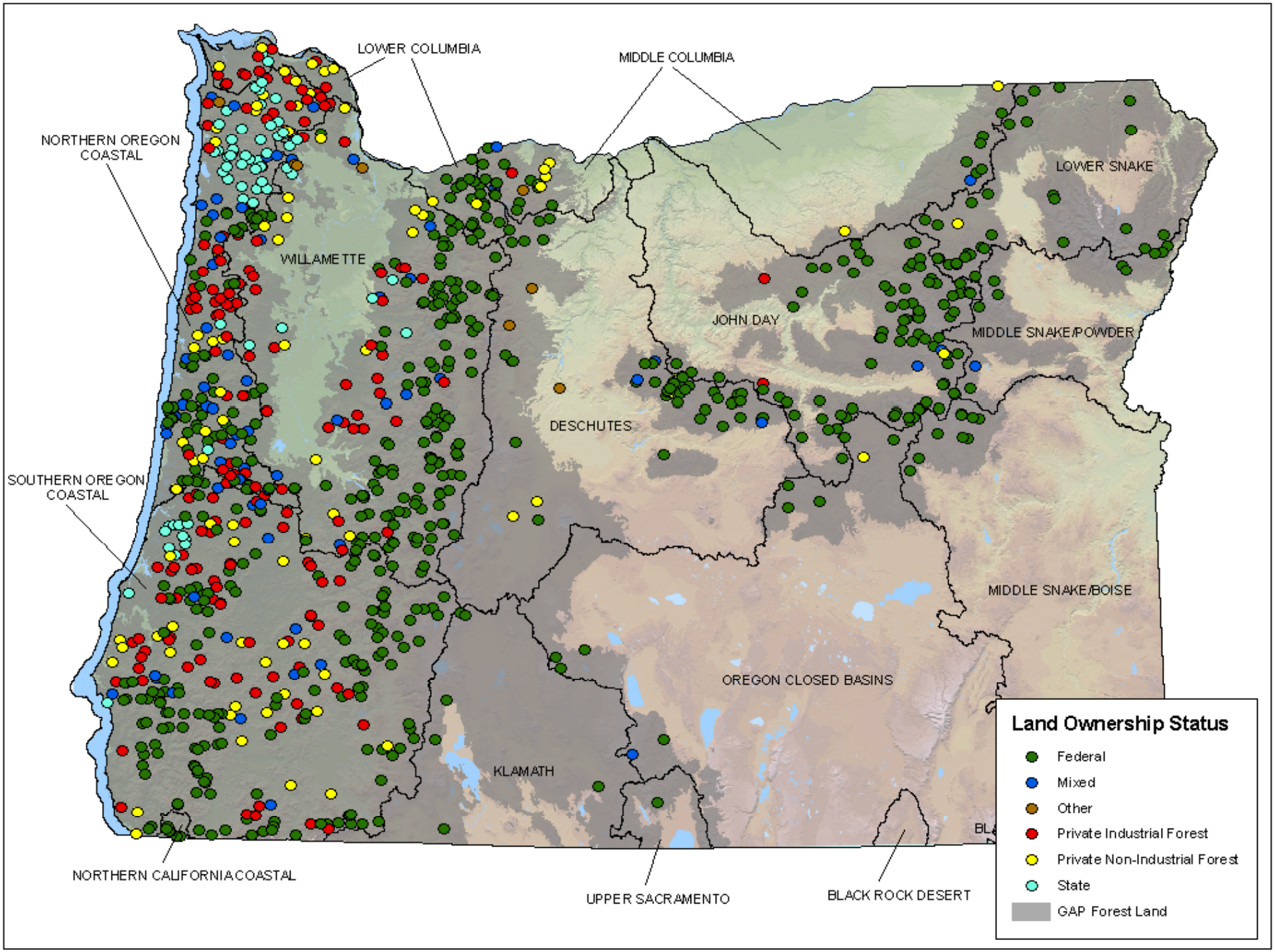
- Criteria:
  - 1) previous 10 years = 1998 - 2007
  - 2) Dominant land use = forestry
  - 3) Water chemistry and/or macroinvertebrate sample
- 67% random survey designs
- 33% non-random survey designs
- Percent of sites only
  - Provides a baseline for future reports

Defining Forest Lands

- Identify forest lands
  - Interagency Mapping and Assessment Project (IMAP coverage)
- Watershed scale
  - delineated pour-point watersheds
  - 6th field HUCs
- Local scale
  - 300 m diameter buffer around sampling location
- Forest lands criteria:
  - ≥ 70% Forest in Watershed
  - ≥ 70 Forest at the Local scale

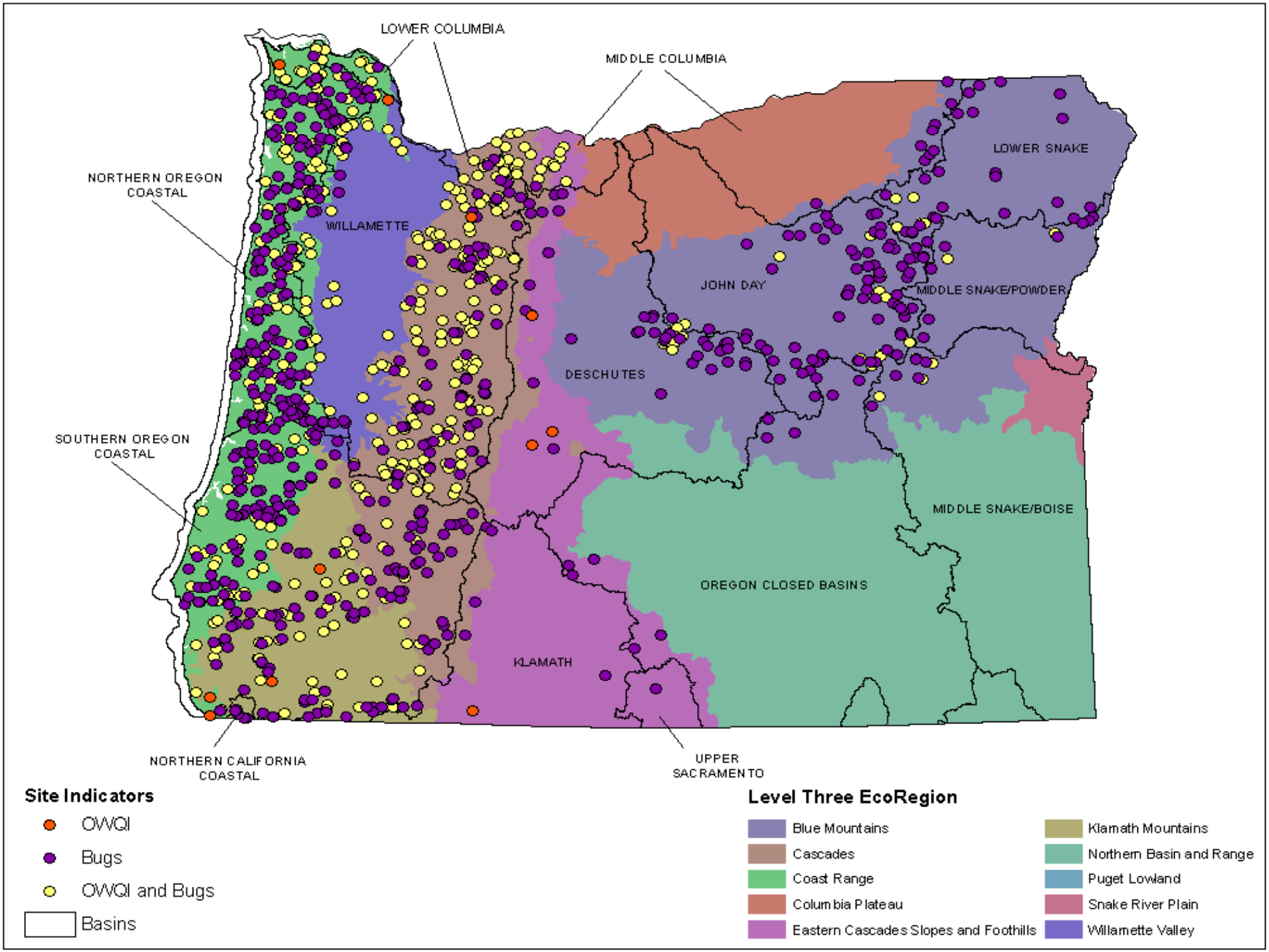
Defining ownership

- ODF forest ownership coverage
- 4 classes
  - Federal
  - State
  - Private industrial
  - Private non-industrial
- Only determined at the local scale
  - Criteria:
    - ≥ 70% of a single ownership class locally
  - We recognize the deficiencies


LOWER COLUMBIA
MIDDLE COLUMBIA
NORTHERN OREGON COASTAL
LOWER SNAKE
WILLAMETTE
JOHN DAY
MIDDLE SNAKE/POWDER
DESCHUTES
SOUTHERN OREGON COASTAL
MIDDLE SNAKE/BOISE
OREGON CLOSED BASINS
KLAMATH
NORTHERN CALIFORNIA COASTAL
UPPER SACRAMENTO
BLACK ROCK DESERT
Land Ownership Status
Federal
Mixed
Other
Private Industrial Forest
Private Non-Industrial Forest
State
GAP Forest Land

Assessment tools

- Water quality = OWQI
  - General expression of water quality condition
  - Integration of 8 sub-indices
- Biological Condition = PREDATOR
  - RIVPACS-type predictive model
  - Reference conditions
  - Predictor variables: non-human influenced
  - Observed/Expected (O/E)
- Stressor ID models
  - Weighted averaging inference models
    - Temperature: summer maximum
    - Fine sediments: % fines in reach
  - No reference benchmarks
  - Screening tool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Site Indicators
OWQI
Bugs
OWQI and Bugs
Basins
Level Three EcoRegion
Blue Mountains
Cascades
Coast Range
Columbia Plateau
Eastern Cascades Slopes and Foothills
Klamath Mountains
Northern Basin and Range
Puget Lowland
Snake River Plain
Willamette Valley

Statewide

- Water quality is predominantly in excellent condition
  - 77% Excellent
  - 5% Poor/Very Poor

- Biological condition is generally good
  - 53% Least disturbed
  - 24% Most disturbed

HUCs

Rankings of water quality and biological conditions. The lowest percent of sites in the least desired condition received the lowest rank (1). The higher the rank, the higher the percent of sites in the least desired condition class.

Reporting Unit	PREDATOR *Most disturbed*	Temperature Score *≥18.0 °C*	Fine Sediment Score *> 10% fines*	Oregon Water Quality Index *Poor + Very Poor*
Middle Columbia	1	1	1	1
Willamette	2	3	2	2
Lower Columbia	3	2	3	4
North Coast	5	7	6	3
John Day	4	5	7	--
Deschutes	7	8	8	--
Lower Snake	5	4	4	--
South Coast	8	6	4	5

Ownership--Statewide

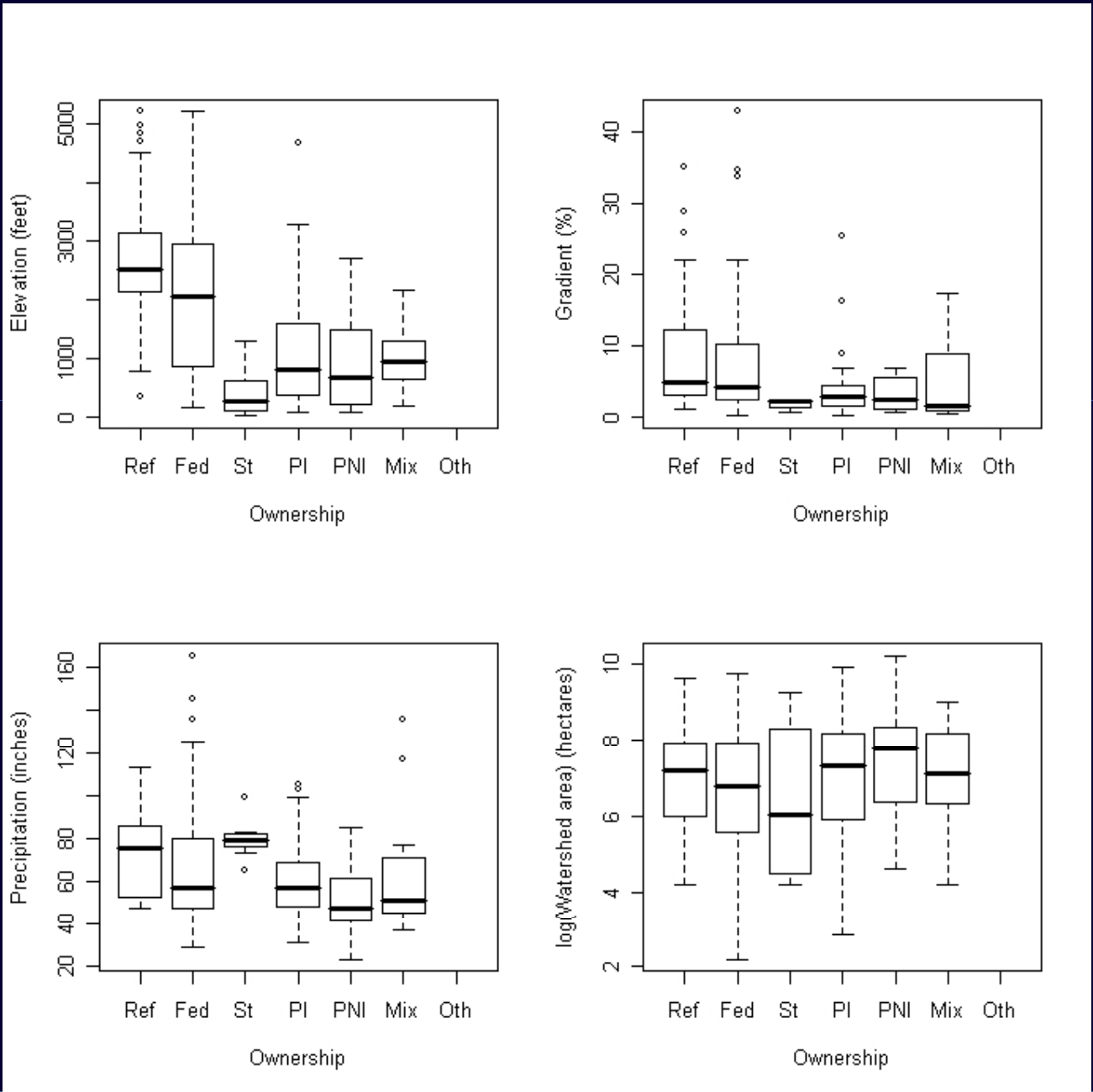
Ownership class (n)	OWQI (% Excellent)	PREDATOR (% Least disturbed)
Federal (623)	86	55
State (69)	75	51
Private Industrial (171)	66	58
Private Non-industrial (80)	59	35

Ownership—South Coast

Ownership class (n)	PREDATOR (Least disturbed)	Inferred Temperature (< 16 °C)	Inferred Fine Sediments (0-10%)
Federal (68)	45%	37%	81%
Private Industrial (57)	42%	*13%	55%
Private Non-industrial (24)	29%	*13%	33%

* > 20 °C = 2x greater for PNI

Natural factors in the South Coast



Future work

- Increase sample sizes
  - Eastern Oregon
    - Incorporate USFS and BLM datasets
- Probability design
  - Statistical confidence
  - Include ownership classes
- Better identify ownership
  - Local and watershed scales
- Add natural expectations and reference condition to Stressor ID models

Acknowledgements

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- Jeff Adams (Xerces)

05/20/2003

OWQI

- 9 sub-indices
- Each scored on 0-100 scale
- OWQI
  - 10 - 100
  - Unweighted harmonic square mean
- Based on a one-time grab sample
- 424 sites

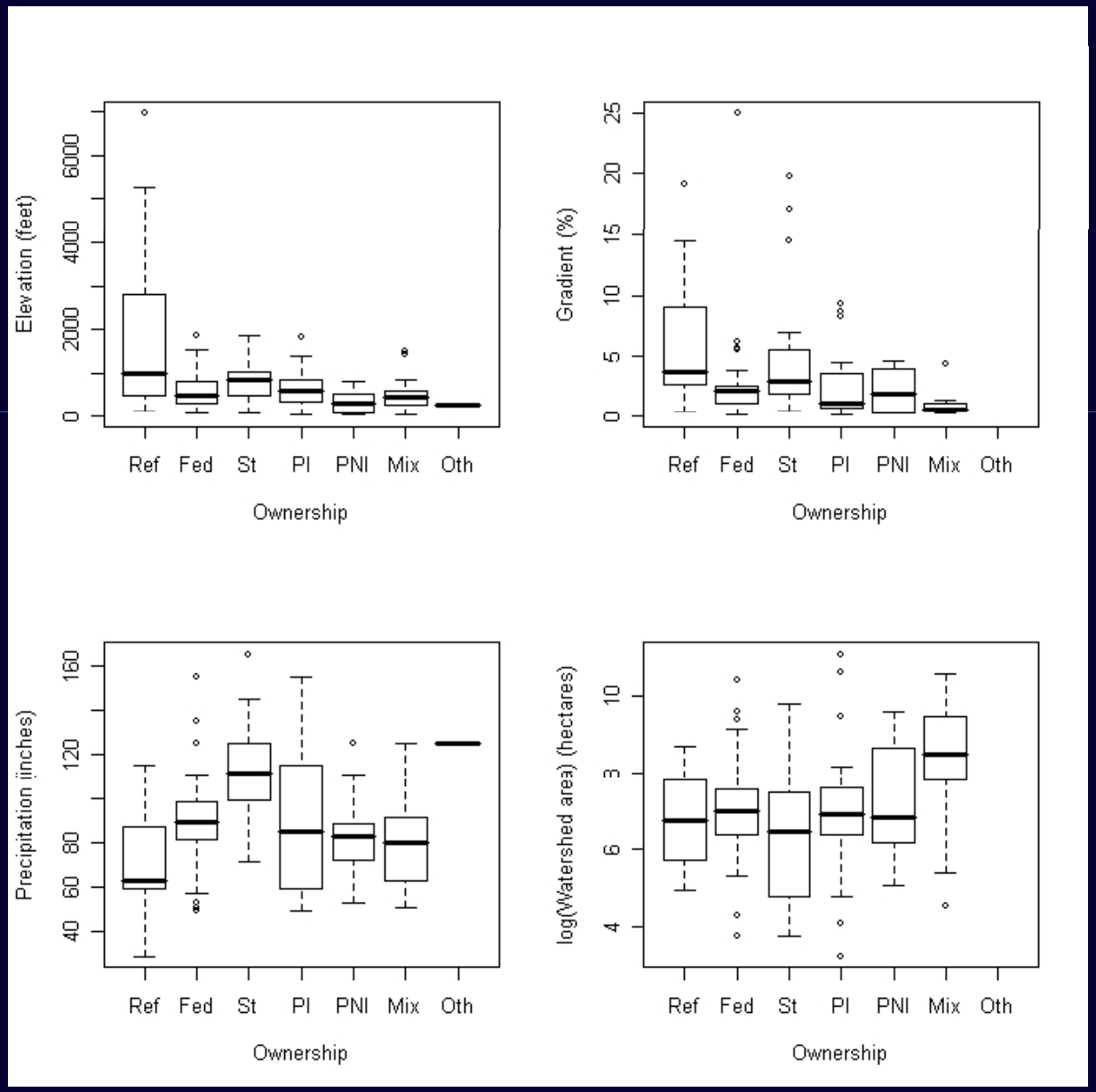
Parameter	Units
Temperature	^{o}C
Dissolved Oxygen	mg/l
Dissolved Oxygen Percent Saturation	%
Biochemical Oxygen Demand (BOD-5)	mg/l
pH	SU
Total Solids	mg/l
Ammonia	mg/l
Nitrate + Nitrite	mg/l
Total Phosphate	mg/l

Score	Category
90 - 100	Excellent
85 – 89	Good
80 – 84	Fair
60 – 79	Poor
< 60	Very Poor

Ownership—North Coast

Ownership class (n)	PREDATOR (Least disturbed)	Inferred Temperature (< 16 oC)	Inferred Fine Sediments (0-10%)
Federal (68)	69%	12%	69%
State (46)	54%	37%	87%
Private Industrial (57)	61%	12%	49%
Private Non-industrial (24)	38%	0%	46%

Natural factors in the North Coast



		PREDATOR O/E					Temperature Stress				Fine Sediment Stress			
	Sample size	Least Disturbed	Enriched	Moderately Disturbed	Most Disturbed	Not assessed	< 16	16.0 - 17.9	18.0 - 19.9	>= 20	0 - 10	11 - 20	21 - 30	> 30
Oregon	1025	53	3	16	24	3	32	30	24	14	69	21	7	3
Federal	623	55	3	17	20	5	42	27	20	12	77	17	4	2
State	69	51	1	12	35	1	28	43	26	3	71	17	6	6
Private Industrial	171	58	4	13	25	1	15	35	36	14	56	29	9	6
Private Non-industrial	80	35	3	18	44	1	10	23	34	34	44	30	23	4
Northern Oregon Coastal	230	59	3	13	26	0	14	38	36	12	63	24	10	3
Federal	68	69	3	12	16	0	12	43	38	7	69	24	7	0
State	46	54	2	11	33	0	37	43	17	2	87	7	2	4
Private Industrial	57	61	2	14	23	0	12	32	40	16	49	32	14	5
Private Non-industrial	24	38	4	17	42	0	0	29	54	17	46	29	25	0
Southern Oregon Coastal	289	42	2	15	33	8	26	28	28	18	67	22	6	4
Federal	167	45	1	18	25	11	37	29	22	12	81	16	1	2
State	12	--	--	--	--	--	--	--	--	--	--	--	--	--
Private Industrial	71	42	4	15	37	1	13	32	34	21	55	27	11	7
Private Non-industrial	24	29	4	8	58	0	13	13	33	42	33	38	21	8
Willamette	216	63	6	16	13	2	46	36	14	4	82	14	2	1
Federal	145	62	6	16	12	3	60	31	8	1	92	8	1	0
State	9	--	--	--	--	--	--	--	--	--	--	--	--	--
Private Industrial	29	83	7	7	3	0	24	41	34	0	69	28	0	3
Private Non-industrial	15	--	--	--	--	--	--	--	--	--	--	--	--	--
Lower Columbia	42	62	2	14	17	5	64	19	14	2	81	12	5	2
Middle Columbia	31	68	3	16	10	3	71	16	6	6	90	6	3	0
Lower Snake	31	42	3	29	26	0	42	23	6	29	68	26	6	0
Deschutes	52	48	2	23	27	0	17	27	19	37	44	35	17	4
John Day	90	56	6	17	22	0	37	19	28	17	62	28	6	4