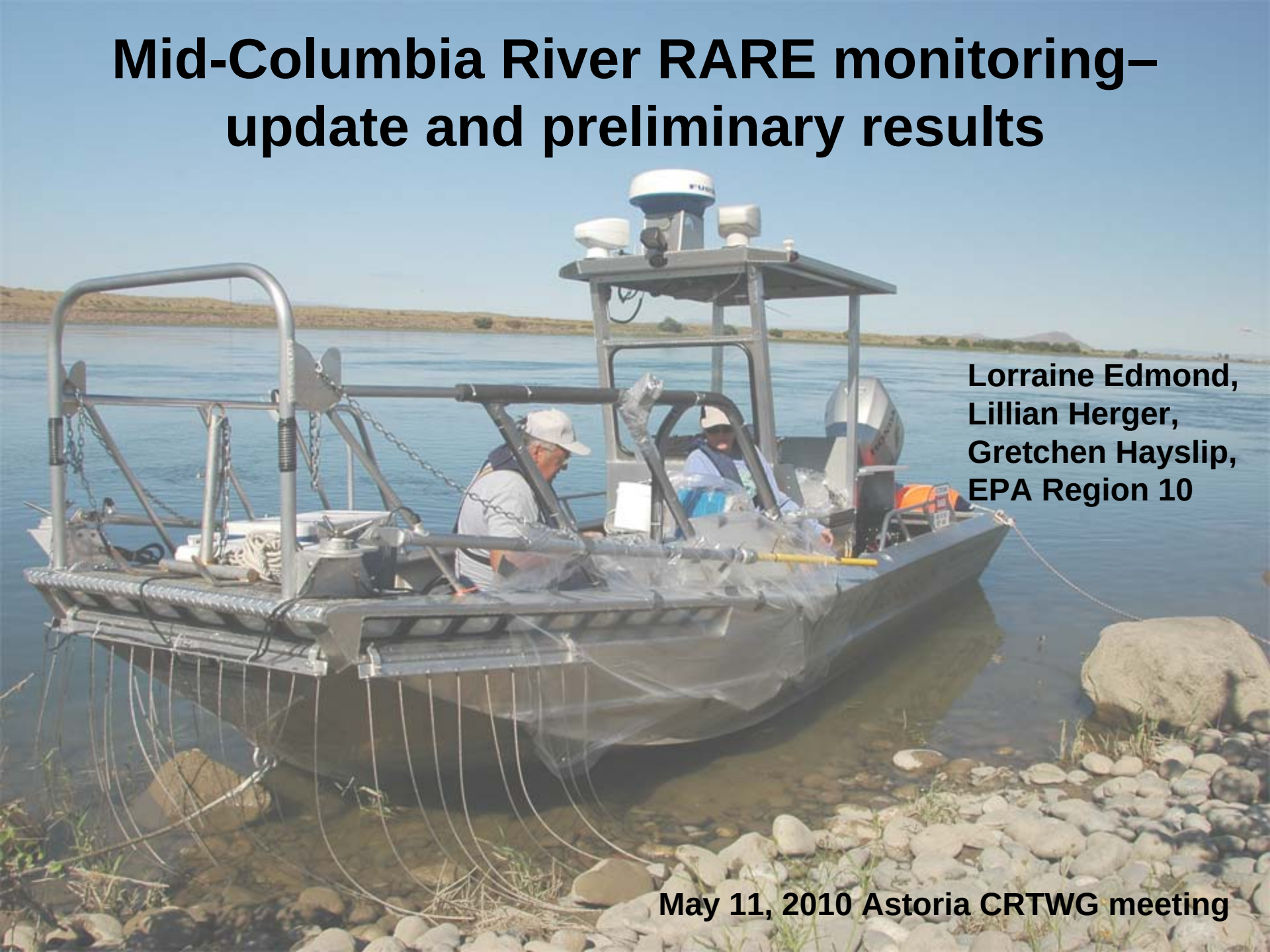
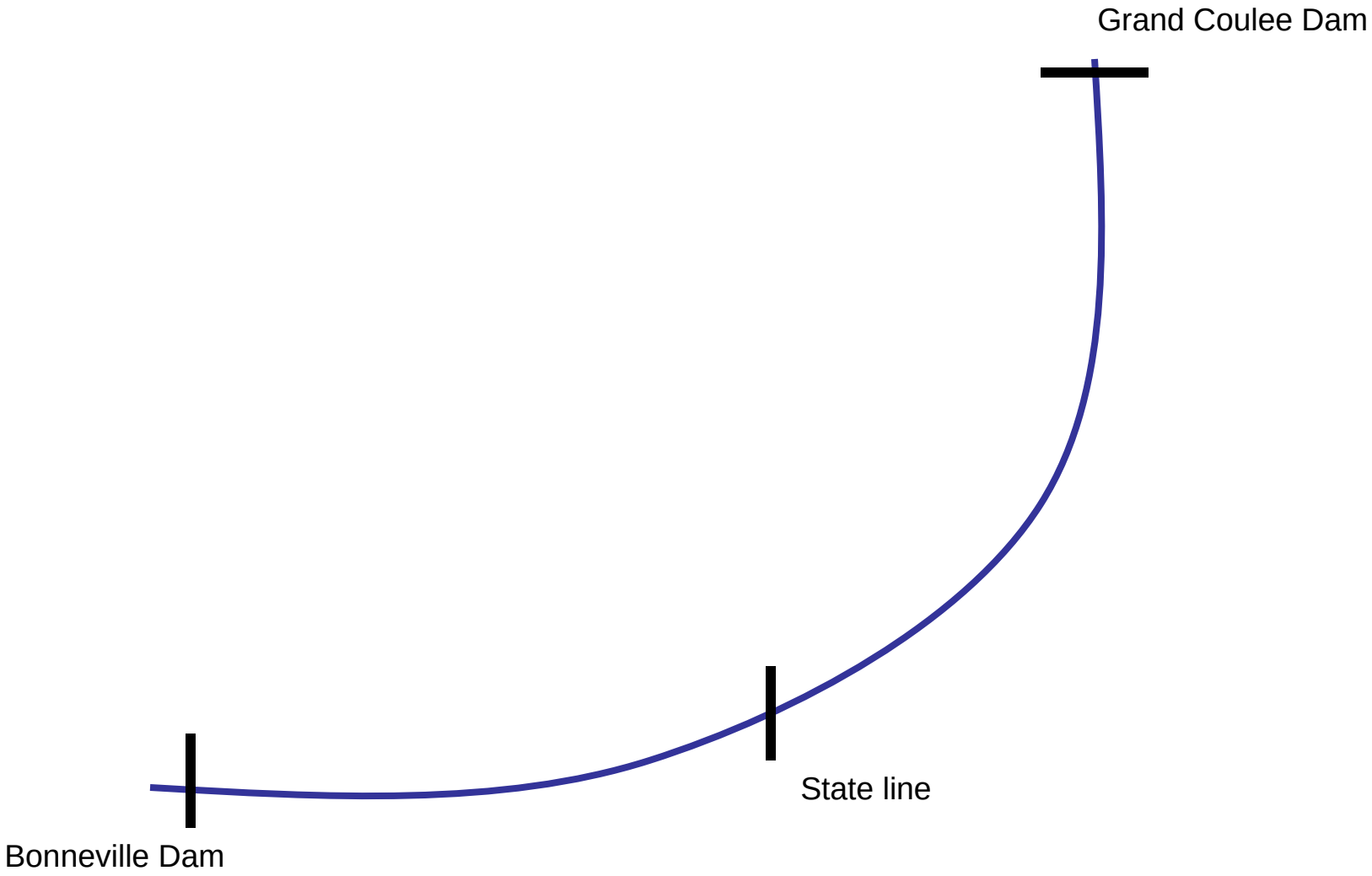
Mid-Columbia River RARE monitoring– update and preliminary results

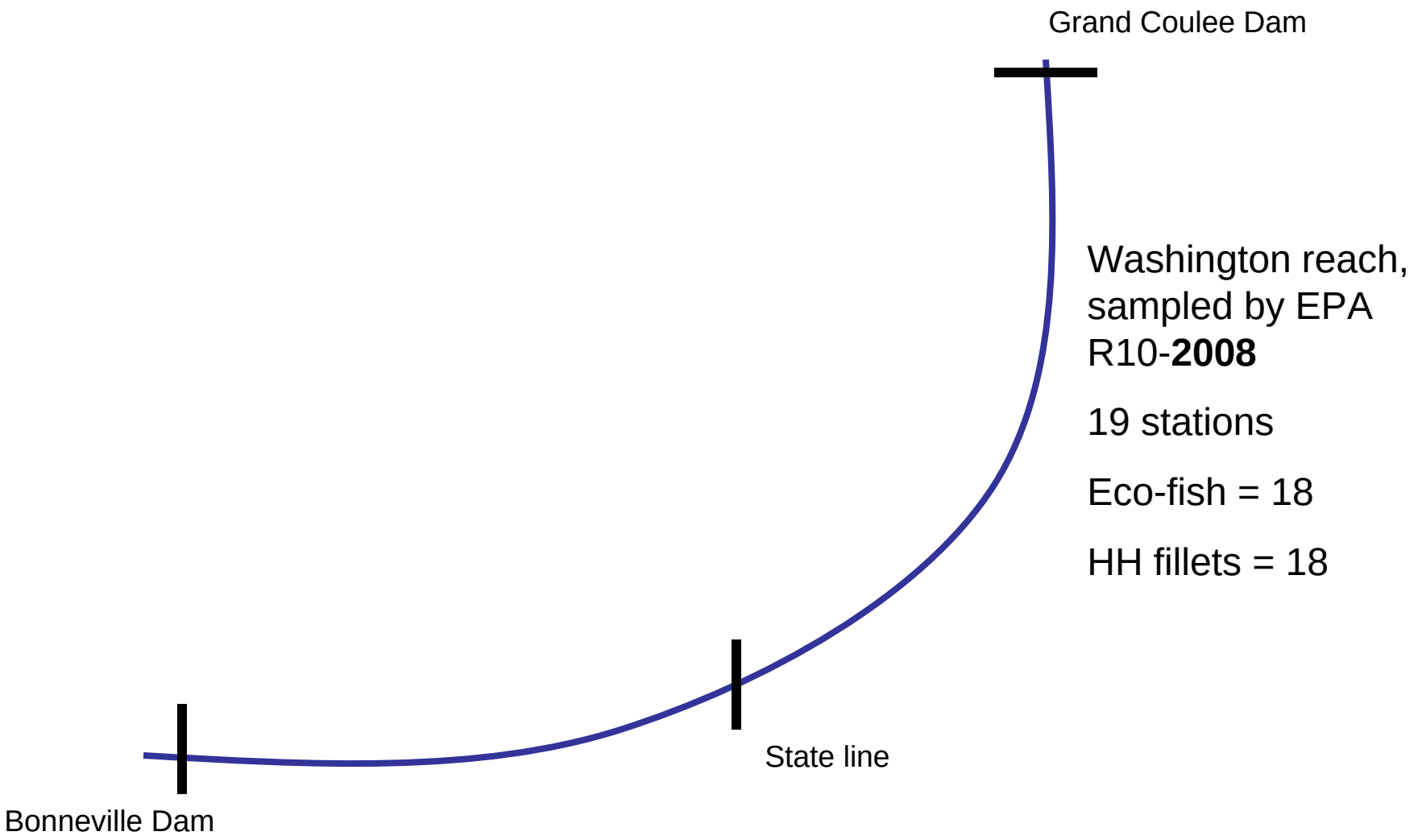


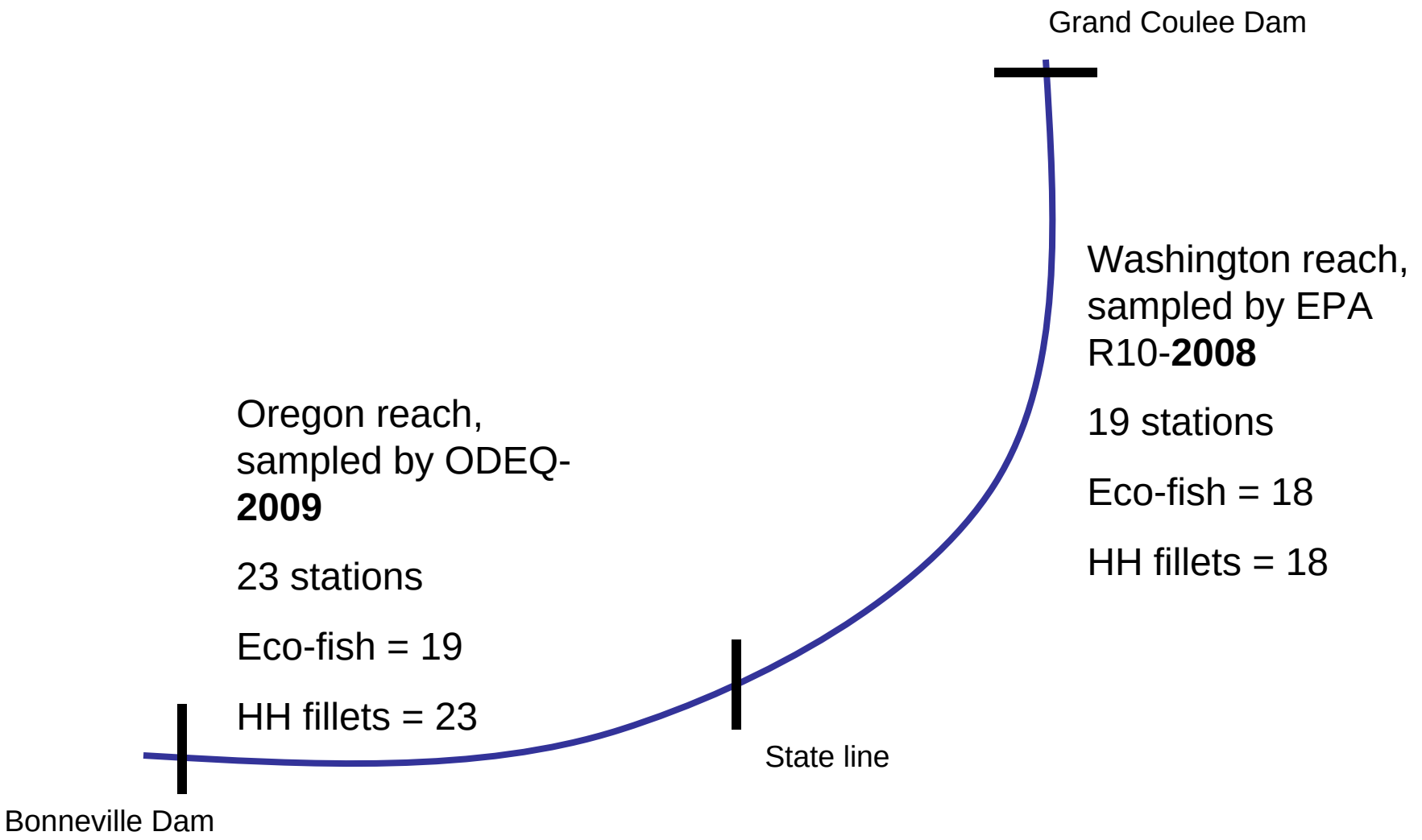
Lorraine Edmond,
Lillian Herger,
Gretchen Hayslip,
EPA Region 10

May 11, 2010 Astoria CRTWG meeting

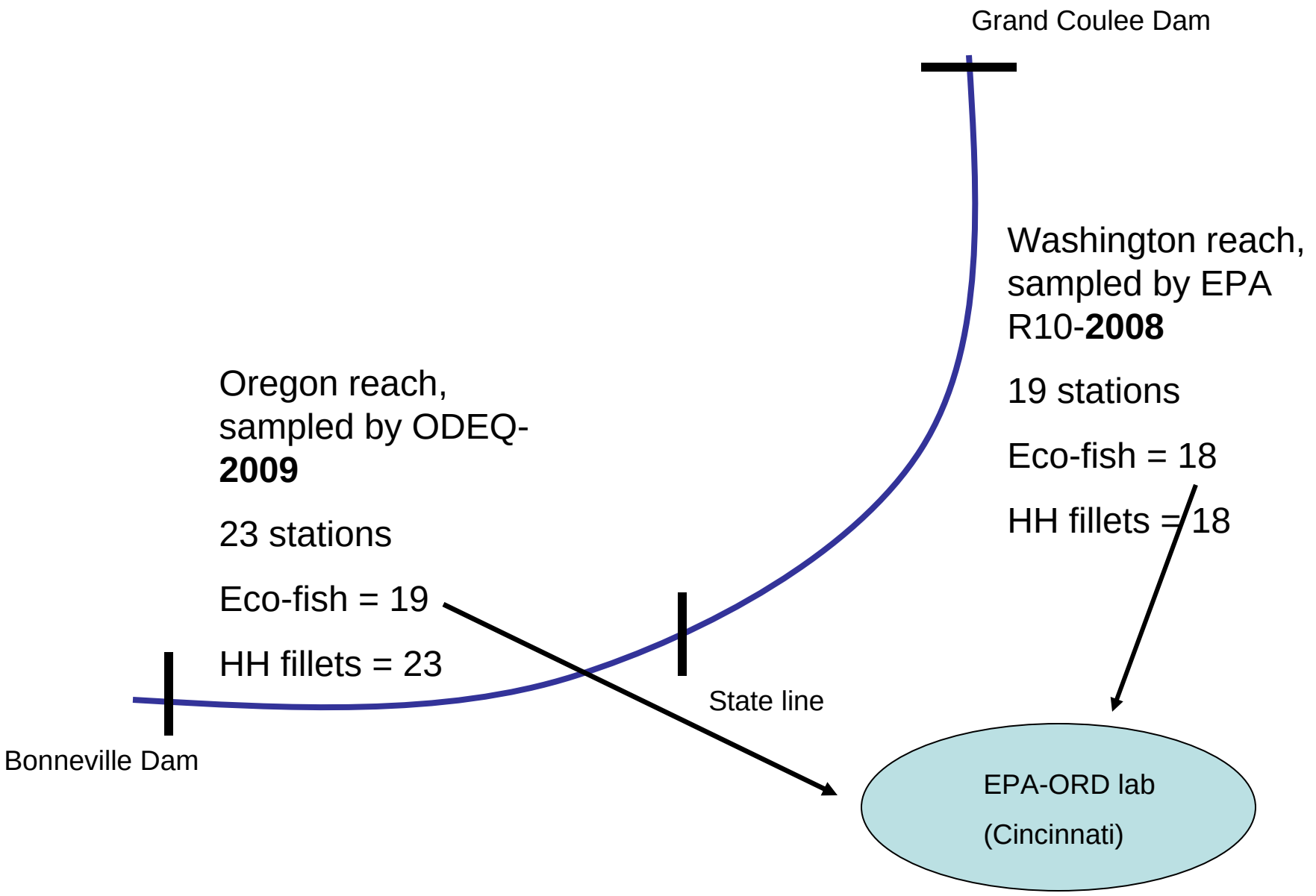
42 randomly-selected stations
Approx 400 river miles, alternating right and left banks


Grand Coulee Dam
State line
Bonneville Dam


Grand Coulee Dam
Washington reach, sampled by EPA R10-**2008**
19 stations
Eco-fish = 18
HH fillets = 18
State line
Bonneville Dam



(Oregon also sampled 8 hand-picked stations, mostly from tributaries)


Grand Coulee Dam
Washington reach, sampled by EPA R10-**2008**
19 stations
Eco-fish = 18
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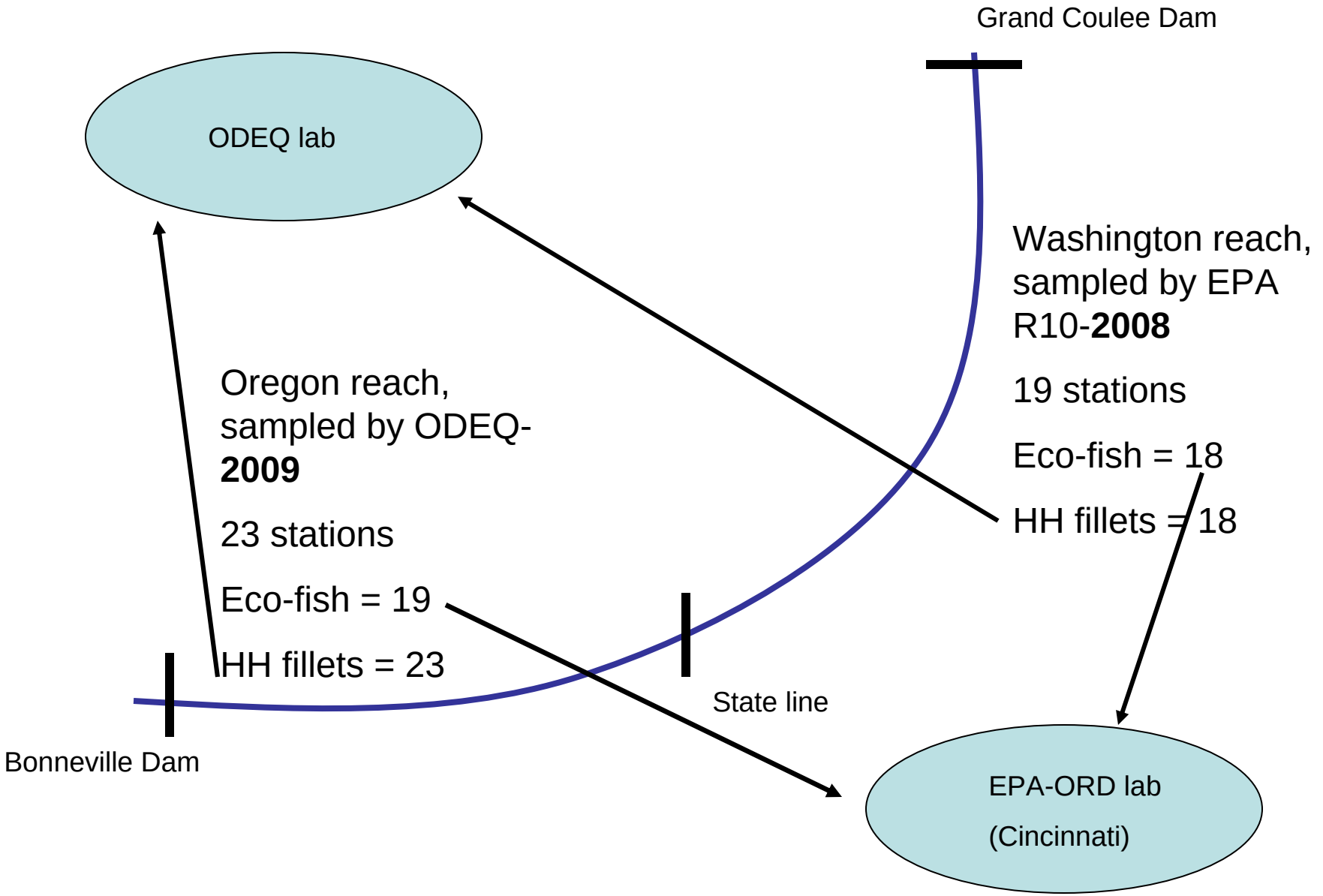
Oregon reach, sampled by ODEQ-**2009**
23 stations
Eco-fish = 19
HH fillets = 23
State line
Bonneville Dam
EPA-ORD lab
(Cincinnati)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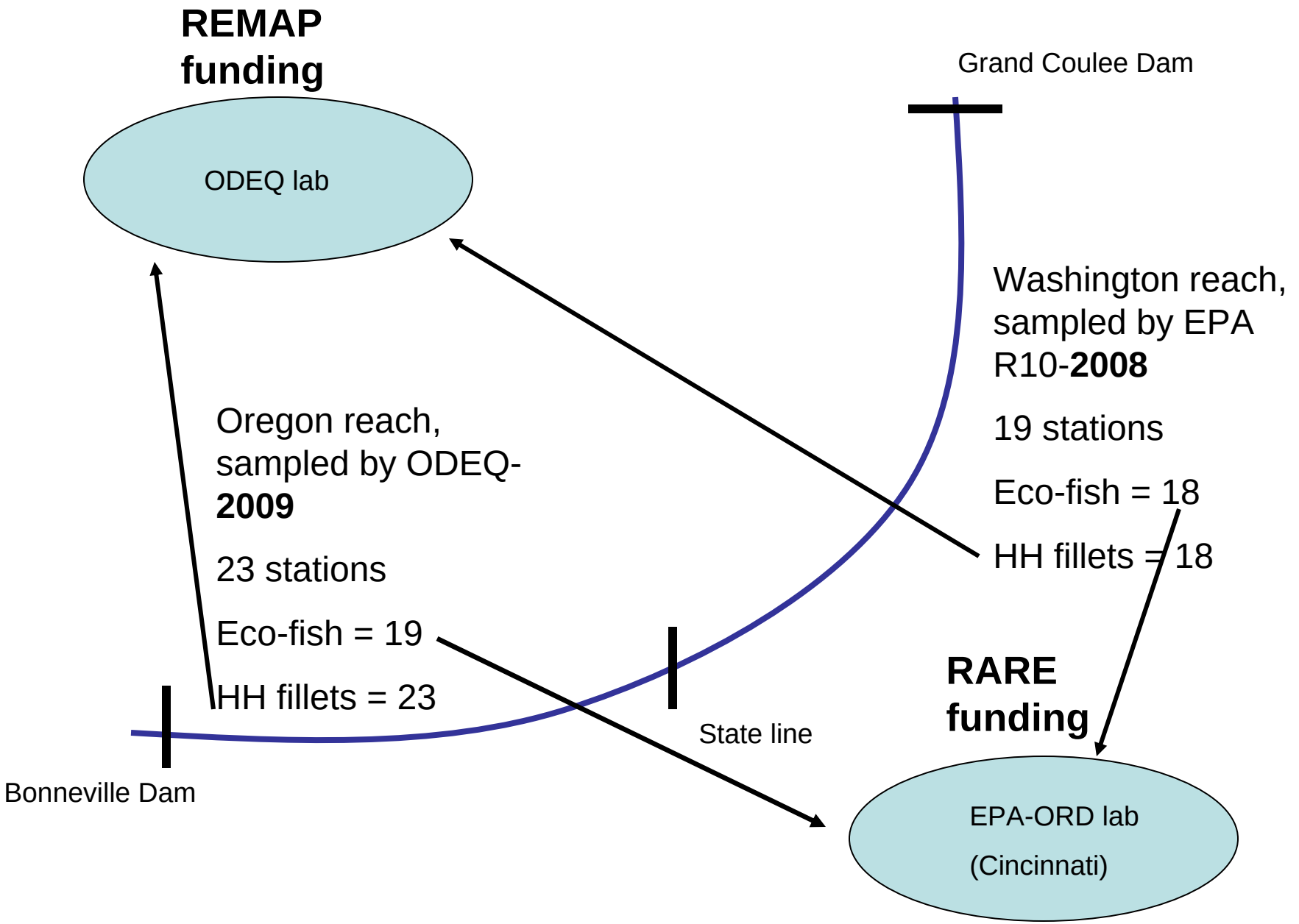


Of the 42 random stations = 37 had eco-fish collected, 41 had HH fillets collected

Analytes –water (to EPA Manchester laboratory)

- Total and dissolved phosphate
- Sulfate, TSS, TOC, DOC
- Total Cd, As, Se, Cu, Pb, Hg
- Total Hg, dissolved Hg, total MeHg, dissolved MeHg ("clean hands" technique, low detection limits)

Analytes -- tissue

- PCB congeners (23)
- Chlorinated pesticides (18) plus DDTs (6)
- DDT and metabolites (6)
- PBDE congeners (11)
- Mercury
- Trace metals

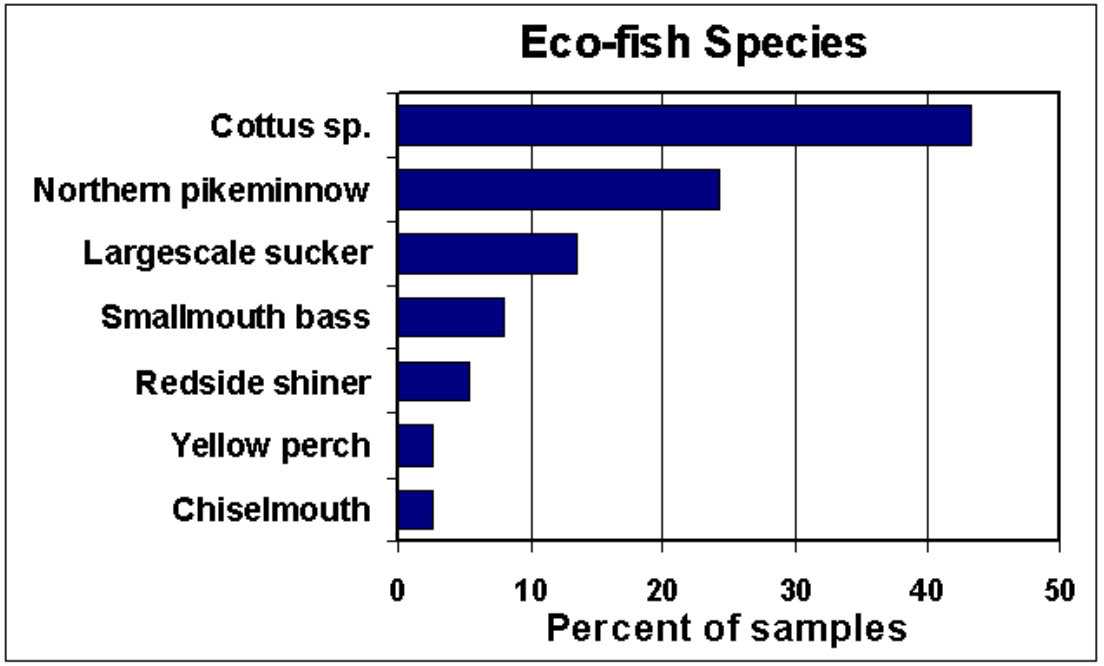
Congeners analyzed

- PBDE congeners 28, 47, 66, 85, 99, 100,138, 153, 154, 183, 209

- PCB congeners 8, 18, 28, 44, 52, 66, 77, 81, 101, 105, 110, 118, 126, 128, 138, 153, 169, 170, 180, 187, 195, 206, 209

Eco-Fish Sample

Target Species: resident omnivores, <200mm in length, that are prey items to other fish species and wildlife



Current status

- Water analyses = complete
- Eco fish organics = complete
- Eco fish Hg and Se = complete
- Eco fish other metals= fall 2010 (EPA-Manchester)
- HH fillets organics = pending (ODEQ)
- HH fillets Hg = complete
- HH fillets Se and other metals = fall 2010 (Manchester)

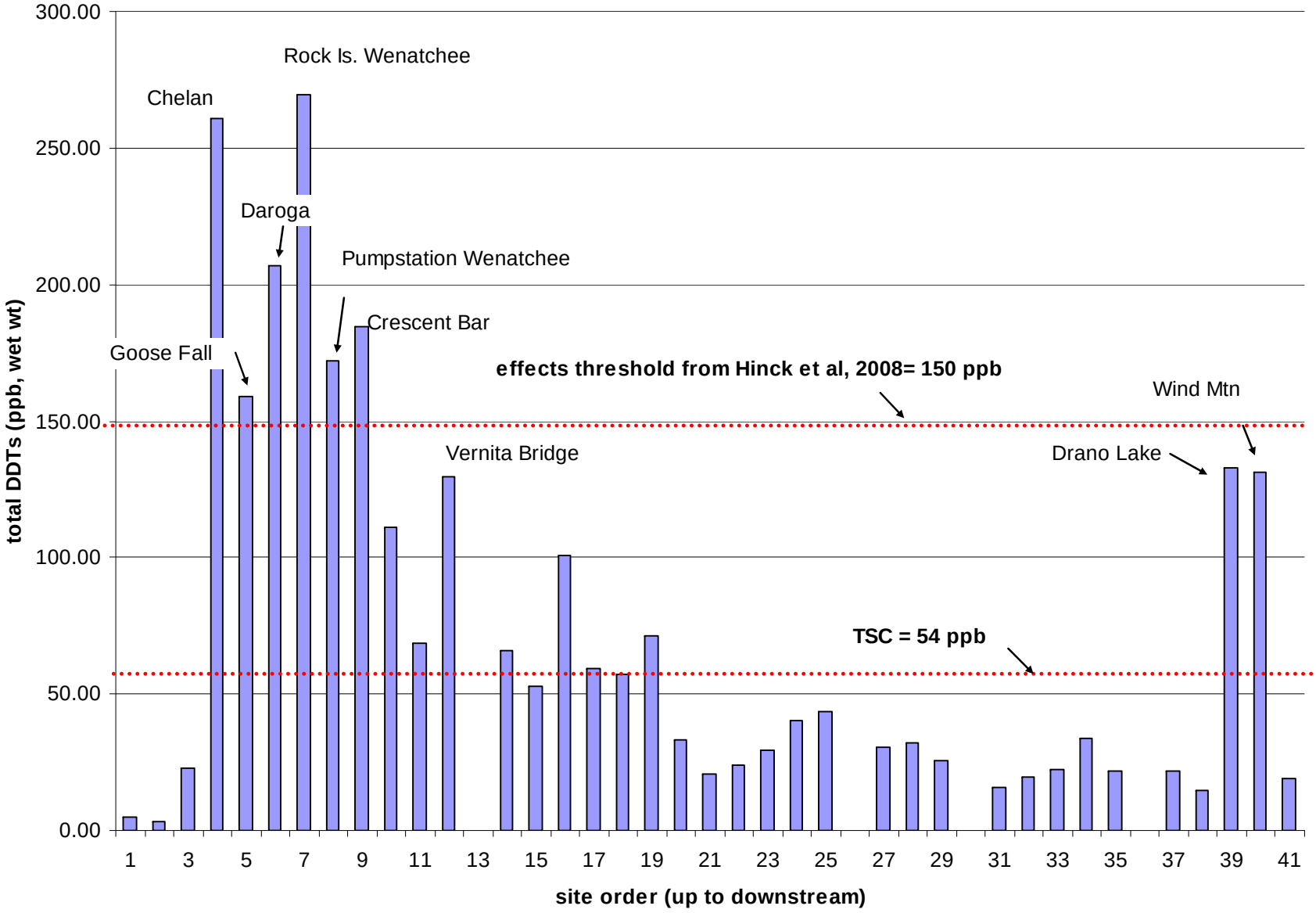
A few preliminary results

2 approaches for analysis:

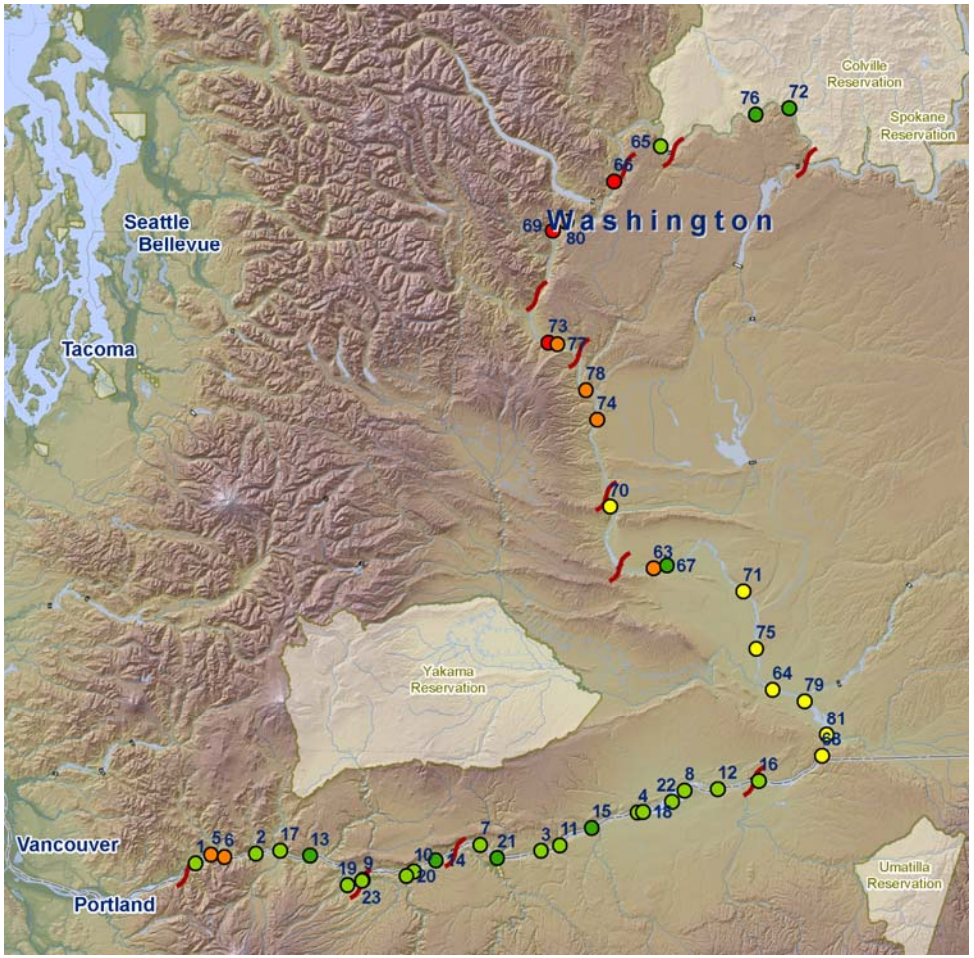
- spatial patterns
  (maps, upstream→downstream graphs)

- EMAP characterization
  (reach-wide descriptive statistics + CDFs)

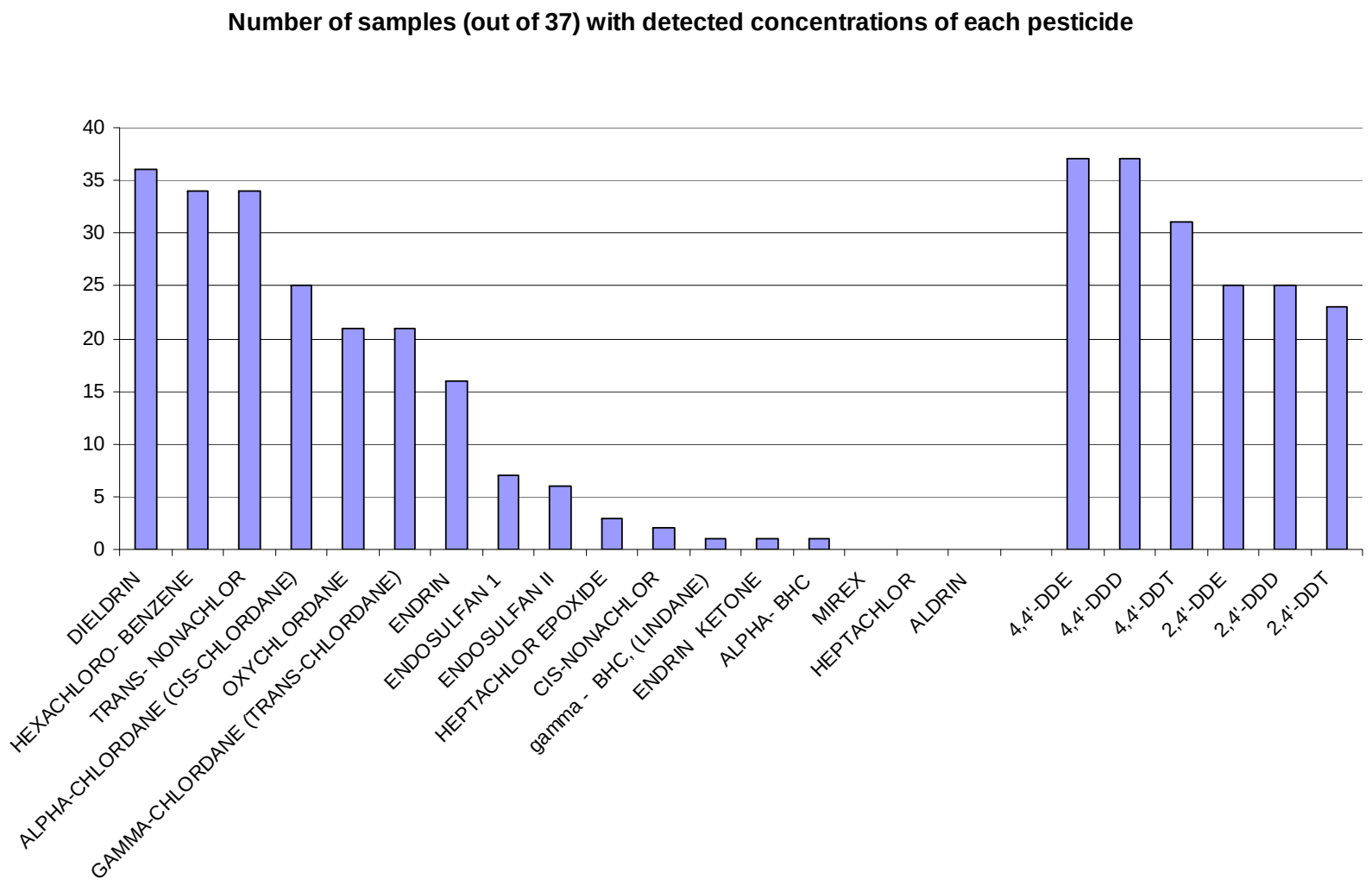
Total DDE+DDD+DDT in ecofish

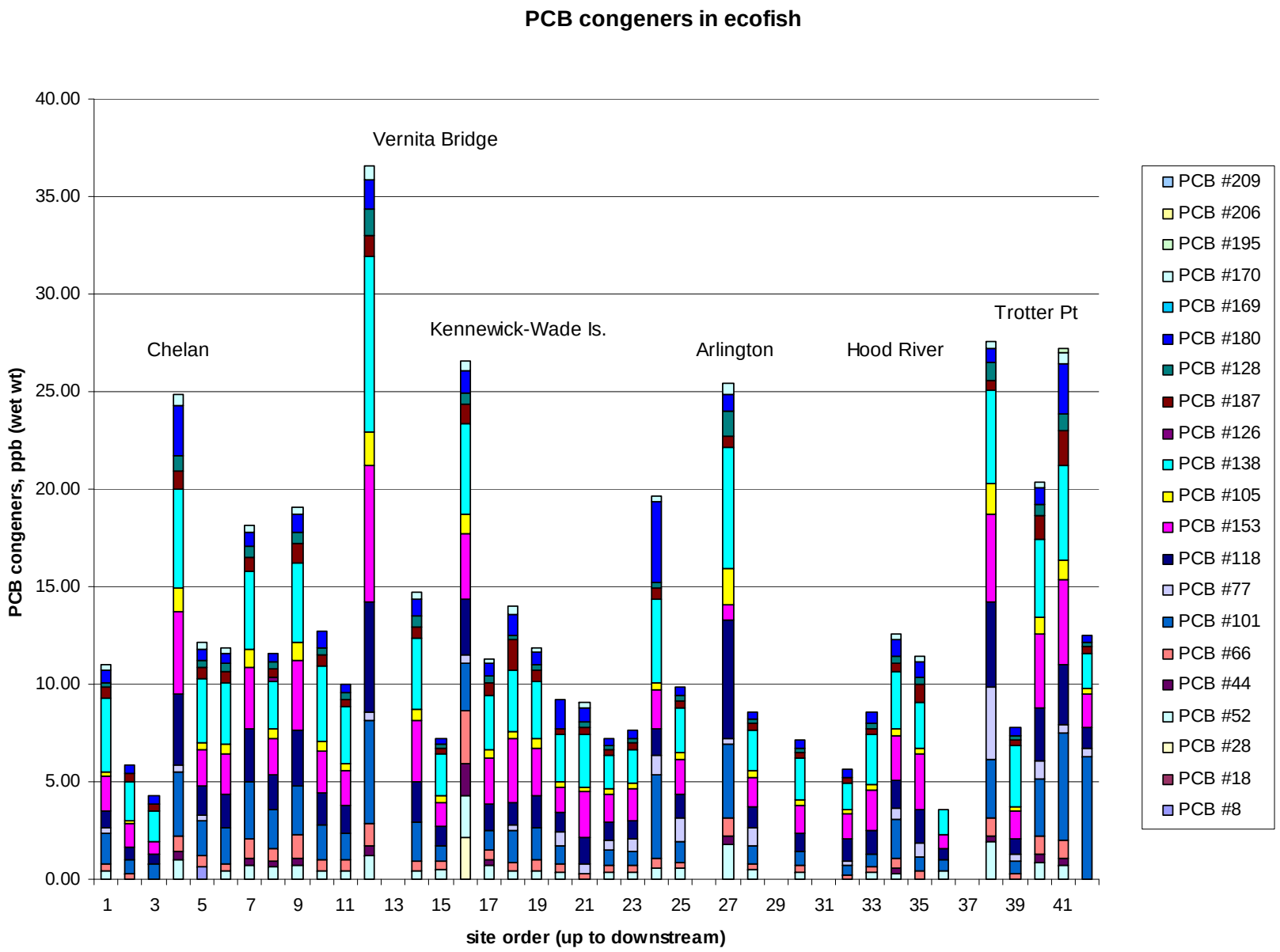


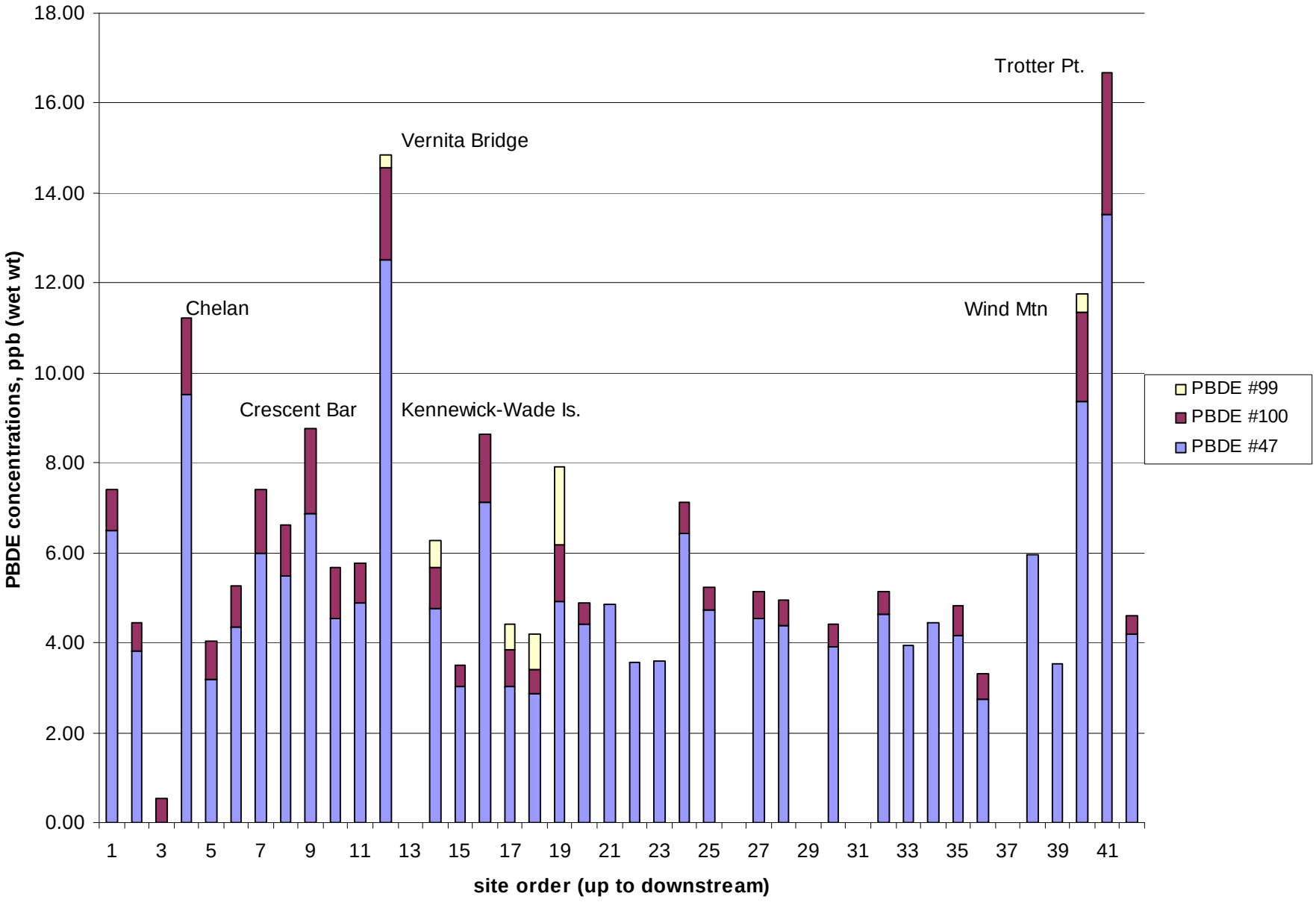
Total DDTs, (quintiles)



Which pesticides were found most often?




PCB congeners in ecofish
PCB congeners, ppb (wet wt)
40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
Vernita Bridge
Chelan
Kennewick-Wade Is.
Arlington
Hood River
Trotter Pt
1
3
5
7
9
11
13
15
17
19
21
23
25
27
29
31
33
35
37
39
41
site order (up to downstream)
PCB #209
PCB #206
PCB #195
PCB #170
PCB #169
PCB #180
PCB #128
PCB #187
PCB #126
PCB #138
PCB #105
PCB #153
PCB #118
PCB #77
PCB #101
PCB #66
PCB #44
PCB #52
PCB #28
PCB #18
PCB #8


PBDE congeners in ecofish
PBDE concentrations, ppb (wet wt)
18.00
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
Trotter Pt.
Vernita Bridge
Chelan
Wind Mtn
Crescent Bar
Kennewick-Wade Is.
PBDE #99
PBDE #100
PBDE #47
1
3
5
7
9
11
13
15
17
19
21
23
25
27
29
31
33
35
37
39
41
site order (up to downstream)

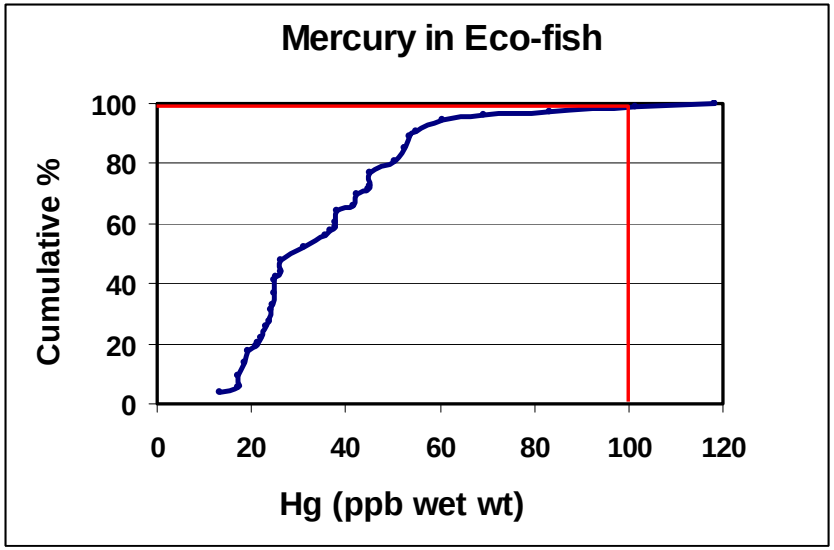
Example CDFs

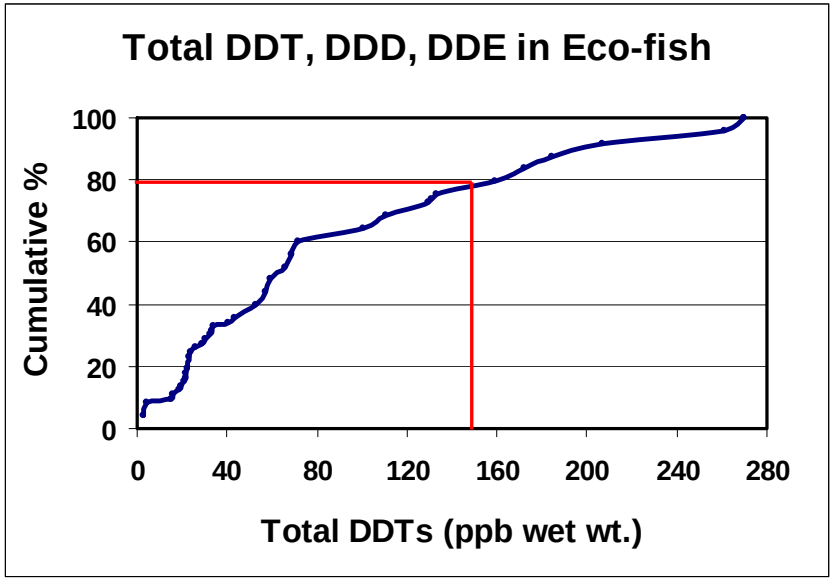
(Cumulative Distribution Functions)

- Mercury: 2% of the reach length had tissue concentrations above 100 ug/kg wet wt

- Total DDTs: 20% of the reach length had tissue concentrations above 150 ug/kg wet wt

- Approx 57% of the reach length exceeds the 54 ug/kg TSC for DDTs





Upcoming analyses:

- Relation of chemicals in fish to species trophic levels
- Comparison of results from ecofish to results from HH fillets
- Compare results to sporadic sampling in the reach conducted over the past 15 years
- Look at landscape and human disturbance metrics
- Look at water quality parameters such as mercury methylation co-factors
- Examine data from the other pesticides (Aldrin, Dieldrin, Lindane, etc)

Questions:

What to compare the concentrations to in terms of risk?
(lack of standards, can use Toxic Screening Criteria, effects values from literature, …)

What comparable datasets to illustrate spatial patterns ?
(Lower Col. EMAP, CRITFC, NAWQA, national studies, other)

What local knowledge might help explain spatial patterns?

Comments, suggestions?

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