Monitoring Critical Areas

Are our regulations effective?

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King County

What is Monitoring?

"… systematically checking or scrutinizing something for purposes of collecting data… typically to detect change in physical, chemical or biological parameters "

Roni (2005)

Types of Monitoring

- Baseline
  - Characterize existing conditions for planning or future comparisons
- Status
  - Characterize condition across a given area
- Trend
  - Measure year-to-year changes over time

(adapted from Roni 2005)

Types of Monitoring

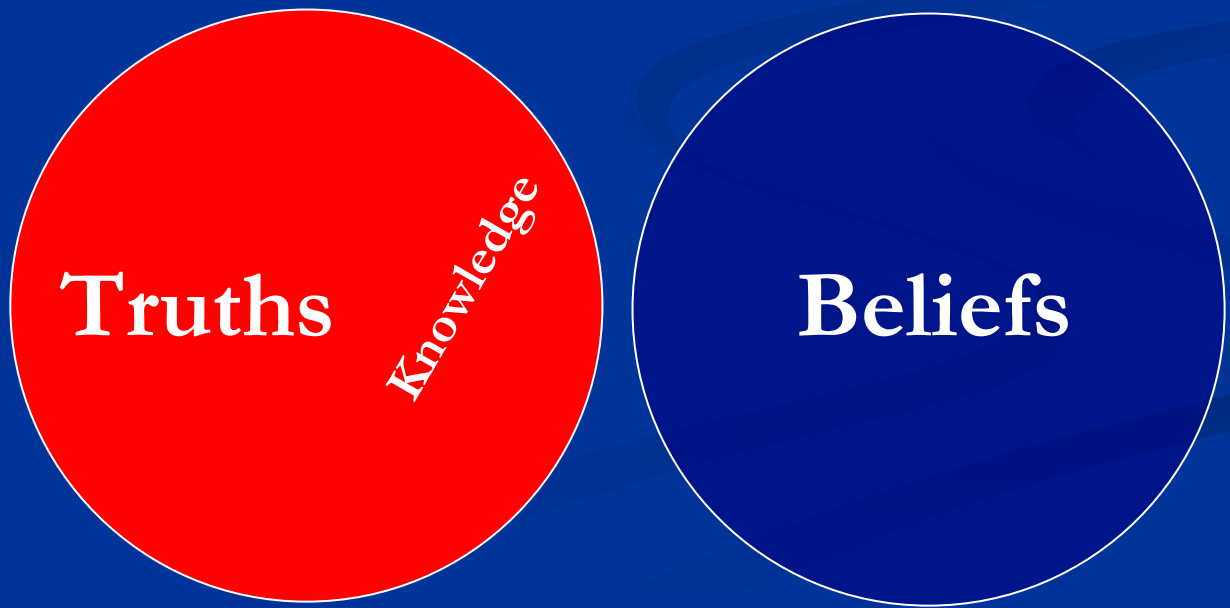
- Implementation/Compliance
  - Assess whether done as planned or required
- Effectiveness
  - Determine if actions had desired effects & outcomes
- Validation
  - Evaluate accuracy of hypotheses/assumptions

(adapted from Roni 2005)

Why monitor?

To reduce uncertainty

- We have limited knowledge of the existing state and the outcomes of our actions.
- Monitoring tells us which of our beliefs are truths

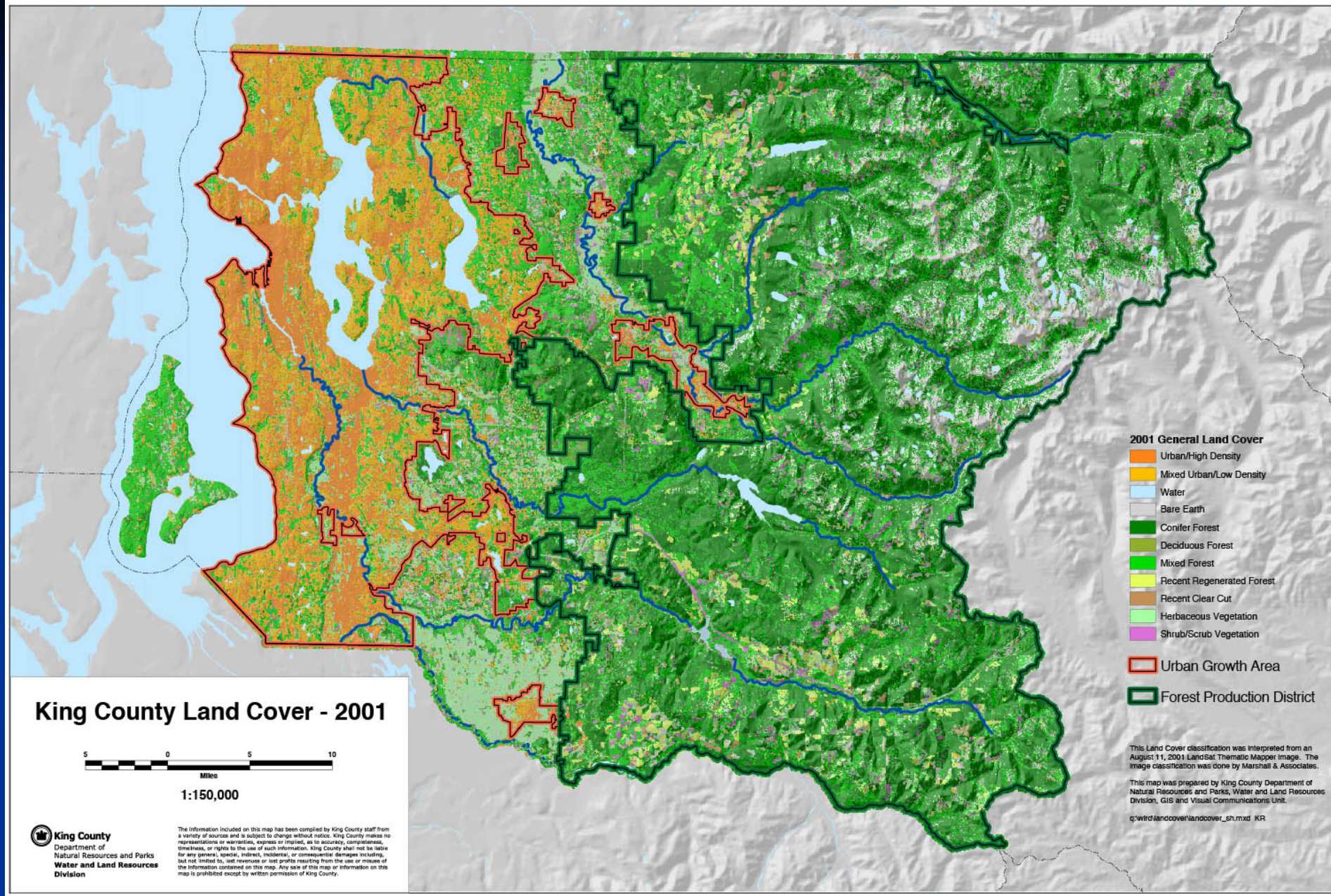


Monitoring helps us manage risk

- Risk is a state of uncertainty where some outcomes result in 'costs' of varying magnitudes

Presentation Objectives

1. Explain the Critical Areas Ordinance
2. Explain the need for a monitoring study
3. Explain the study design
4. Set expectations and describe outputs


2001 General Land Cover
Urban/High Density
Mixed Urban/Low Density
Water
Bare Earth
Conifer Forest
Deciduous Forest
Mixed Forest
Recent Regenerated Forest
Recent Clear Cut
Herbaceous Vegetation
Shrub/Scrub Vegetation
Urban Growth Area
Forest Production District
This Land Cover classification was interpreted from an August 11, 2001 LandSat Thematic Mapper image. The image classification was done by Marshall & Associates.
This map was prepared by King County Department of Natural Resources and Parks, Water and Land Resources Division, GIS and Visual Communications Unit.
q:\wlrd\landcover\landcover_sh.mxd KR
King County Land Cover - 2001
5 0 5 10
Miles
1:150,000
King County
Department of
Natural Resources and Parks
Water and Land Resources
Division
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4. 25. 2001

Pacific Salmon of King County

WA GMA Requires

- protect functions and values of critical areas
- give special consideration to preserve or enhance anadromous fisheries
- Substantive use of best available science
- When information is lacking or inadequate… be precautionary *in favor of the resource*
- deviation from BAS allowed to balance other GMA goals BUT must give rationale

Critical Areas

- Aquatic Areas (streams, rivers, lakes, ponds estuaries, marine shorelines)
- Wetlands
- Wildlife Habitat Conservation Areas (10 bird species)
- Hazard Areas (Flood, Erosion, Seismic, Volcanic, Coal Mine)
- Aquifer Recharge Areas

Balancing Act

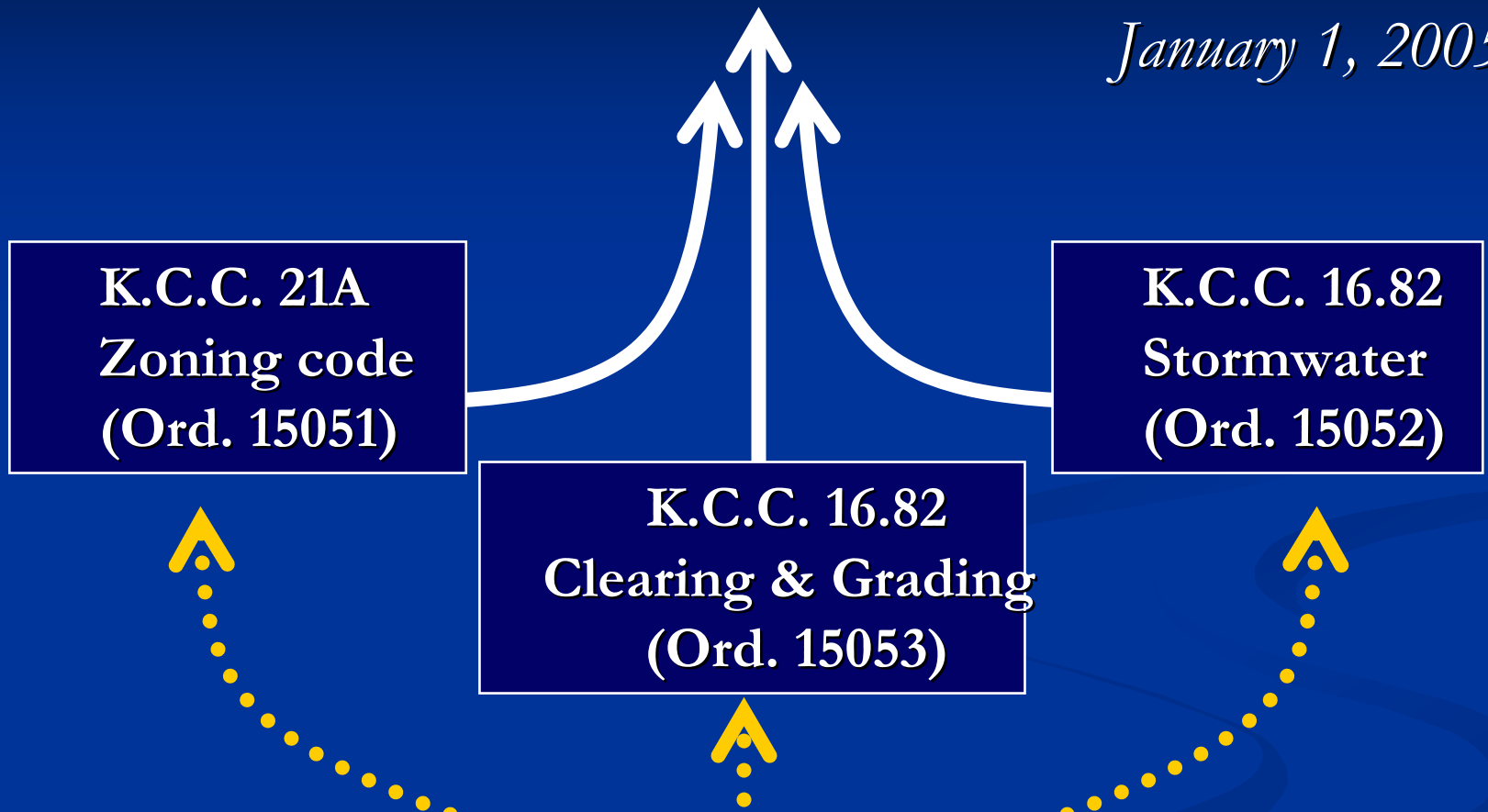
- Property Rights (everywhere)
- Urban
  - Urban density
  - Affordable housing
  - Buildable land supply
- Rural
  - Agriculture
  - Equity (Urban-Rural)
  - Rural character and rural development

Tools for Protection

- Regulations
- Restoration and flood control projects
- Habitat and open space acquisition
- Educational programs, basin stewardship, and technical assistance
- County practices (tax incentives, technical assistance, grants)
- Agricultural and forestry programs

Critical Areas Ordinances (CAO)

January 1, 2005



Best Available Science:

- Riparian and landscape measures are needed
- Effectiveness of previous regulations poorly known

Elements of CAO

What's new?

- Definitions
- Critical areas
- Alteration table
- Alteration exception replaces PAUE and variance
- Wetland and aquatic area classification systems and buffer widths
- Critical area designation required
  - prior to septic system and well approval
- Alternative methods for approval
  - farm and rural stewardship plans

Major Changes?

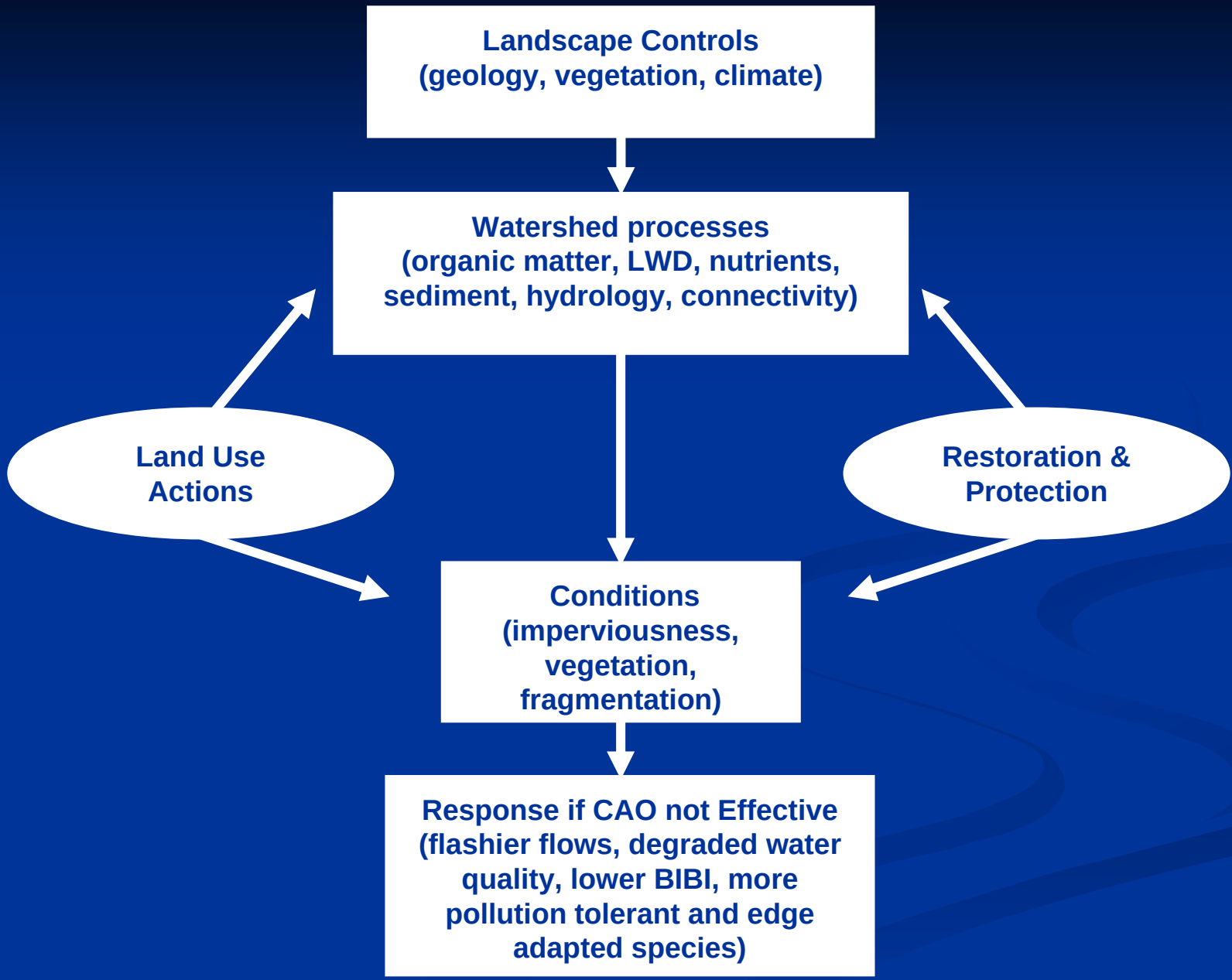
- Larger Buffers
- Clearing Limits and Seasonal Restrictions
- Enhanced Stormwater

Major Changes?

- More Mitigation
- Prescriptions and Stewardship
- For CARAs,
  - Limits on certain uses,
  - Improved designs
    - Buried tanks, septic
  - Improved testing
    - Saltwater intrusion

Why is a study needed?

- Determine if new land use regulations are working to protect critical areas
- If not working, why not?
- Better understand role of scale, location and timing of activity and behavior of implementation
- Inform 2012 GMA-required review
- Provide a framework that can be used for long-term monitoring and that can be applied elsewhere


Landscape Controls
(geology, vegetation, climate)
Watershed processes
(organic matter, LWD, nutrients,
sediment, hydrology, connectivity)
Land Use
Actions
Restoration &
Protection
Conditions
(imperviousness,
vegetation,
fragmentation)
Response if CAO not Effective
(flashier flows, degraded water
quality, lower BIBI, more
pollution tolerant and edge
adapted species)

Key Questions:

What people may want to know in 2012 and beyond

Q1: Did critical areas change?

If so, was change related to CAO implementation?

Q2: To what extent was change due to poor implementation?

How well did people follow the regulations?

Q3: How did the environment respond?

What was the significance of those changes?

Q4: If responses were significant, how might the CAO be modified to reduce future impact?

STUDY: Regulatory effectiveness monitoring for developing rural areas

Purpose

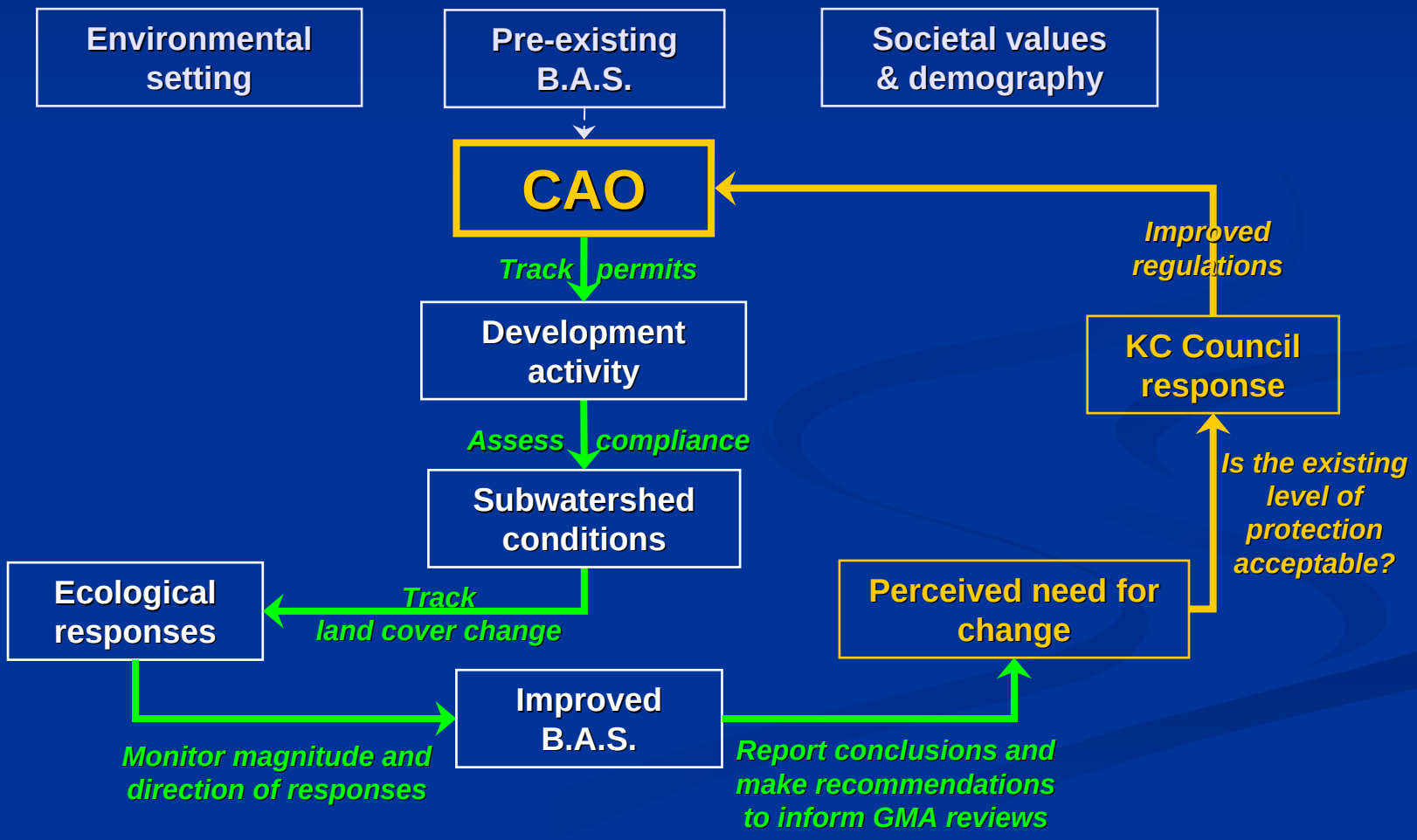
To provide information on implementation and effectiveness for 2012 review… and beyond

Goals

1) To track changes in critical areas

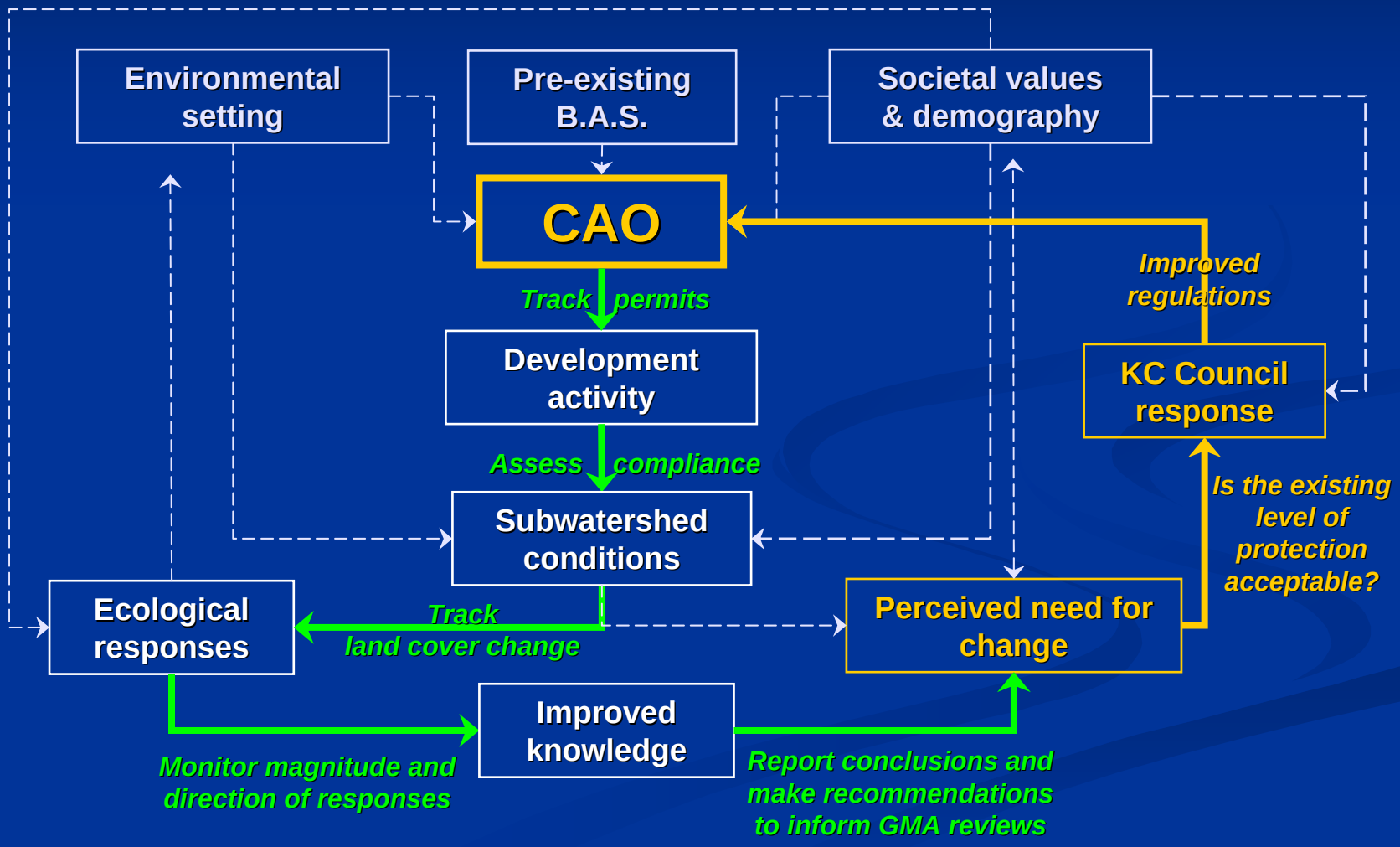
2) To determine whether and extent to which changes are related to CAO permit-driven actions

Objectives



Modified from Grimm et al. 2000

Objectives



Modified from Grimm et al. 2000

Hypothesis

If CAO works, then the *direction* and *magnitude* of change in response variables should:

- Be similar as for areas with no additional future development,
- Not be commensurate with the potential cumulative effect of actions

Study Design

- Natural Experiment
  - "Treatment not randomly applied"
  - Watershed-scale
  - Low order streams
  - 6 developing watersheds
  - 3 reference watersheds

Drivers

- Permits
- Compliance
- Land cover change

Rating Potential Effect

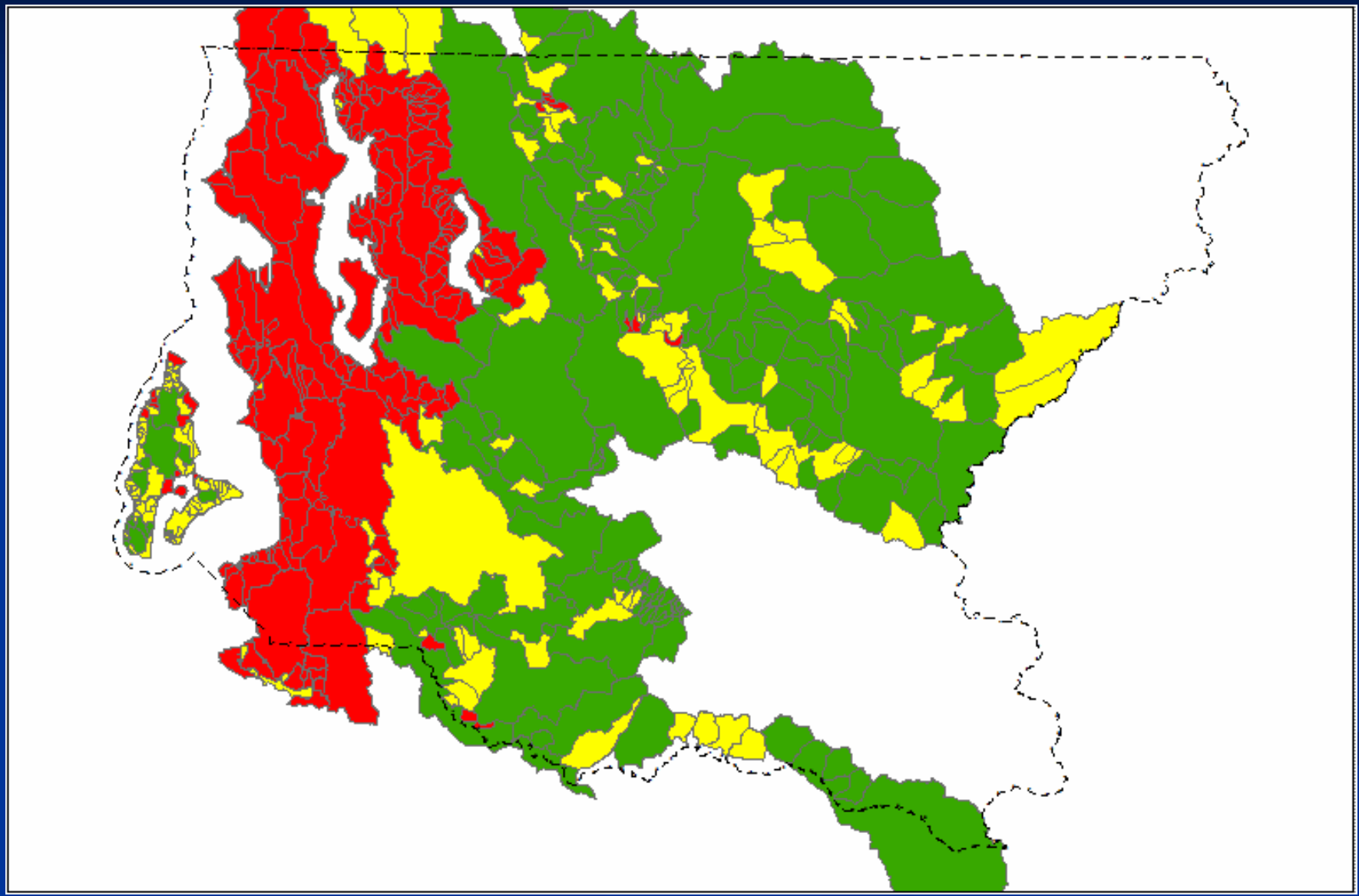
- Potential effect based on:
  - Type/intensity of action
  - Area disturbed by action
  - Sensitivity of Action Site
  - Sensitivity of Critical Area
  - Proximity to Critical Area

- Mostly can be automated except "area disturbed by action", which will require manual data entry

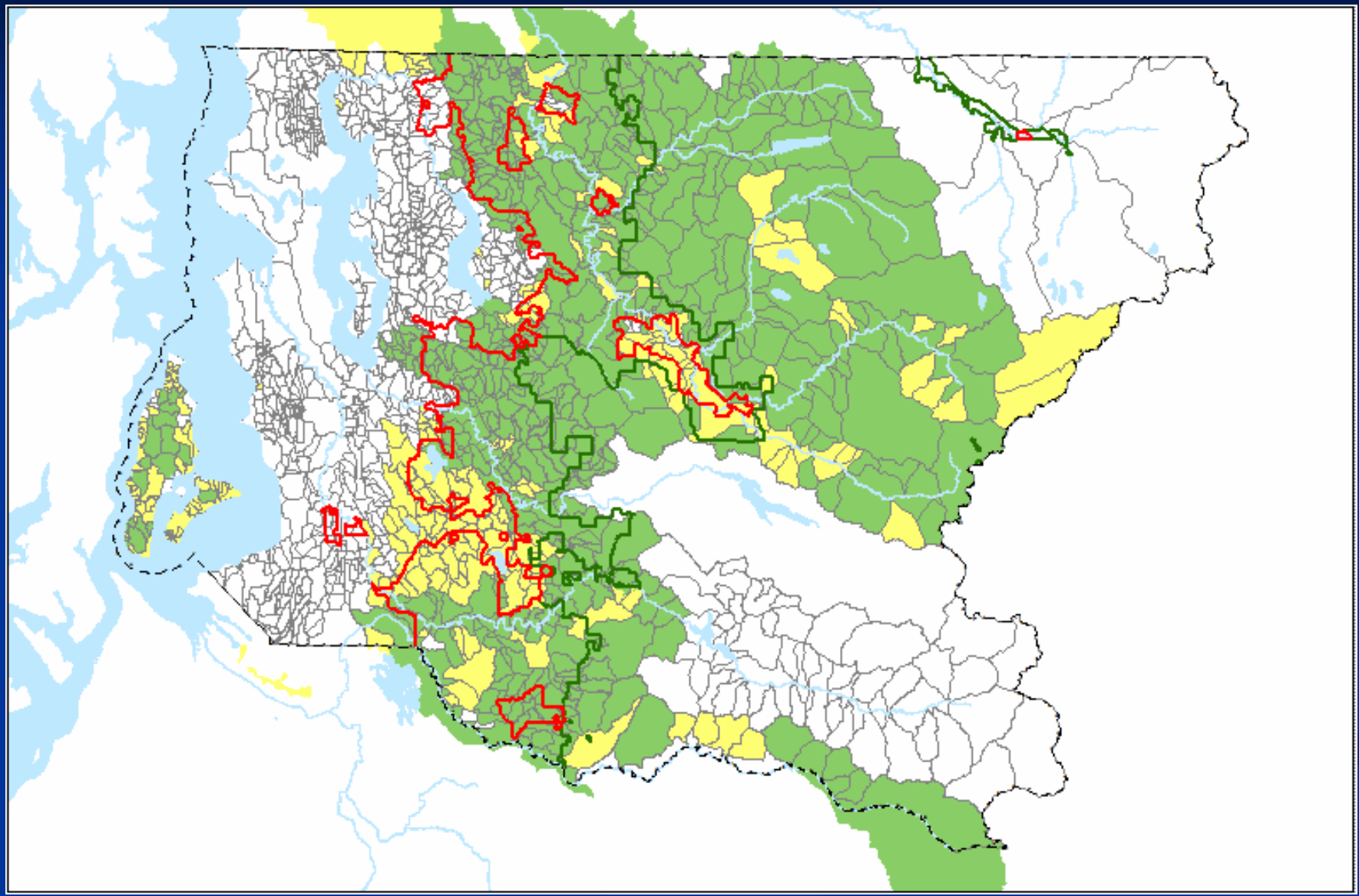
Response Indicators

- Flow
- B-IBI
- Water Quality
- Stream Complexity

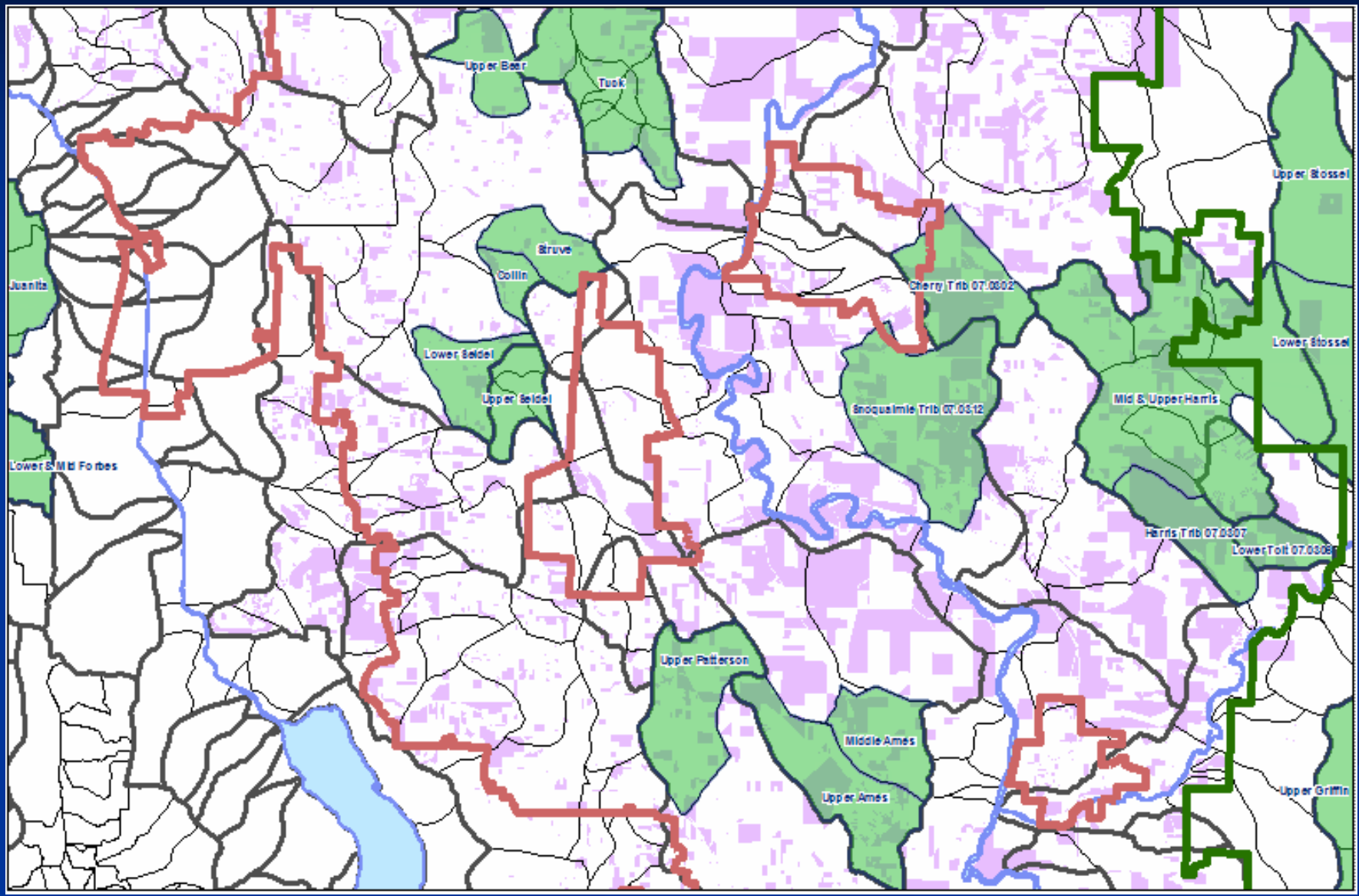
Step 1: Use CAO catchments and catchment ratings



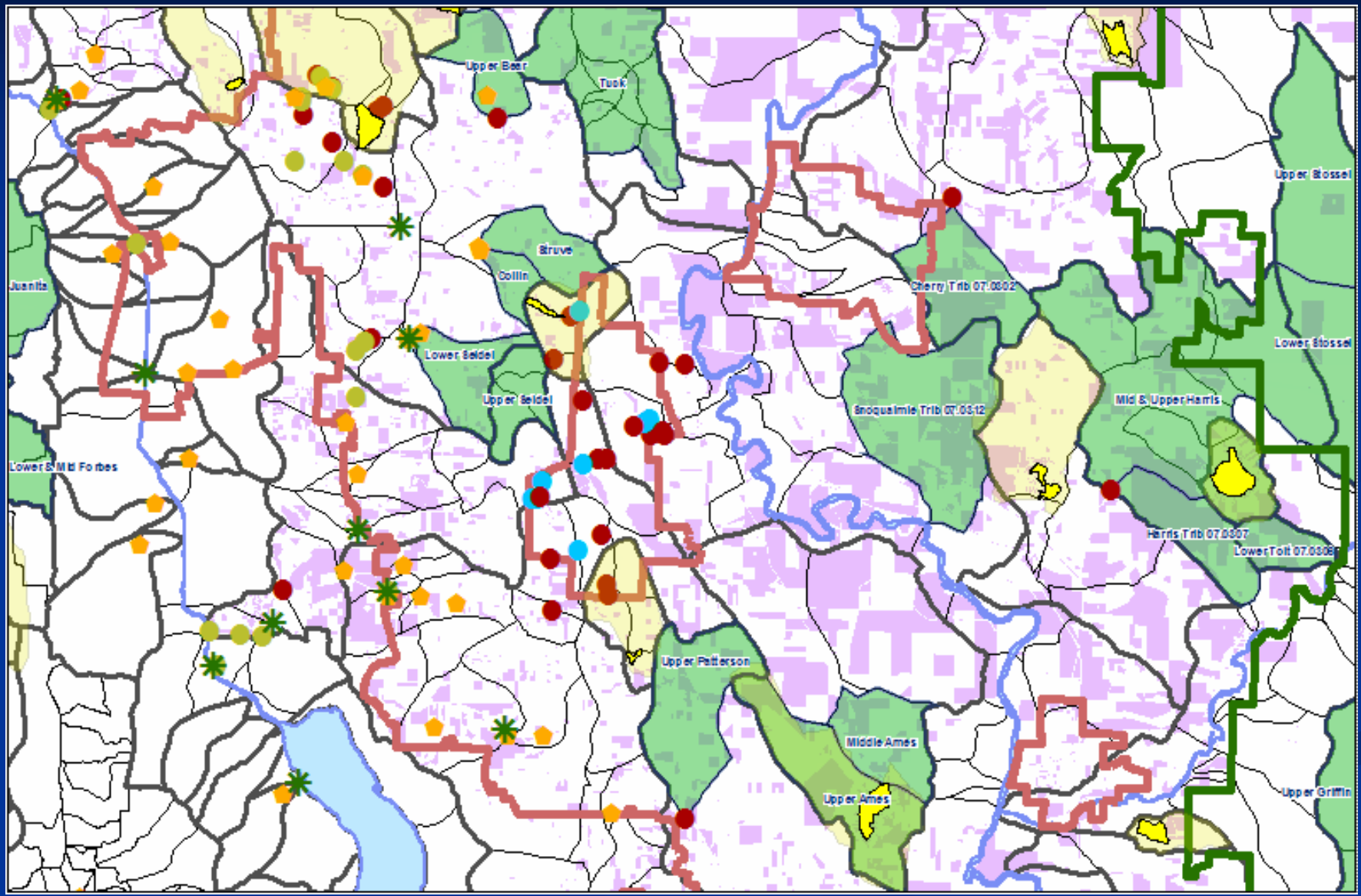
Step 2: Assess development potential in Medium and High rated catchments

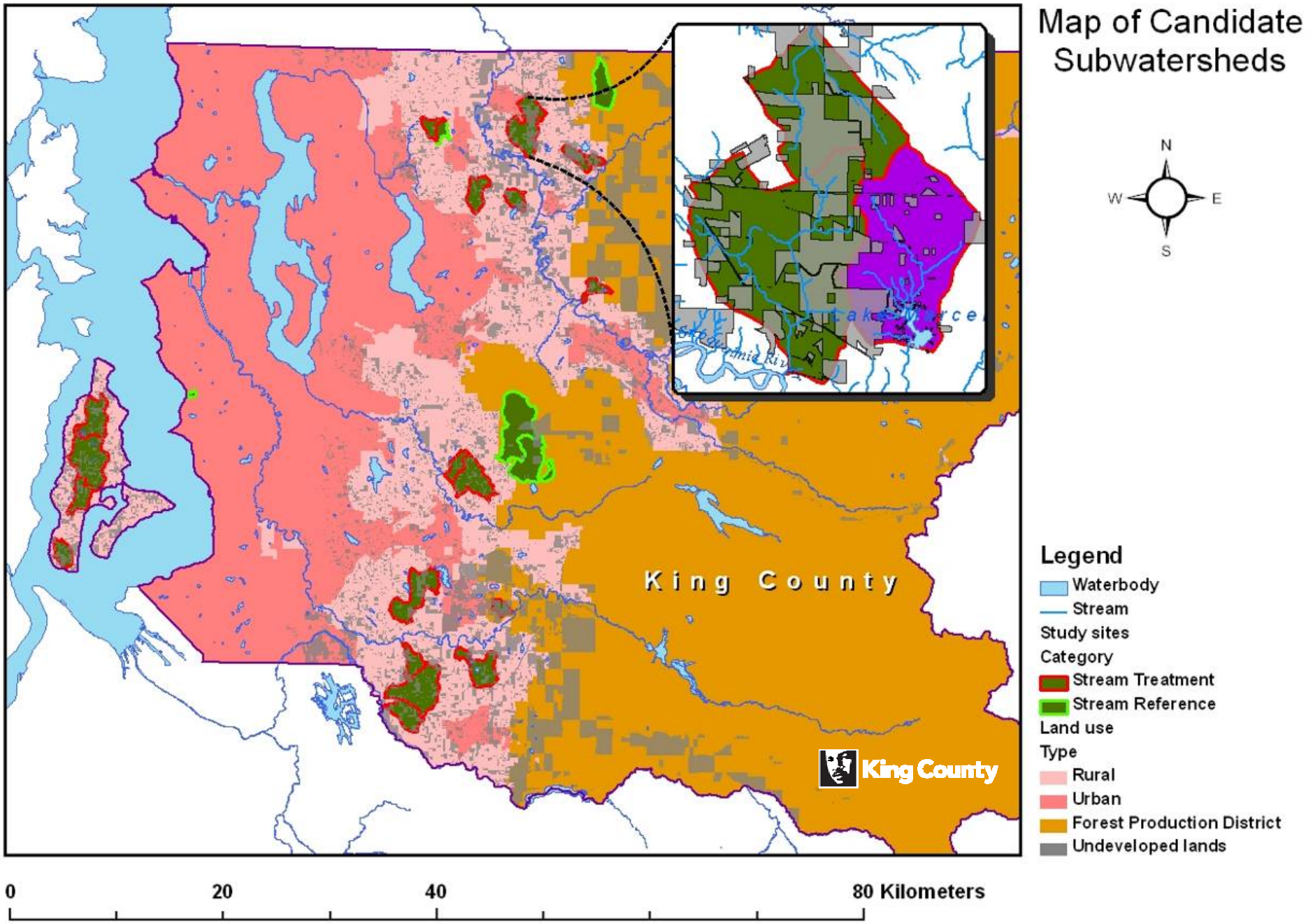


Step 4: ID catchments with moderate to high development potential, no or very low levels of other jurisdiction, and potential for paired combinations.



Step 5: Compare overlap of potential catchments w/ existing flow, WQ and BIBI gage sites




Map of Candidate Subwatersheds
N
W
E
S
King County
King County
Legend
Waterbody
Stream
Study sites
Category
Stream Treatment
Stream Reference
Land use
Type
Rural
Urban
Forest Production District
Undeveloped lands
0
20
40
80 Kilometers

Outputs

- Information regarding implementation
- Estimates of ecological response
- Recommendations for change as needed
  - 2012 GMA Review
  - Long-term

Outcomes

- Natural-experiment to assess a specific suite of land use regulations over long term
- Locally-derived empirical measures of effectiveness at multiple scales
- A model framework for assessing regulatory effectiveness elsewhere
- Inputs for KingStat performance measures
- Partnerships and training opportunities
  - UW, USGS, VCC

Applications

- King County
- Other local governments
- Salmon recovery
- Puget Sound Partnership

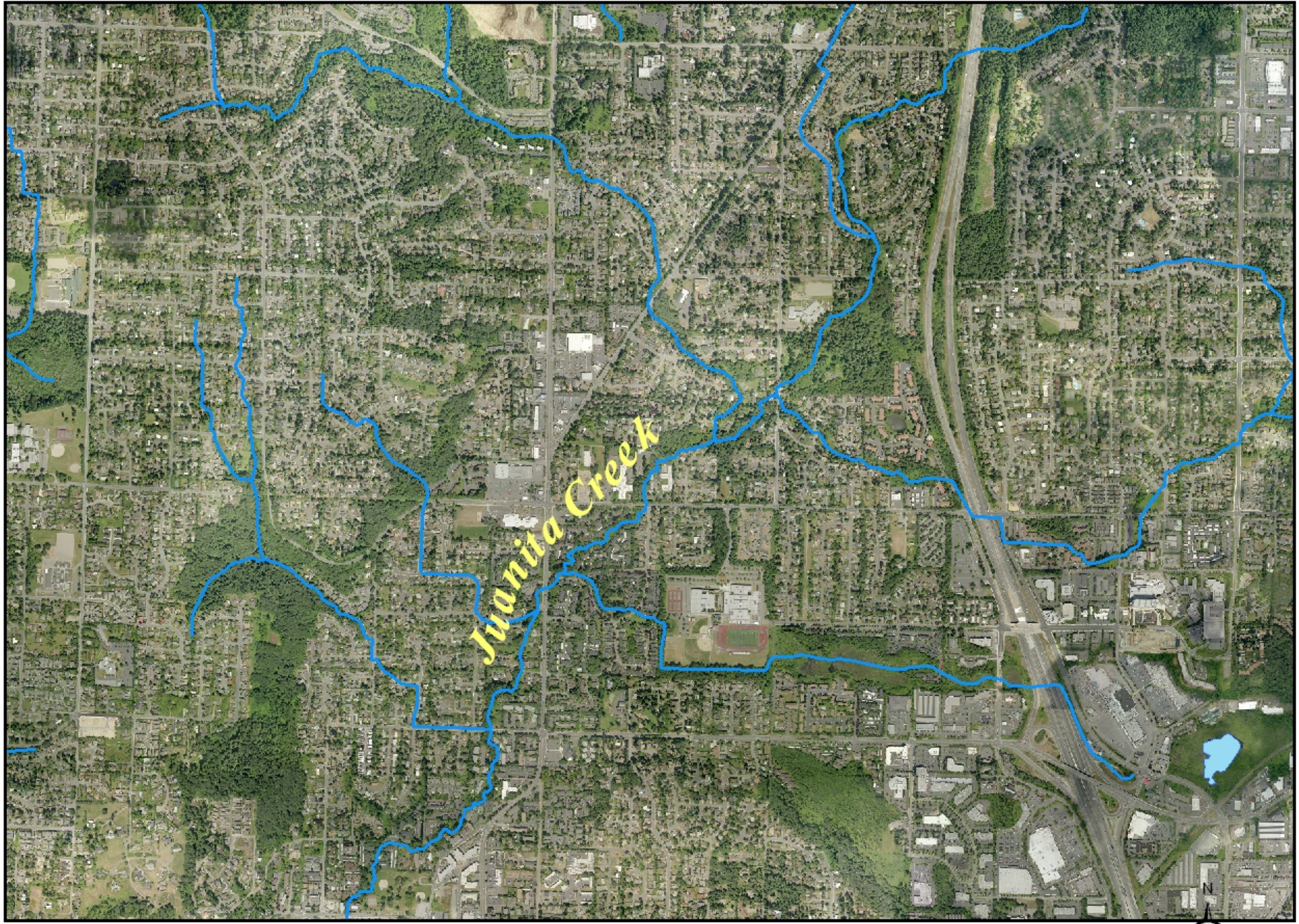
Next steps

- Finalize work plan
- Construct database
- Field work (4 yr) begins August 2008
- Additional partnerships and collaborations

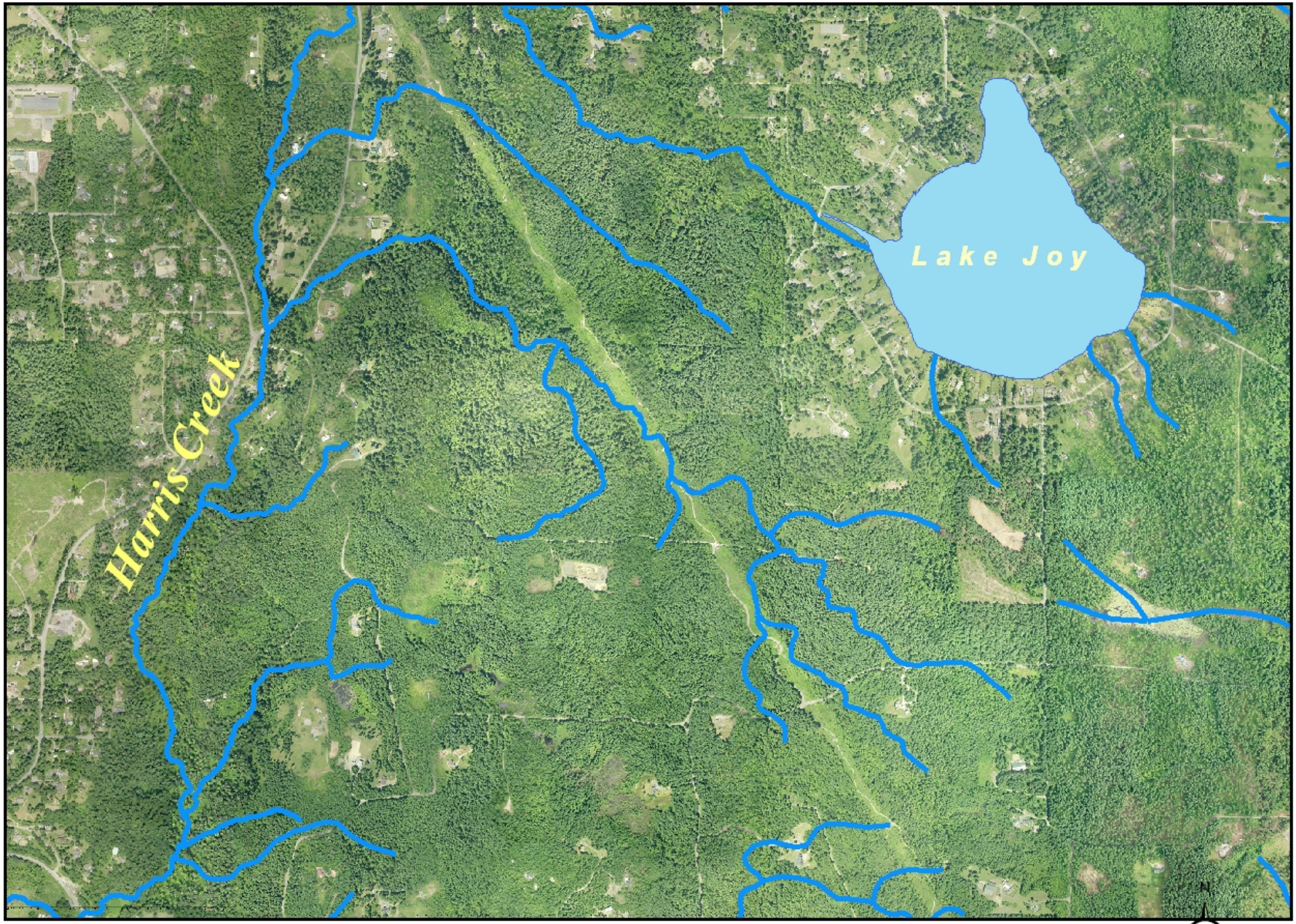
Acknowledgements

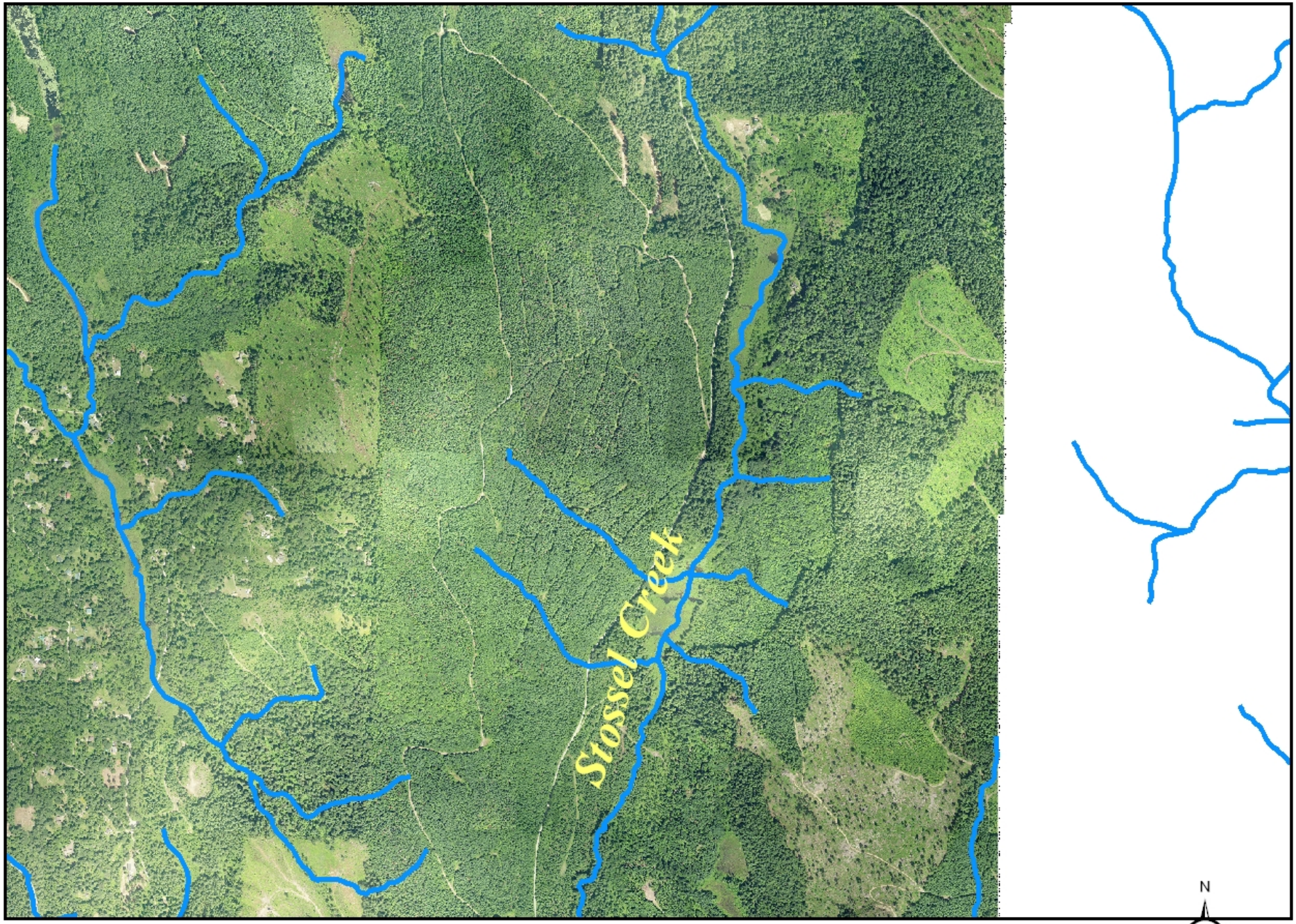
- U.S. Environmental Protection Agency
  - Region 10
- U.W. Urban Ecology Lab
- U.S. Geological Survey
- Veteran's Conservation Corps
- King County

The End

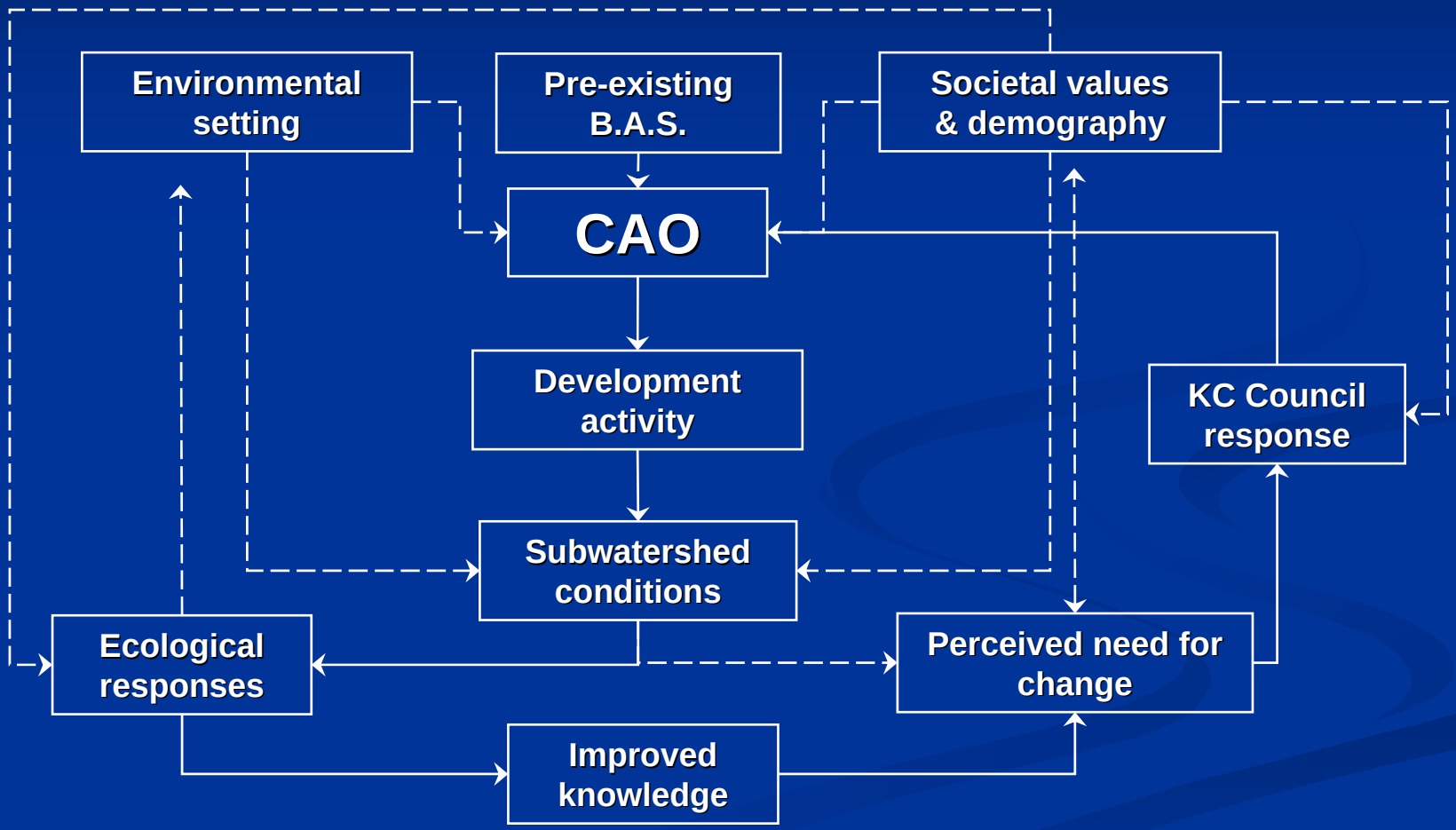

Juanita Creek
0
0.5
1
2 Kilometers
N
W
E
S


King County


Lake Joy
Harris Creek
0
0.5
1
2 Kilometers
N
W
E
S


Stossel Creek
0
0.5
1
2 Kilometers
N
W
E
S

Objectives



King County

Modified from Grimm et al. 2000

Washington Growth Management Act	King County Critical Areas Ordinance
Wetlands	Wetlands
Areas with a critical recharging effect on aquifers used for potable water	Critical Aquifer Recharge Area (CARA)
Fish and wildlife habitat conservation areas	Aquatic Areas Wildlife Habitat Conservation Areas and Wildlife Habitat Networks
Frequently flooded areas	Flood hazard areas Channel migration zones (CMZ)
Geologic hazards	Coal mines Erosion hazard areas Landslide areas Steep slopes Seismic hazard areas Volcanic hazard areas