May 1st, 10:30 AM - 12:00 PM

Monitoring for Adaptive Management: Status and Trends
Monitoring of Aquatic and Riparian Habitats in the Lake Washington/Cedar/Sammamish Watershed

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Monitoring for Adaptive Management

Status and Trends Monitoring of Aquatic and Riparian Habitats in the Lake Washington/Cedar/ Sammamish Watershed

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May 1, 2014
Lake Washington/Cedar/Sammamish Watershed

- 1.4 million inhabitants
- Most highly developed watershed in the state
• Two listed Chinook salmon populations, plus steelhead, bull trout, kokanee, other salmonids

• Protected headwaters (Cedar Watershed)

• Spawning and rearing areas generally outside urban growth boundary

• Salmon recovery governed by a collaborative “Salmon Recovery Council” of 27 jurisdictions plus business and environmental groups
Chinook Salmon (VSP)
(Fish in/fish out monitoring)

Watershed Conditions
- Stream Condition (habitat, biota)
- Streamflow
- Water Quality
- Land Cover
• 52 sites in WRIA 8
  • (Ecology/EMAP GRTS sample draw)

• 5y sampling window
  • (year 1: n = 29)

• +5 EPA “Sentinel” sites across Puget Sound
  • Chuckanut Creek
  • Glendale Creek
  • Griffin Creek
  • Dewatto River
  • Big Beef Creek
Biology: BIBI, FIBI, diversity indices

Habitat: normalized metrics vertical residual pool area, embeddedness, % fines, LWD count/volume, riparian cover, disturbance, etc. (ECY/EMAP protocols)

Hydrology: Flashiness, high pulse count, low pulse count, TQ Mean, R-B Index, etc (subset of sites)

Summer water temperature: 7DADM, days above critical thresholds, etc. (one year)

Land cover: % urban, % impervious, % forest, population/KM², elevation, forest fragmentation, etc.
Derived from LandSat (30m) land cover product: “300 feet” = 3 pixels and “1,000 feet” = 10 pixels
Database

Lake Washington/Cedar/Sammamish (WRIA 8) Watershed Wadeable Streams Status and Trends Monitoring Project

WRIA 8 - All Basins - All Creeks

May Creek gauge (pick one): 37a 37b Lyon Creek gauge (pick one):

Statistics for hydrologic data is from year 2009 to year 2013.

Maximum days allowed in missing data to report hydrologic data:

BIBI option:
- Traditional approach (10-50)
- New BIBI method (0-100), taxonomic resolution is coarse

Stream Benthos: Select one or more items or get statistics for year

Fish:

Habitat:

Hydrologic:

Land Use:
- Forest fragmentation index - Edge
- Forest fragmentation index - Large core

Selected: Maximum 7-day moving average of the daily maximum temperature July-August

Clear Reaches Reset Dropdowns Get Hybrid (Hydrological statistics and raw other)

Average only Average, Count and SDEV Get Statistics Get Statistics for all Metrics (no need to select metrics)

Species Get Taxonomy

SOME ASSEMBLY REQUIRED
2009: Tier 1 and Tier 2 areas only (n = 29)

2010-2013: All Tiers (n = 52)
% Urban
% Impervious
Population/km^2
% Patch (PPA)
Densiometer
% Human Disturb.
% Native Fish spp. (PNS)
% Sands+Fines
Wood count
Avg pool depth
**Vertical Residual Pool Area**
% Small core (PSC)
Sculpin count
Fish IBI
% Large Core (PLC)
% Perforated
% Forest
BIBI (100 scale)
Multivariate Approaches

- Principal Components Analysis
- Nonmetric Multidimensional Scaling
- Logistic Regression
Plot numbers = increasing order (population per km$^2$)

- % Impervious
- Population/km$^2$
- % Patch (PPA)
- Densimeter
- % Human Disturb.
- % Native Fish spp. (PNS)
- % Sands+Fines
- Wood count
- Vertical Residual Pool Area
- % Small core (PSC)
- Fish IBI
- % Large Core (PLC)
- % Perforated
- % Forest
- BIBI (100 scale)

Principal Components Analysis
Adaptive Management

(Salmon Recovery Council)

Plan, Decide

Implement

Monitor

Assess

Establish baseline

Re-assess

(27+ Local Jurisdictions)
Adaptive Management

10-Year Review (2015)

• Are we doing what we said we’d do?
• Are actions having the predicted effects?
• Interlocal Agreement renewal
• Recovery Plan update
• Recommendations to leadership
• Corrective actions
Each jurisdiction has its own local priorities and schedules concerning...

- Land use and critical areas planning
- Shoreline planning updates
- Capital improvement programs
- Local needs (urban, rural)
- Election cycles
- Special interests
- Etc...
Thank You

• U.S. Environmental Protection Agency
• WRIA 8 Salmon Recovery Council & Partners
• King County Dept. of Natural Resources and Parks
• Washington Department of Fish and Wildlife
• Washington Department of Ecology

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