

# Barker Creek Alternative Futures

How Could We Manage Land Use and Water Use in a More Fish-friendly Way?



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## Presentation Overview

- ◆ **Context**
  - Alternative Futures Process
- ◆ **Barker Alternative Futures**
  - Land Use → Stream Flow → Fish Habitat
  - Water Use → Stream Flow → Fish Habitat
  - Land Use → Wildlife Habitat
- ◆ **Results**
- ◆ **Conclusions**
- ◆ **Questions**

# Alternative Futures Planning

- ◆ **Decision Support Tool**
  - Data → Information → Knowledge → Wisdom
- ◆ **Scenario Building approach**
  - Business strategy used in 1970s by Royal Dutch/Shell
- ◆ **Systematically and creatively think about plausible futures**
- ◆ **Demonstrate plausible long-term, cumulative outcomes of today's decisions**
- ◆ **Help identify key drivers of change**

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# Assumption

- ◆ **Decision-makers want to make fish-friendly land use and water use decisions**

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## Why Haven't We?

- ♦ **Temporal mismatch**
  - Today's pain for tomorrow's gain
- ♦ **Spatial mismatch/cumulative impacts**
  - “*This* development makes no measurable impact!”
- ♦ **Institutional mismatch**
  - Silo-ing → “Not my job”
  - Land use managers aren't water resources managers; neither are fish/wildlife managers
  - Resource agencies lack land use authority/expertise
  - Land use/water resource agencies have limited and prescribed resource responsibilities & expertise
  - Economics: monetized costs, non-monetized benefits
  - Technical info; non-technical public/decision-makers

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## Barker Alternative Futures Problem Statement

- ♦ Local land use (water use) decision makers lack the technical basis and public support to implement a land use (water resources) plan for the Barker Creek watershed which protects and preserves its beneficial uses and promotes properly functioning watershed conditions.

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## Solution: Alternative Futures

- ◆ **Helps bridge temporal & spatial mismatches**
  - Instant land use build out (water use changes) under various scenarios
  - Insights on impacts: stream flow, salmon habitat, wildlife habitat
- ◆ **Helps bridge institutional mismatches**
  - Dialog among resource agencies, planning authority
  - Dialog among public and scientists
  - Community visioning: proactively defines desired future, rather than reactively relying on fragmented regulatory approaches to protect watersheds
- ◆ **Provides the needed technical basis and public support for a “Preferred” alternative**
  - Informed dialog among scientists, public, decision makers

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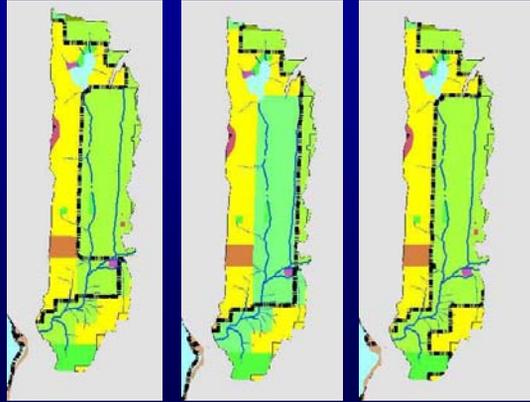
## Alternative Futures Planning

- ◆ **Technical tools**
  - Land use scenarios: GIS (Kitsap County DCD)
  - Stream flow modeling: HSPF (Corps of Engineers)
  - Salmon habitat modeling: PHABSIM (WDFW)
  - Wildlife habitat modeling: GIS model (WDFW)
- ◆ **Advisory Groups**
  - Northern Dyes Inlet Watershed Academy (public-technical interface). Barker watershed + others
  - Silverdale Citizen’s Advisory Committee (watershed land use advice). Included a watersheds subcommittee.
  - Planning Commission (County-wide land use advice)
  - Technical Work Group (interagency technical interface)
- ◆ **“Deciders”**: Board of Commissioner

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# Land Use Modeling: ArcGIS

- ◆ “Virtual build out”
  - Assigned future imperviousness, forest cover based on zoning
- ◆ Modest differences among scenarios
- ◆ “Expansive” & “Conservative” created by TWG & subcommittee
- ◆ Results used as input for stream flow model



Current/ Plan Trend      Expansive      Conservative

# Stream Flow Modeling: HSPF

- ◆ Current conditions
  - Calibrate, validate model
- ◆ Modeled scenarios
  - Current
  - Historic
  - Plan Trend
  - Conservative
  - Expansive
- ◆ Results used as input for salmon habitat model
- ◆ Findings: More development = More peakiness

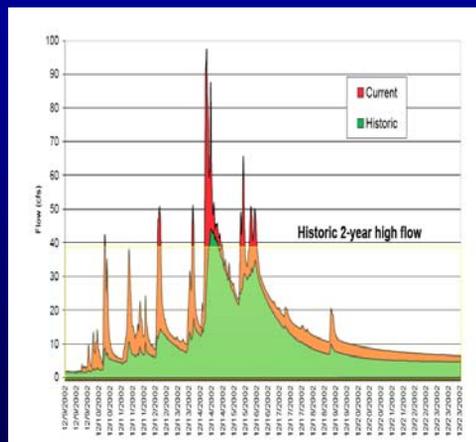
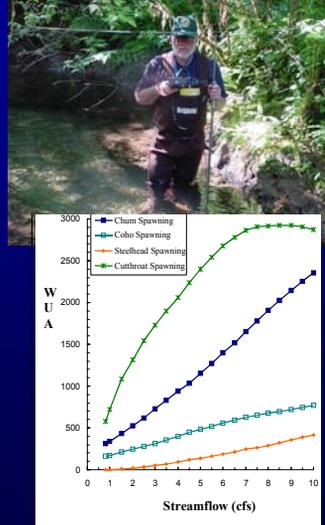


Figure 19: Barker Creek Hydrograph: Current vs Historic Flows for a two-week Rainy Period (December 9-23, 2002)

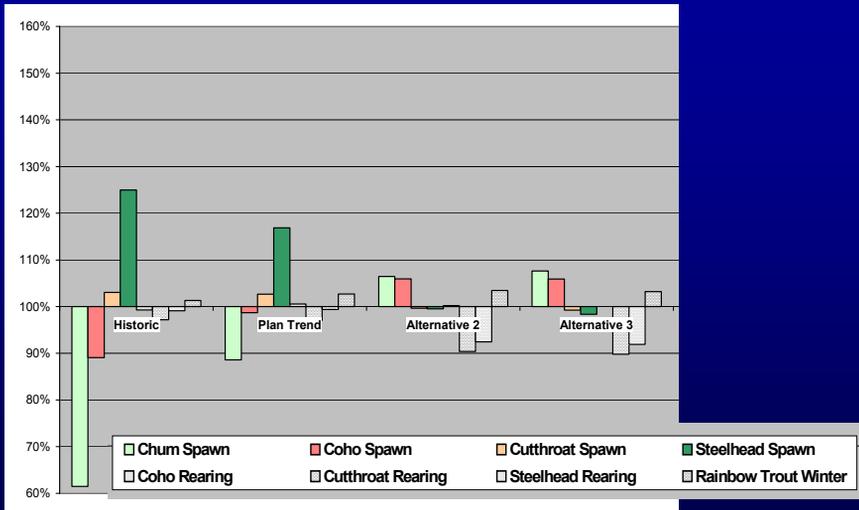
# Salmon Habitat Modeling: PHABSIM

- ◆ Relationship between stream flow and salmon habitat quantity
  - Based on current channel conditions
  - Considers depth, velocity, substrate
- ◆ Modeled scenarios
  - Current
  - Plan Trend
  - Conservative
  - Expansive
  - Historic
  - Mitigation



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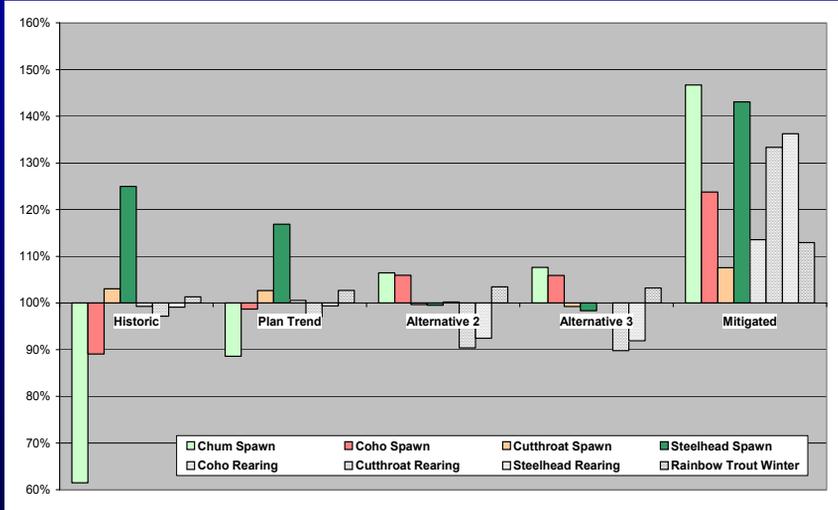
## PHABSIM Results



Quantity of Habitat Available by Scenario and Life State, Lower Site, Change from Current Conditions.

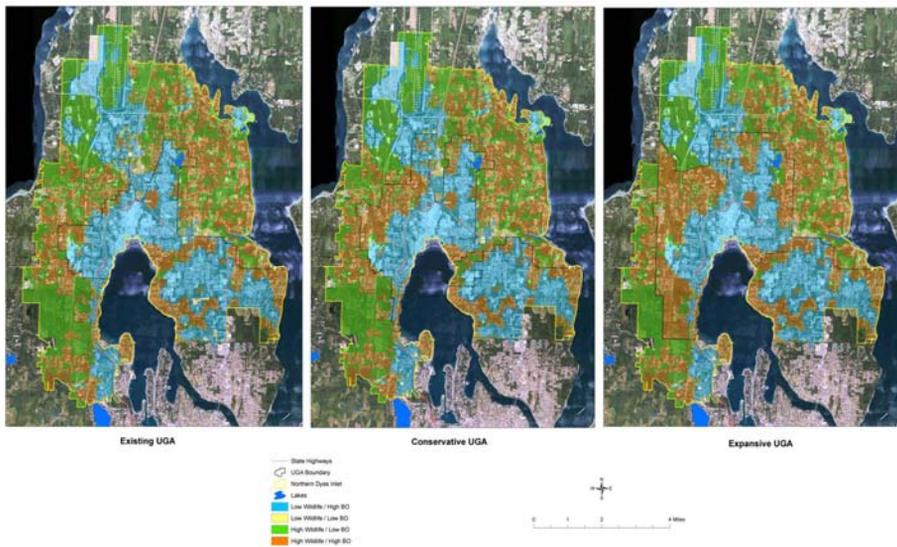
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# PHABSIM Results

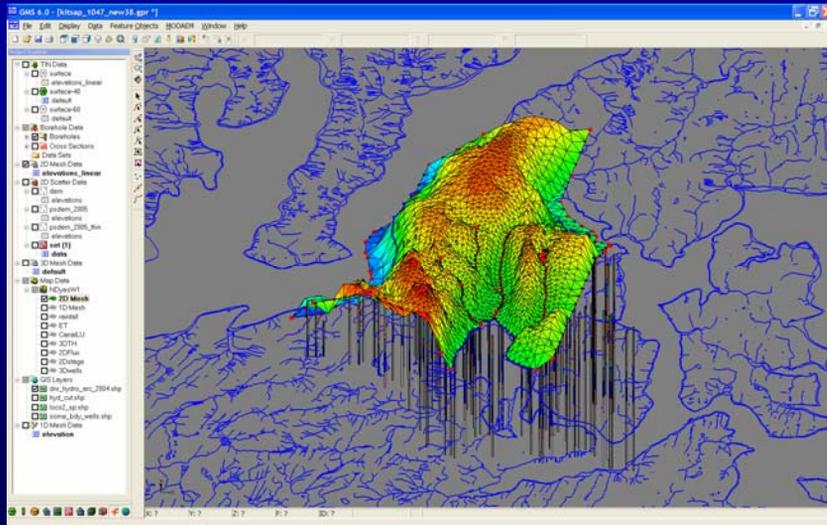


Quantity of Habitat Available by Scenario and Life State, Lower Site, Change from Current Conditions. <sup>13</sup>

# Wildlife Modeling



# Groundwater Characterization



Hydro-geological characterization: TIN of DEM with boreholes

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## Water Management Scenarios

- 1. Water Reuse streamflow support**
  - Add 2 cfs when flow < 20 cfs
- 2. Island Lake streamflow support**
  - Add water to stream based on flow & lake level
- 3. Impacts of Silverdale Water District wellfield**
  - Measurable impact if all wells turned off? If so, refine scenario.
- 4. Impacts of enhanced stormwater infiltration**
  - Measurable impact if stormwater ponds improved? If so, refine scenario.
- 5. Impacts of removing on-site sewage systems**
  - Measurable impact if all OSSS removed? If so, refine scenario.

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# Results

Were decision-makers able to make fish-friendly land use and water use decisions?

# Local GMA Land Use Planning Process



## Land Use Plan Adoption

- ◆ **Barker Creek corridor: only place where an existing UGA pulled back**
- ◆ **Preferred Alternative coincided with desire to separate Silverdale and Bremerton**



## Water Resources Management

- ◆ **Results TBD**
- ◆ **Could influence decisions regarding**
  - Water reclamation
  - Island Lake level management
  - Silverdale Water District wellfield management
  - Stormwater management
  - Mitigating water quantity impacts of sewerage

## Keys to Success

- ◆ Pick a place where a decision is about to be made
- ◆ Involve/educate key stakeholders
- ◆ Work within the existing framework
  - GMA planning drove the timing
  - This effort put water considerations on the table early
- ◆ GIS expertise needed to create Alternatives
- ◆ Keep it as simple as possible
  - Early stream modeling attempts were way too complex
  - Simple = Able to Communicate with Public
- ◆ Be opportunistic, find partners
- ◆ Grant funds provided focus, wherewithal

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## Critique

- ◆ Models didn't meet everyone's expectations
  - HSPF model doesn't show impacts of stormwater ponds
  - PHABSIM's Low "Historic" score confusing
- ◆ Modeling rigor
  - Modeled habitat quantity based on modeled stream flows—how real?
  - Caveats get lost
- ◆ Costly
  - GIS = \$40K; HSPF = \$110K; PHABSIM = \$45K
  - Grant-dependent
- ◆ Risk
  - No guarantee that rigorous studies carried out in good faith will provide definitive results

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# Acknowledgements

- ♦ **GIS Land Use Analysis, Kitsap County DCD**
  - David Nash
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  - Erik Neatherlin, John Jacobson
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**Questions?**