Welcome

YOU ARE IN THE RIGHT SPOT. WE WILL START AT 9:00 AM.

1

Proposed Indicators for Evaluating The Effectiveness of CAOs
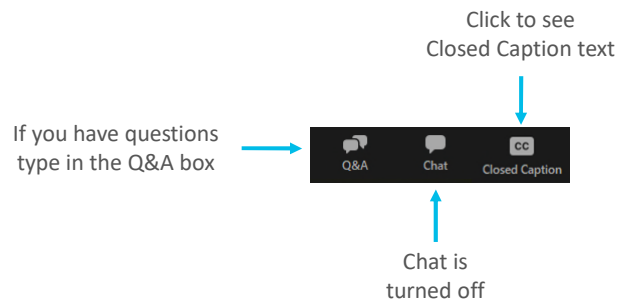
MARCH 17, 2021

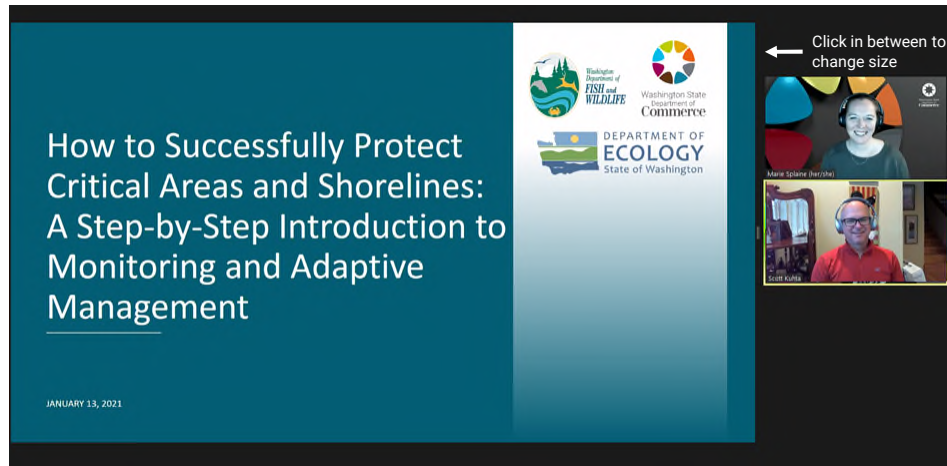# 2021 Critical Areas and Shoreline Monitoring & Adaptive Management Online Workshops

Welcome to

Proposed Indicators for Evaluating The Effectiveness of CAOs

3

2021 Critical Areas and Shoreline Monitoring & Adaptive Management Online Workshops

Click to see
Closed Caption text

If you have questions
type in the Q&A box

Chat is
turned off

4

2021 Critical Areas and Shoreline Monitoring & Adaptive Management Online Workshops

Click in between to change size

5

Visit Project Website for More Information

https://www.ezview.wa.gov/site/alias__1992/37576/overview.aspx

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2021 Critical Areas and Shoreline Monitoring & Adaptive Management Online Workshops

This project has been funded wholly or in part by the United States Environmental Protection Agency under assistance agreement PC-01J2230116-05251 through the Washington Department of Fish and Wildlife.

The contents of this document do not necessarily reflect the views and policies of the Environmental Protection Agency or the Washington Department of Fish and Wildlife, nor does mention of trade names or commercial products constitute endorsement or recommendation for use.

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Workshop Wednesday Series Lineup
Register using Zoom.

January 13 - 9:00 a.m. - 11:00 a.m.
How to Successfully Protect Critical Areas and Shorelines: A Step-by-Step Introduction to Monitoring and Adaptive Management

January 20 - 9:00 a.m. - 11:00 a.m.
Setting the Stage: Successful adaptive management and critical areas monitoring program basics

January 27 - 9:00 a.m. - 11:00 a.m.
Wetlands

February 3 - 9:00 a.m. - 11:00 a.m.
Geologically Hazardous Areas

February 10 - 9:00 a.m. - 11:00 a.m.
Fish and Wildlife Habitat Conservation Areas

February 17 - 9:00 a.m. - 11:00 a.m.
Frequently Flooded Areas

February 24 - 9:00 a.m. - 11:00 a.m.
Critical Aquifer Recharge Areas (CARAs)

March 3 - 9:00 a.m. - 11:00 a.m.
Shorelines

March 10 - 9:00 a.m. - 11:00 a.m.
Permit Implementation Monitoring Tools

March 17 - 9:00 a.m. - 11:00 a.m.
CAO Performance Indicators

March 24 - 9:00 a.m. - 11:00 a.m.
Adaptive Management Interactive Workshop

Note: Workshop names may change but topic will stay the same.

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American Planning Association Education Credit

Land Acknowledgment

Discover which tribal lands you reside on text your zip code to (855) 917-5263.

Poll

| What size jurisdiction do you work with? | What is your role? | How long have you worked on critical areas? |

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Meet Your Presenters

Keith Folkerts is currently leading WDFW's efforts to convey agency information about Priority Habitats and Species (PHS) to local governments in support of their regulatory efforts under the Growth Management Act and Shoreline Management Act. During his 7 years at WDFW, he has worked on PHS riparian management recommendations and High Resolution Change Detection, served as a member of the Voluntary Stewardship Program Technical Panel, and has been the project manager for several grants with the Puget Sound Partnership. Prior to working for WDFW, Keith worked for Kitsap County in the Department of Community Development, Public Works Department, and Commissioners Office in positions that included Watershed Planner, Stream Team Coordinator, and Natural Resources Coordinator.

Prior to working for Kitsap County, Keith served as Surface Warfare Officer, including deployments to the Arabian Gulf during the Gulf War. Keith has BA in political science from the US Naval Academy in Annapolis, Maryland. Outside of work, Keith enjoys backpacking, kayaking, gardening, and trying to keep up with his three daughters and marathon-running wife.

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Welcome to Webinar #10 of 11!
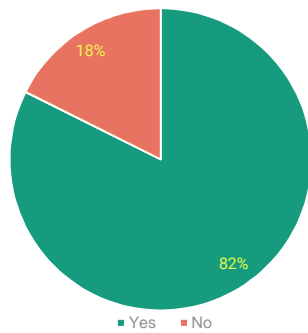
Proposed indicators for evaluating the effectiveness of CAOs

Use of PHS Maps and Getting Advice from Habitat Biologists is Common

Does your jurisdiction use PHS data to flag possible presence of a FWHCA?
(51 responses)

18%
82%

■ Yes ■ No

Does your jurisdiction get advice from WDFW Habitat Biologists?
(52 responses)

13%
87%

■ Yes ■ No

Department of Fish and Wildlife
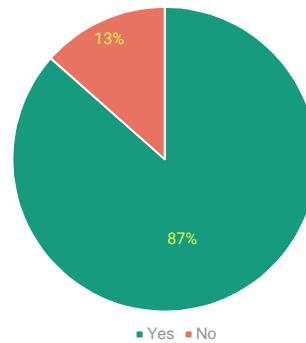
Tracking Change and Using it to Evaluate CAO Effectiveness is Not Common (Yet!)

Does your jurisdiction track tree canopy loss in impervious surface gains within FWHCAs?
(40 responses)

- 22%
- 78%

■ Yes ■ No
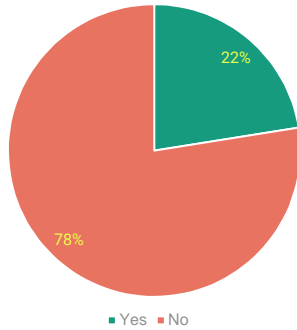
Does your jurisdiction utilize HRCD to evaluate CAO effectiveness?
(32 responses)

- 12%
- 88%

■ Yes ■ No
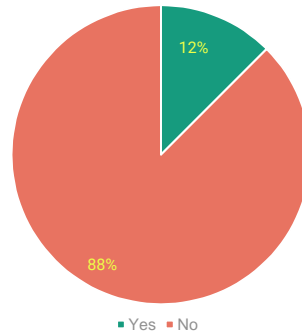
Department of Fish and Wildlife

Our CAO performance indicators rely on HRCD. ~~What~~ Who is HRCD?

Ken Pierce

Jeanne

Kevin

Robyn

Syler

Rachel

HRCD Data

Download HRCD Data

Want to download HRCD data for your area of interest? It's FREE!

The most current data is available at the Washington Geospatial Open Data Portal. To quickly locate HRCD data, search for "change."

Go to the Data

About   Download Data   Contact Us

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Our CAO performance indicators rely on HRCD. What is HRCD?

- Compares aerial images (2 time periods)
- Computer IDs places that have changed
- Person confirms & IDs cause of change
  - **Development, tree removal**, forestry, other (stream meanders, landslides, fires...)
- Results: Change polygons
  - Canopy cover loss, new imperviousness...
  - As small as 1 large tree; 3 small trees
- All of Puget Sound; Five time periods for
  - First: 2006-09; Most recent: 2015-17
- $Millions to produce; free to you

17
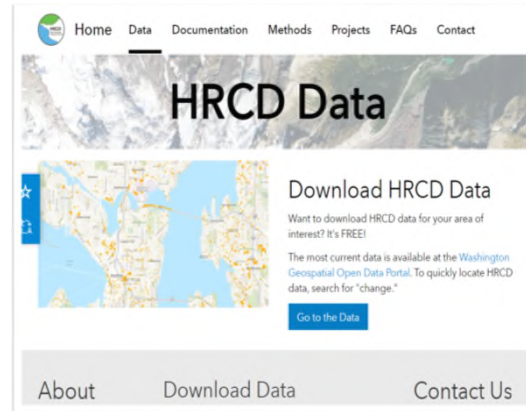
Levels of Monitoring

The previous webinars have focused primarily on the left side.

HRCD allows you to look at outcomes – which is more to the right.
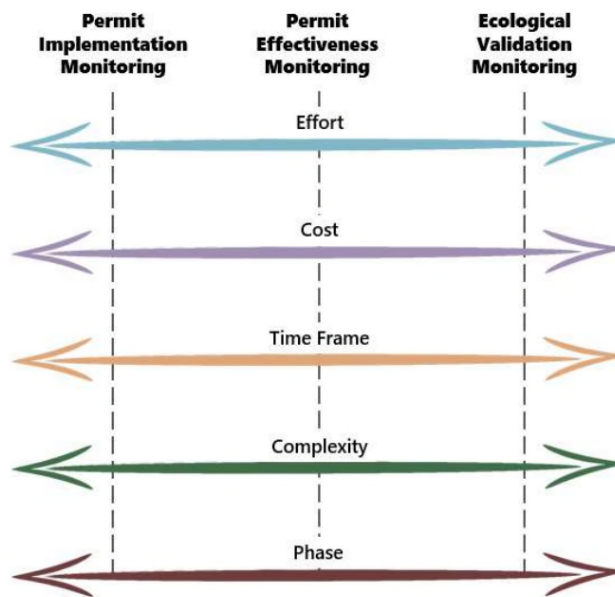
Source: Chapter 7 of Commerce's CAO Handbook

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Today's Discussion

- CAO Effectiveness
  - What is an "effective" CAO?
  - What are performance indicators?
  - 4 proposed CAO Effectiveness Performance Indicators
- Getting WDFW datasets
  - HRCD, Tree Canopy, Visible Surface Water

Q&A #1

- Calculating your performance indicators
  - Demo with fictitious jurisdictions

Q&A #2

Why is WDFW doing this?

- WDFW's stake: For many species direct habitat loss is the largest threat
  - WDFW investing millions to better understand the threat
- Our success depends upon your success

What is an "Effective" CAO?

What is an Effective CAO Performance Indicator?

The CAO's Job

The Performance Indicators' Job

Characteristics of an effective CAO Performance Indicator

What is the job of the CAO?

1. **Designate** Critical Areas
2. **Protect** ecosystem functions and values of Critical Areas
   - **No net loss of ecological function** of affected ecosystems and components via mitigation sequencing
   - **Support viable populations;** avoid creating isolated sub-populations of species

What is the job of the CAO?

- Avoid, minimize, offset harmful activities within Critical Areas
  - **Avoid** = Shift activity out of Critical Area
  - **Minimize** = Do as little of the harmful activities as possible
  - **Offset** = Make improvements in proportion to the un-avoided harm
  - "Harmful activities"
    - Adding imperviousness
    - Removing trees
    - Adding pollutants; fragmenting habitats, introducing invasive species, hardening stream banks…

An "effective" CAO

- Avoids adverse changes to critical areas
  - By shifting development

- Minimizes adverse change within critical areas.

- Ensures offsets for unavoidable harm sufficient to achieve no net loss of ecological functions.

An Ideal Performance Indicator…

- Provides insights for making good decisions
  - Informs a meaningful decision
  - Or at least points to where to dig deeper
- Provides useful information
  - Affordable
  - Reliable: Precise (quantitative), accurate
  - Timely
- Be widely used; provides context
  - What is "normal," "important"?
  - How urgent/good/bad is our situation?

Interpreting Performance Indicators

- Benchmarks (or targets)
  - How good is good enough? What results do we want?
  - By when should the results be accomplished?
  - Value judgments set by policy makers
  - Necessity of benchmarks for CAO adaptive management discussed in State Supreme Court's *Swinomish* Case

An "Effective" CAO

- Avoids adverse changes to critical areas by shifting development

- Minimizes adverse change within critical areas.

- Ensures offsets for unavoidable harm sufficient to achieve no net loss of ecological functions.

An Ideal CAO Performance Indicator

Provides context and insights

What is "normal"?
How urgent, important is this?
Where to dig deeper?

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An "Effective" CAO

- Avoids adverse changes to critical areas by shifting development

- Minimizes adverse change within critical areas.

- Ensures offsets for unavoidable harm sufficient to achieve no net loss of ecological functions.

An Ideal CAO Performance Indicator

Provides context and insights

What is "normal"?
How urgent, important is this?
Where to dig deeper?

Quantifies extent to which development is **shifted** out of critical areas

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Slide 29

An "Effective" CAO

- Avoids adverse changes to critical areas by shifting development

- Minimizes adverse change within critical areas.

- Ensures offsets for unavoidable harm sufficient to achieve no net loss of ecological functions.

An Ideal CAO Performance Indicator

Provides context and insights — What is "normal"? How urgent, important is this? Where to dig deeper?

Quantifies extent to which development is **shifted** out of critical areas

Quantifies extent to which change occurs in critical areas

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Slide 30

An "Effective" CAO

- Avoids adverse changes to critical areas by shifting development

- Minimizes adverse change within critical areas.

- Ensures offsets for unavoidable harm sufficient to achieve no net loss of ecological functions.

An Ideal CAO Performance Indicator

Provides context and insights — What is "normal"? How urgent, important is this? Where to dig deeper?

Quantifies extent to which development is **shifted** out of critical areas

Quantifies extent to which change occurs in critical areas

Quantifies lift provide by offsets

30

An "Effective" CAO

- Avoids adverse changes to critical areas by shifting development

- Minimizes adverse change within critical areas.

- Ensures offsets for unavoidable harm sufficient to achieve no net loss of ecological functions.

An Ideal CAO Performance Indicator

Provides context and insights — What is "normal"? How urgent, important is this? Where to dig deeper?

Quantifies extent to which development is **shifted** out of critical areas

Quantifies extent to which change occurs in critical areas

Quantifies lift provide by offsets

Is, reliable, timely, affordable, and widely used

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An "Effective" CAO

- Avoids adverse changes to critical areas by shifting development

- Minimizes adverse change within critical areas.

- Ensures offsets for unavoidable harm sufficient to achieve no net loss of ecological functions.

An Ideal CAO Performance Indicator

Provides context and insights — What is "normal"? How urgent, important is this? Where to dig deeper?

Quantifies extent to which development is **shifted** out of critical areas

Quantifies extent to which change occurs in critical areas

Quantifies lift provide by offsets

Is, reliable, timely, affordable and widely used

Is the subject of locally created benchmarks

32

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How to Measure "Avoidance"?

- To measure "avoidance", we need to know the difference in the rate of change *within* Critical Areas vs the rate of change *outside of* Critical Areas
  - If a CAO is supposed to avoid development within Critical Areas (shifting it into Non-Critical Areas), to know its effectiveness we need to know both.
  - Knowing the rate of change outside of Critical Areas also adds context

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Conveying the Idea of "Shift"

1. "For every 10 acres of change outside of critical areas, how much change happened within Critical Areas?"

10 acres

? ac
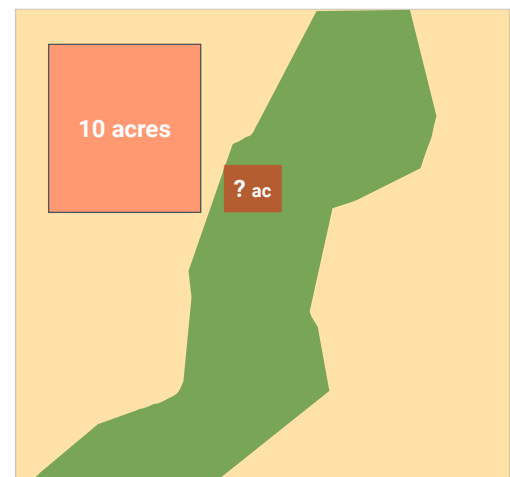
34

Conveying the Idea of "Shift"

1. "For every 10 acres of change outside of critical areas, how much change happened within Critical Areas?"
2. "For every acre of change within a critical area, how many acres of change happened outside of critical areas?"

Both of these questions
- Provide an easy way to simultaneously consider the two rates
- Self-adjust for the community's overall growth rate

? acres

1 ac

35

Things we Kept in Mind when Developing CAO Performance Indicators

- Only count what is under the jurisdiction's control
  - No lumping cities and counties
  - No holding local jurisdiction to account for federal, tribal, or state actions
  - No penalizing the jurisdiction when a river, wildfire or landslide takes out some tree
- Exclude all surface water from the calculations

Things we Kept in Mind when Developing CAO Performance Indicators

- You decide your benchmarks
- How much development in your critical areas is acceptable?
- We can help you figure out ways to measure indicators, but you have the authority establish local goals
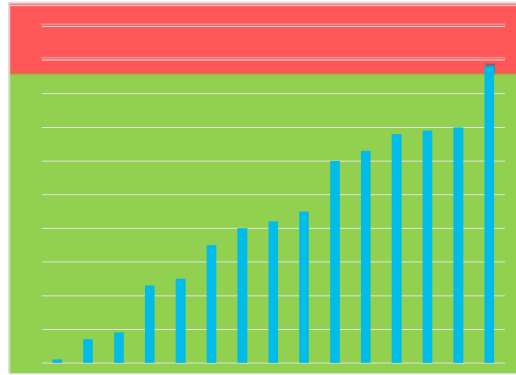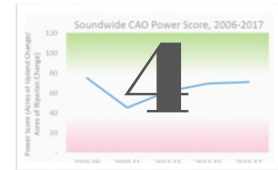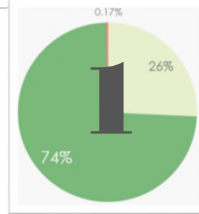
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CAO Performance Indicators

Four Performance Indicators

CAO Effectiveness Performance Indicators

- Four basic indicators
  - Primarily related to Fish and Wildlife Habitat Conservation Areas
  - Can be used to assess change in any geography that you can map
- Each indicator leverages HRCD and associated high-resolution **tree maps** and **surface water maps**

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## 5 Indicators to Measure CAO Effectiveness

One looks at the **current** state (2017)	
Two indicators look at **rates of change** and **trends since 2006**	
One **looks ahead** a decade, showing results of recent trends continuing	
One reports on the **shifting** of development	
One reports **how much change** occurred within critical areas	

Results are provided as absolute numbers and normalized

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Indicator Examples Use Soundwide Results

To explain these indicators, we use actual results from our analysis of change within urban and rural CAO-defined stream buffers

- All 12 Puget Sound Counties, 10 cities
- Averages for all UGAs and all rural (non-UGA) areas
- More on the specific geography in the demo
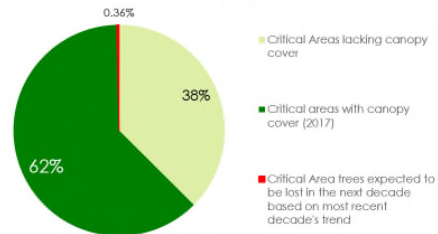- NTA's final report has more details

41
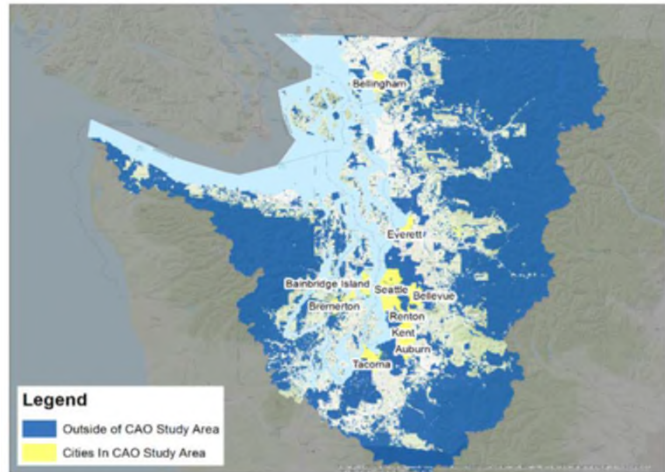
Indicator #1

- Portion of Critical Areas that have trees (blue slice)
- Soundwide riparian averages:
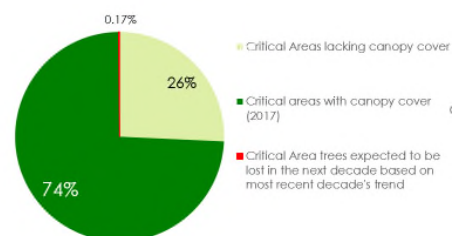 - Urban areas: 62%
  - Rural areas: 74%

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Indicator #2

- Portion of Critical Area trees that will be lost in a decade at recent rate (red slice)
- Soundwide riparian averages
  - Urban Areas: 0.36% canopy loss per decade
  - Rural Areas: 0.17% canopy loss per decade

Critical Areas with Trees (2017) and Expected Critical Area Tree Loss in Next Decade based on Previous Deacade's Tree Loss

0.36%

38%

62%

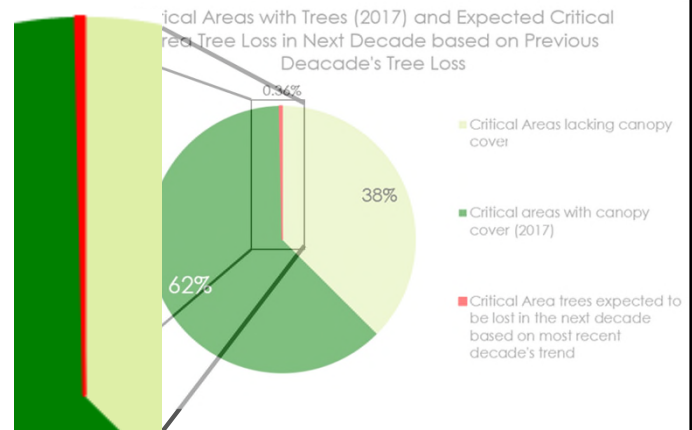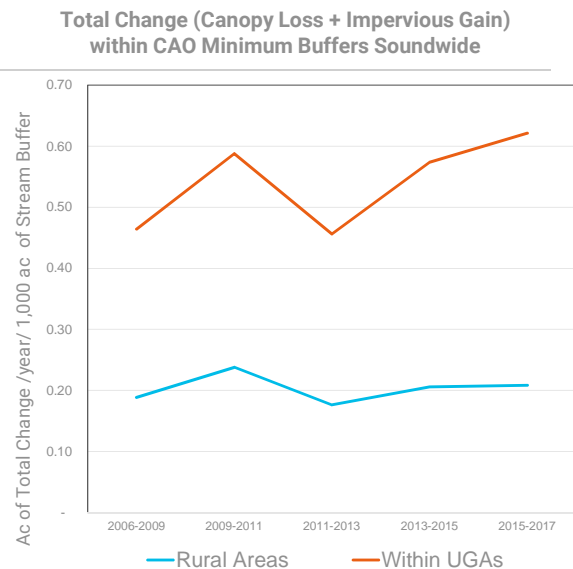- Critical Areas lacking canopy cover
- Critical areas with canopy cover (2017)
- Critical Area trees expected to be lost in the next decade based on most recent decade's trend

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Indicator #3

- Acres of change per year in Critical Areas
  - Total change and canopy change
- Soundwide total change averages (2006-2017)
  - Urban Areas: 0.53 ac change per 1,000 ac of riparian area
 - Rural Areas: 0.20 ac change per 1,000 ac of riparian area

Total Change (Canopy Loss + Impervious Gain) within CAO Minimum Buffers Soundwide

Ac of Total Change /year/ 1,000 ac of Stream Buffer

2006-2009　2009-2011　2011-2013　2013-2015　2015-2017

—Rural Areas　—Within UGAs

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Indicator #4

- "CAO Power Score": (Relative Change)
  - "For every acre of change *within* Critical Areas, how many acres of change happened *outside of* Critical Areas?"
  - Larger number = More powerful CAO
- Soundwide averages (2006-2017):
  - Urban Areas: 135
  - Rural Areas: 52

Soundwide CAO Power Score, 2006-2017

45
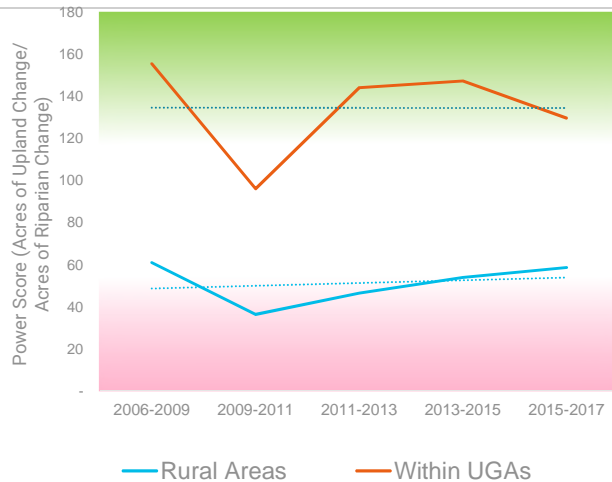
How Ideal are these Proposed Indicators?

✓ Quantify extent to which development is **shifted** out of critical areas

✗ Quantify extent to which change occurs in critical areas

Quantify lift provide by offsets

Be timely, reliable, and affordable

Provide context and actionable insights — What is "normal"? How urgent/good/bad is this? Where to dig deeper?

Be the subject of locally created benchmarks

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How Ideal are these Proposed Indicators?

✓
✓
✗
✓ *
✓

Locals do this →

✓ Quantify extent to which development is **shifted** out of critical areas

✗ Quantify extent to which change occurs in critical areas

Quantify lift provide by offsets

Be timely, reliable, and affordable
*Dependent on the accuracy of your base map

Provide context and actionable insights
What is "normal"?
How urgent/good/bad is this?
Where to dig deeper?

Be the subject of locally created benchmarks

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Survey: Utility of Indicators

What do you think?

? ?

How useful would it be to know the results of these five CAO performance indicators for your jurisdiction?

Knowing these indicators for my jurisdiction would likely result in us revising our CAO to better protect critical areas.

Very, somewhat, a little, not at all, unknown

Strongly agree, agree, disagree, strongly disagree, I don't know

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Survey: Application of Indicators

How helpful would it be to be able to compare...

? **?** **?**

...your jurisdiction's scores **through time** (continuing into the future)?

Very, somewhat, a little, not at all, unknown

...your jurisdiction's scores to a **regional average score** (e.g., Soundwide)?

Very, somewhat, a little, not at all, unknown

...your jurisdiction's scores to other **similar jurisdictions**?

Very, somewhat, a little, not at all, unknown

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Q&A - "Effective" CAO
WDFW's Five Proposed CAO Effectiveness indicators

TYPE YOUR QUESTIONS IN THE Q&A BOX IN YOUR TOOLBAR

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Demonstration: Information Available from WDFW

Robin Hale, Landscape Analytics Section, WDFW

Project background and data
High Resolution Change Detection (HRCD)

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Project background

WDFW Mandate:

"*Preserve, protect, perpetuate, and manage*" fish and wildlife (RCW 77.04.012)

USDA National Agriculture Imagery Program (NAIP)

Salmon Recovery Funding Board
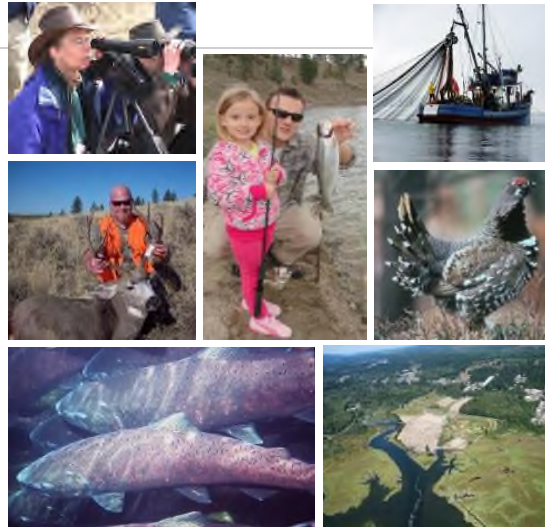
Spatial resolution matters

30-meter resolution
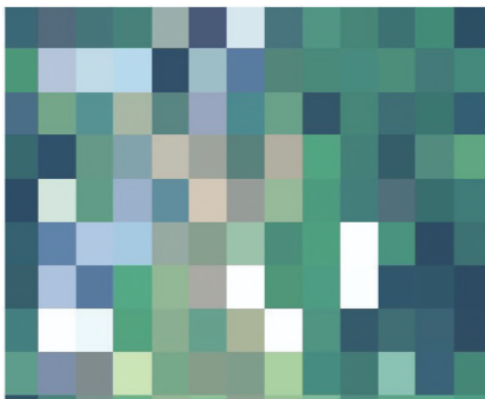
1-meter resolution (used by HRCD)

Project data

1) Land cover changes
    2006-09
    2009-11
    2011-13
    2013-15
    2015-17
2) Tree canopy
    2017
3) Visible surface water
    2017
4) Analyses and reports*

Department of Fish and Wildlife

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Land Cover:
Canopy & Visible surface water

Department of Fish and Wildlife

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What is 'change?'

| Tree canopy loss | Impervious surface increase | Semi-pervious surface increase |

An example of change

2006 Imagery
2017 Imagery
HRCD Data

Area: **4.5 acres**
Initial land cover: **Mixed natural**

Canopy loss: **25%**
New impervious: **25%**
Total change: **50%**

Cause of change: **Development**

Data Availability

- **Currently available***
- **Planned**

* Some counties are partially completed due to lidar availability
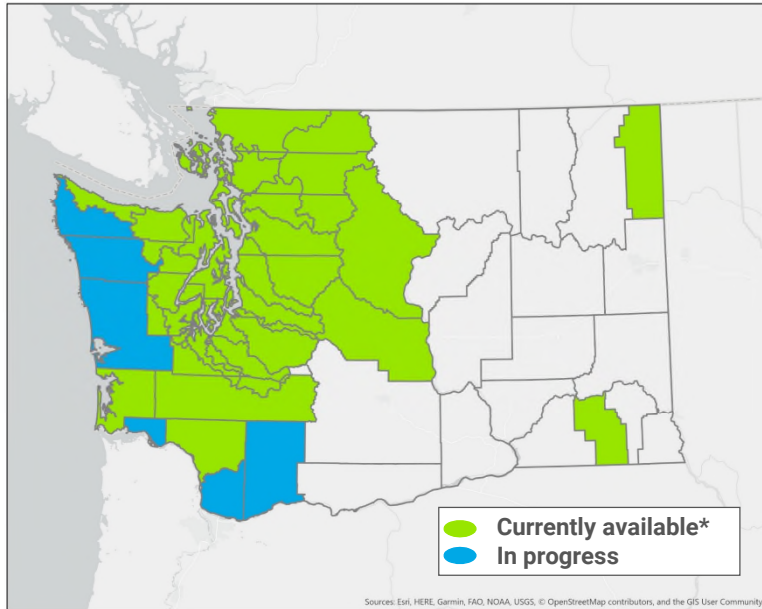
Currently available*
In progress

Sources: Esri, HERE, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community

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Obtaining the data

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Data availability as of March 2021

Department of Fish and Wildlife

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Option 1:
Washington Geospatial Open Data Portal

Currently for:

- Changes *(within Puget Sound)*

Soon:

- For all data products

Department of Fish and Wildlife

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Option 2:
Data Request Form

Currently for:

- Tree canopy
- Visible Surface water
- Changes *(outside of Puget sound)*

Online resources: hrcd-wdfw.hub.arcgis.com

Learn

Download Data

Explore

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Department of Fish and Wildlife

https://hrcd-wdfw.hub.arcgis.com/

A tour of WDFW's HRCD Data Hub

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How to Calculate the Four Performance Indicators

A demonstration using a fictitious Puget Sound city

Survey: Your Jurisdiction's Indicators

What do you think?

?	?	?
How interested are you in calculating your jurisdiction's CAO performance indicator scores?	Can your jurisdiction map your critical areas with reasonable accuracy?	Are you (or a colleague) capable of doing a *union* with ArcGIS?
Very, somewhat, a little, not at all, unknown	**Yes, No, I don't know**	**Yes, No, I don't know**

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4 Steps to Calculate Your Performance Indicators

1 PREPARE A MAP OF YOUR JURISDICTION

2 ANALYZE EXTENT OF TREE COVER

3 DO THE HRCD ANALYSIS PER INSTRUCTIONS

4 ENTER RESULTS IN EXCEL SPREADSHEET. REFLECT. DISCERN. DESCRIBE.

1

Create the Initial Map of Your Jurisdiction

- Exclude non-GMA areas
  - Federal lands; Tribal lands; Forestry Lands
- Exclude surface water
  - Use HRCD's visible surface water & others
- Differentiate "critical areas" from "non critical areas"
  - Use your CAO's definitions and maps where possible
- Counties: Differentiate UGAs from non UGAs; do separate analysis
- The Initial map shows 100% of your jurisdiction (no overlaps) as
  - "Critical Area"
  - "Non Critical Area" or
  - "Out of Study Area"
  - Counties have two maps: one of rural area; one of unincorporated UGAs

ArcGIS® ArcMap™
10.6.1

Initializing License...

esri THE SCIENCE OF WHERE

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2 Evaluate Extent of Tree Canopy

- Instructions provided to help you determine extent of trees in critical areas and in non-critical areas

ArcGIS® ArcMap™
10.6.1

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Home   Data   Documentation   Methods   Projects   FAQs   Contact

HRCD Data

Download HRCD Data

Want to download HRCD data for your area of interest? It's FREE!

The most current data is available at the Washington Geospatial Open Data Portal. To quickly locate HRCD data, search for "change."

Go to the Data

About   Download Data   Contact Us

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3 Use HRCD Polygons to Evaluate Change

- Instructions provided to help you determine extent of change within critical areas and non-critical areas
- Not so difficult; pivot tables help get results quickly

ArcGIS® ArcMap™
10.6.1

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HRCD
High Resolution
Change Detection

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4 Calculate Your Performance Indicators

- Plug in the numbers into the spreadsheet
- Interpret the results:
  - What does it mean? How are you doing?
- Investigate things you might want to change
- Work with your policy makers to establish benchmarks
- Share results with neighboring jurisdictions; encourage them to calculate their performance indicators
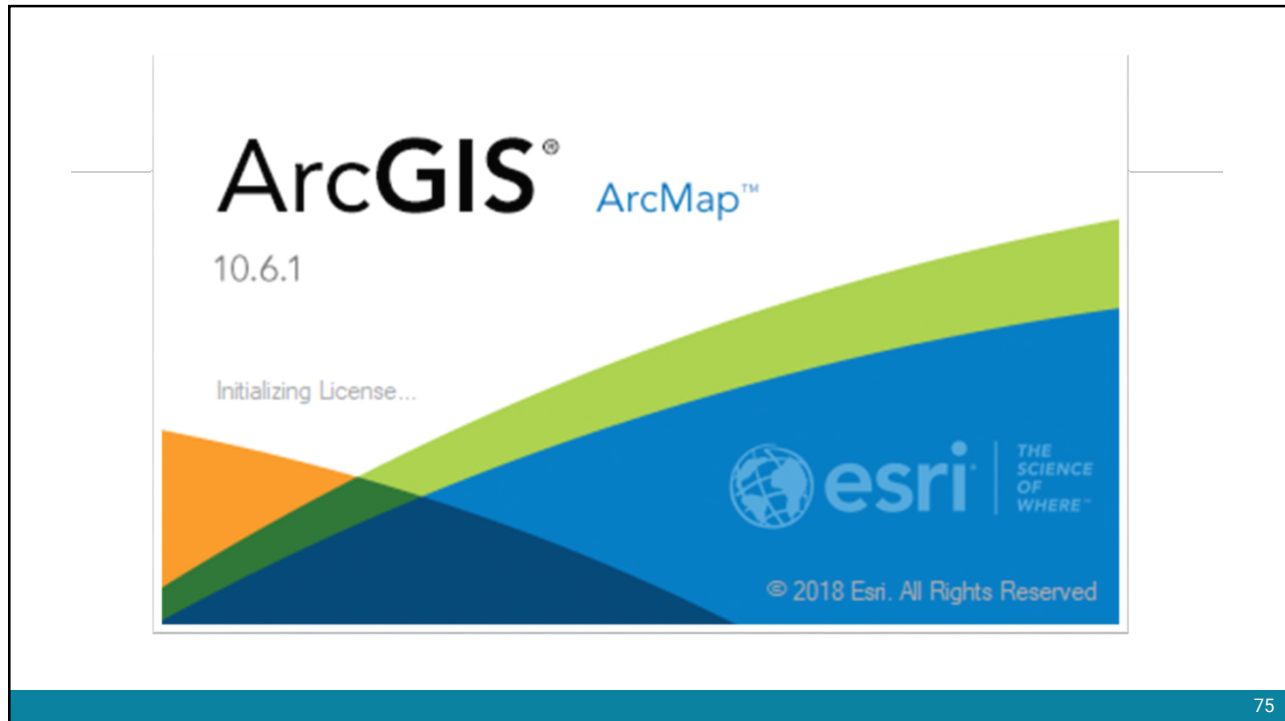- Include benchmarks in Countywide Planning Policies

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River City, WA

- Population: 32,000
- Planning director, you, and one other planner
  - You have basic GIS skills
- New council member
  - Wants to know how well the city's CAO is protecting the environment and how to make meaningful improvements

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What's Next for This Work?

- Do the analysis in interested jurisdictions
  - City/county take lead doing step 1 map
  - We can help with the other steps
- Determine interest in developing regional indicators, trends, metrics, and benchmarks

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Survey: Your Jurisdiction's Indicators

How interested are you in calculating your jurisdiction's CAO performance indicator scores?

Very, somewhat, a little, not at all, unknown

Can your jurisdiction create a reasonably accurate map of your critical areas?

Yes, No, I don't know

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Q&A - WDFW HRCD Hub: HRCD, Tree Canopy, Visible Water Method for calculating CAO Effectiveness Indicators

TYPE YOUR QUESTIONS IN THE Q&A BOX IN YOUR TOOLBAR

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Thanks for attending.
Contact me if you want to calculate your indicators!

Keith Folkerts
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