



USING AN ECOSYSTEM SERVICES FRAMEWORK TO RESTORE AQUATIC HABITAT IN OREGON

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ACES 2014



WILLAMETTE PARTNERSHIP

Tualatin River, Oregon

Restoration for TMDL compliance

Cooling Towers

\$60 -
\$150
million

35 miles of restoration

\$6
million

FROM THIS...



...TO THIS



Grey Infrastructure

Cooling Towers

Compliance – *Achieved*

Cost – *A lot*

Ecological Value – *Not Much*



Green Infrastructure

Restore 35+ miles of stream

Compliance – *Achieved*

Cost – *A lot less*

Ecological Value – *Huge*



Ecosystem Services Framework


- ✓ Policy
- ✓ Quantify impacts and benefits
- ✓ Accounting system
- ✓ Verification
- ✓ Sustained benefits
- ✓ Spatial framework

Creates incentives for conservation



Ecosystem Credit Accounting System

**Joint Statement of Agreement
for an
Ecosystem Credit Accounting System**
Issued and signed by organizational leadership
September 2009



Crediting protocol approved for use





Overview

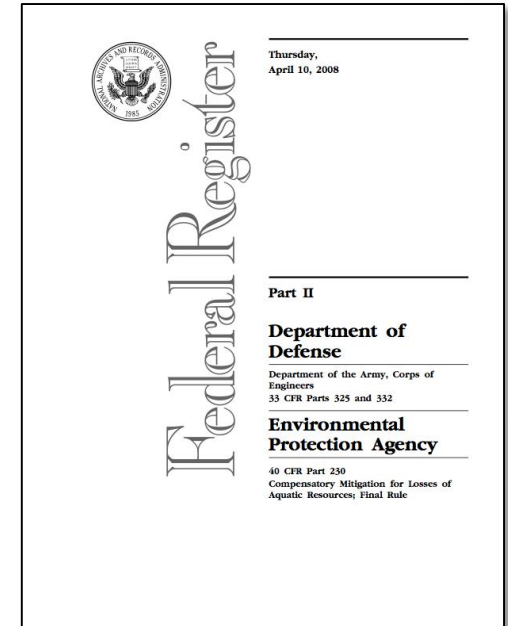
- Aquatic Resource Mitigation Program for Oregon
- Challenges & Opportunities
- Ingredients of success (so far)



A Watershed-Based Approach to Mitigation in Oregon

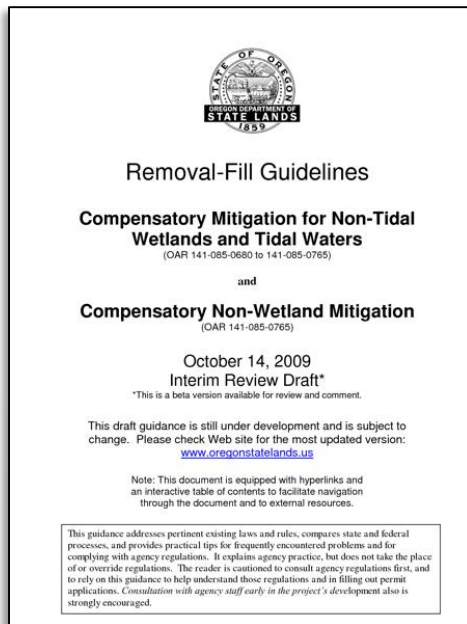
Final Compensatory Mitigation Rule (2008)

- ✓ Compensatory mitigation decision-making in a **watershed** context
- ✓ Replace loss of **functions** due to unavoidable impacts to all aquatic resources
- ✓ Use of **function or condition assessment** to determine compensatory mitigation



A Watershed-Based Approach to Mitigation in Oregon

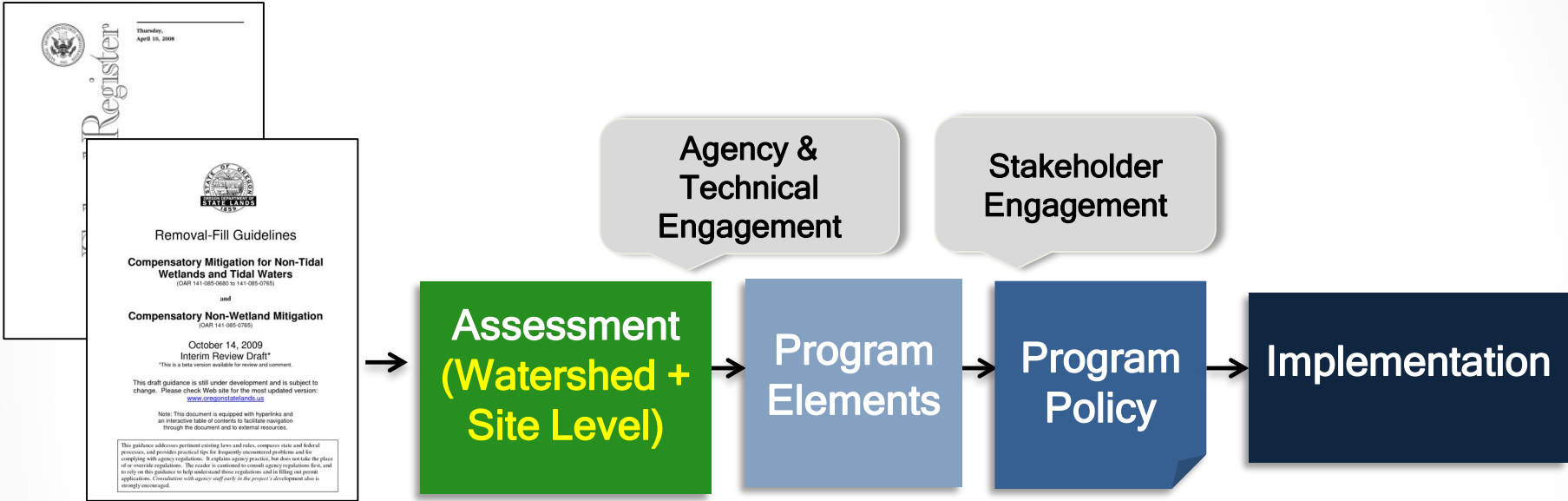
Oregon Removal-Fill Program Rule (2009)



- ✓ Specified **compensatory mitigation** required for unavoidable impacts
- ✓ Expanded mitigation statutes to “**waters of the state**” (previously only referred to wetlands)
- ✓ Requires mitigation offsetting losses of functions and **values**



Aquatic Resources Mitigation Program for OR



Challenges (or Challenging Goals)

- **State and federal** regulations & agencies
- **Complexity** of policy - DSL requires values
- **Vested stakeholders** – existing mitigation banks
- **Technical work** – assessment tools & spatial frameworks



Opportunities

- Federal & State Policy
 - Mitigation hierarchy
 - Watershed-based approach
 - Program requirements that align with an ES approach
- ES Framework: transparent, predictable, standardized approach – for both regulators and regulated community



Ecosystem Services Framework

- ✓ Policy
- ✓ Quantify impacts and benefits
- ✓ Accounting system
- ✓ Verification
- ✓ Sustained benefits
- ✓ Spatial framework



Ecosystem Services Framework

- ✓ Policy
- ✓ Quantify impacts and benefits
- ✓ Accounting system
- ✓ Verification
- ✓ Sustained benefits
- ✓ Spatial framework – targeting investments in the most effective places



Stream Mitigation Program

1. Lack of a stream function-based assessment tool
2. Lack of a watershed-based approach
3. Narrow recognition of values
4. Absence of function-based accounting



FUNCTIONAL GROUP	ECOLOGICAL FUNCTION	VALUE
Hydrological	Sub/surface transfer	Floodplain condition
	Flow variation	Flooding regime
	Surface water storage	With/without drawal or impoundments
Geomorphic	Sediment continuity	Landuse/Landcover
	Substrate mobility	Sedimentation issues (303d)
Biological	Maintain biodiversity	ESA listed species
	Create habitat (aq/riparian)	Rare species
	Sustain trophic structure	Priority watershed
Chemical, Nutrient & Thermal	Nutrient cycling	TMDL (nutrient)
	Chemical regulation	Metal/toxic impairment
	Thermal regulation	TMDL (temperature)

Office & Field Measurements

Stream Function Assessment Methodology for OR

OREGON STREAM FUNCTIONAL ASSESSMENT METHOD

Name of Project Site: 0

FUNCTIONS MEASURES TABLE

Question #	Primary Function Group	Measure	Measure Name	Qualifiers in Function Final Score	Data Entry			Measure Subscore
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Obtain these answers in Office.

F1	<p>What percent of the floodplain has been disconnected? For alluvial rivers, floodplain is defined by distinct break in slope at valley margin, change in geologic character from alluvium to other, and indications of historical channel alignments within valley or as 100-year flood limit. For freshwater estuary, any area within historic tidal influence. Disconnection refers to any portion of the flood area no longer inundated due to levees, channel entrenchment, roads or railroad grades, or other structures (including buildings and any associated fill) within the defined assessment area reach. Sum both sides of channel. For areas with partial inundation exclusion, such as with tide gates or undersized culverts, consider partial exclusion as total exclusion EXCEPT where the regulation is expressly managed for floodplain function and inundation.</p> <p>If <10%, select A. If 10 - 20%, select B. If >20 - 50%, select C. If >50%, select D. If it cannot be determined, leave blank.</p>							
	Hydrology	Floodplain or Tidal Exclusion	Exclusion	0.00				

F2	<p>What is the Richards-Baker Flashiness Index? R-B Index is based on mean daily flow and the relative size of the watershed. Flashy streams tend to have either urbanized environments or may be associated with arid, rocky environments. Stable streams tend to be groundwater driven.</p> <p>Based on watershed area, is the R-B Index considered stable, average, or flashy:</p> <table border="1"> <tr> <td></td> <td>Stable</td> <td>Mean</td> <td>Flashy</td> <td></td> </tr> <tr> <td>< 30 mi²</td> <td>< 0.2</td> <td>0.2 - 0.35</td> <td>> 0.35</td> <td></td> </tr> <tr> <td>> 30 mi²</td> <td>< 0.1</td> <td>0.1 - 0.25</td> <td>> 0.25</td> <td></td> </tr> </table> <p>If not known, leave blank.</p>									Stable	Mean	Flashy		< 30 mi ²	< 0.2	0.2 - 0.35	> 0.35		> 30 mi ²	< 0.1	0.1 - 0.25	> 0.25	
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> 30 mi ²	< 0.1	0.1 - 0.25	> 0.25																				
Hydrology	R-B Flashiness Index	RBIndex																					

F3	<p>Are there non-native aquatic animal species present? Presence of individuals of observed or likely reproducing population of non-native aquatic animal species (vertebrate or invertebrate) within the assessment reach. From spatial database of known presence (see Manual).</p>							
	Biology	Non-native Aquatic Species	NNAquSpp					

F4	<p>Are side channels present? What proportion of the reach length has side channels. Field check office estimates and revise as needed.</p> <p>If <10%, select A. If >10 - 50%, select B. If >50%, select C.</p>							
	Biology	Backwater Side	SideChan					



Stream Function Assessment Methodology

OREGON STREAM FUNCTIONAL ASSESSMENT METHOD										
Name of Project										
Site:										
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Obtain these answers in Office.										
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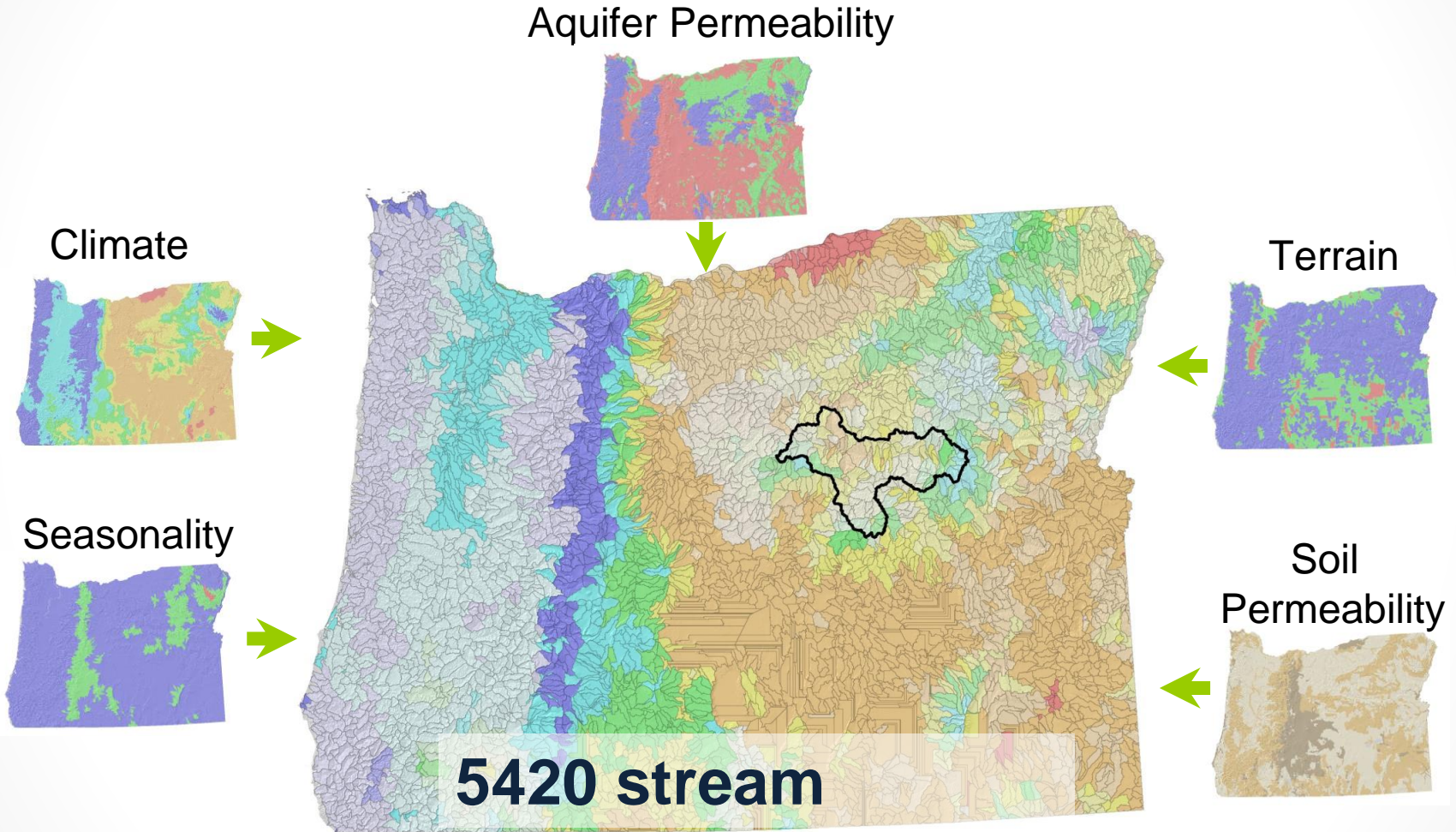
Score

Applications

- ✓ Mitigation credits
- ✓ Voluntary credits
- ✓ Tracking & accounting
- ✓ Prioritization & planning

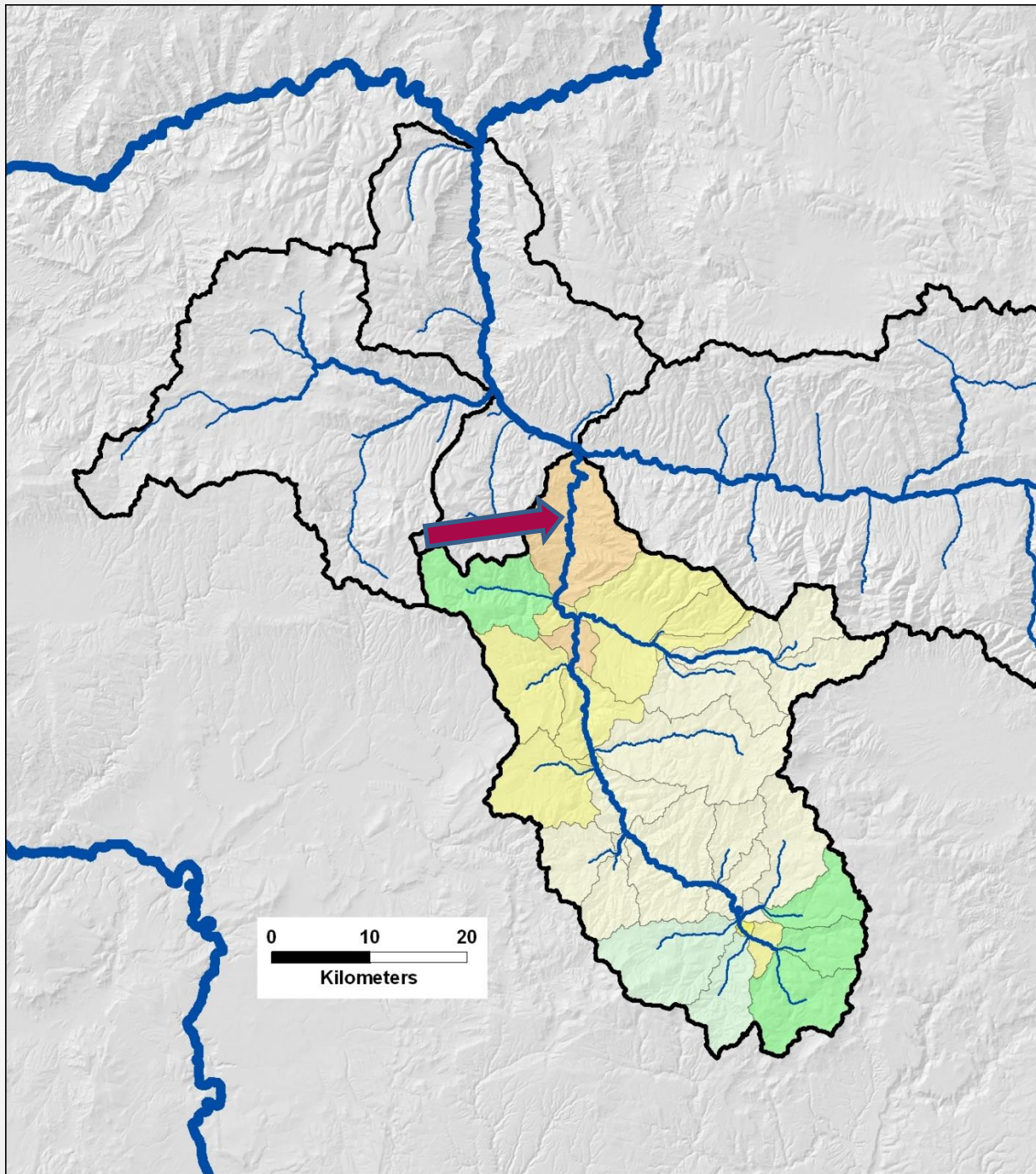


Stream Classification System for OR

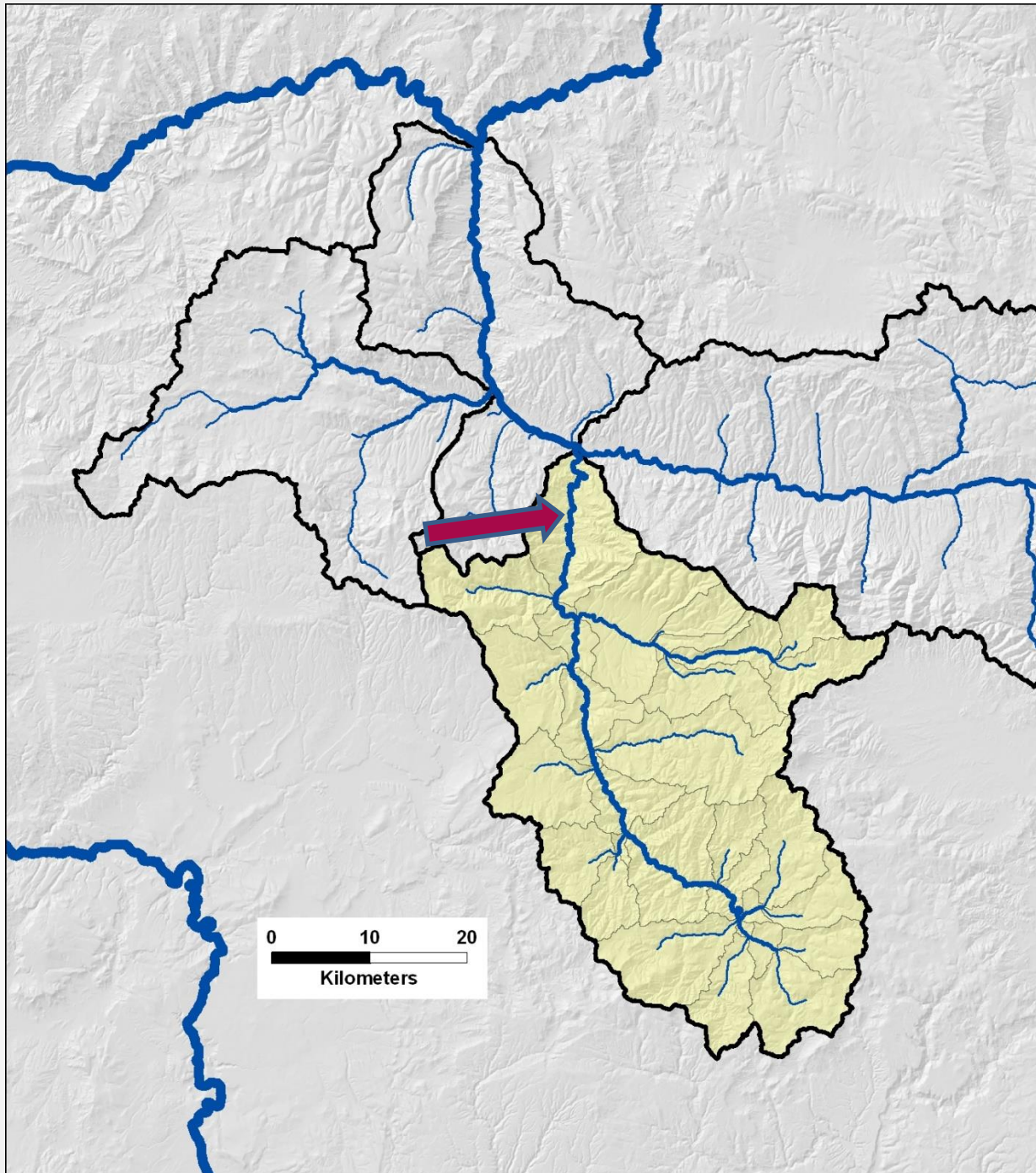


OR Hydrologic Landscape Regions





L_STREAMORDER	3
L_AREA_KM	116.3556
L_CLIMATE	Semiarid
L_SEASONALITY	Fall or Winter
L_AQUIFER_PERM	Moderate
L_TERRAIN	Mountain
L_SOIL_PERM	Low
L_HL_CLASS	SwMML
L_ERODE_CLASS	Difficult to Erode
L_GRADIENT	Low
L_FLOODPLAIN	No
W_AREA_KM	1569.075
W_TERRAIN	Mountain
W_FLOODPLAIN	No
W_SURPLUS	Limited
W_VOL_SURPLUS	22059132
W_SEASONALITY	Fall Winter
W_PC_L_PERM	47.36
W_PC_M_PERM	45.42
W_PC_H_PERM	7.22



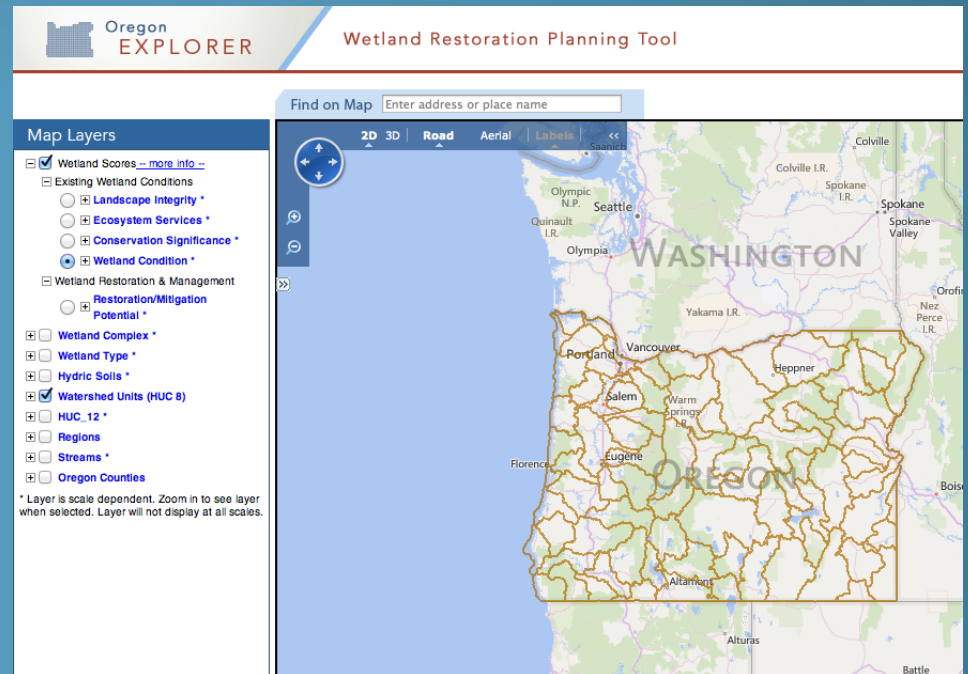
L_STREAMORDER	3
L_AREA_KM	116.3556
L_CLIMATE	Semiarid
L_SEASONALITY	Fall or Winter
L_AQUIFER_PERM	Moderate
L_TERRAIN	Mountain
L_SOIL_PERM	Low
L_HL_CLASS	SwMML
L_ERODE_CLASS	Difficult to Erode
L_GRADIENT	Low
L_FLOODPLAIN	No
W_AREA_KM	1569.075
W_TERRAIN	Mountain
W_FLOODPLAIN	No
W_SURPLUS	Limited
W_VOL_SURPLUS	22059132
W_SEASONALITY	Fall Winter
W_PC_L_PERM	47.36
W_PC_M_PERM	45.42
W_PC_H_PERM	7.22

Wetland Mitigation Program

1. Existing function-based assessment tool – *ORWAP*
2. Lack of “watershed-based” approach
3. Transition *acres to acres* to function-based debit/credit accounting

OR Wetland Restoration Planning Tool

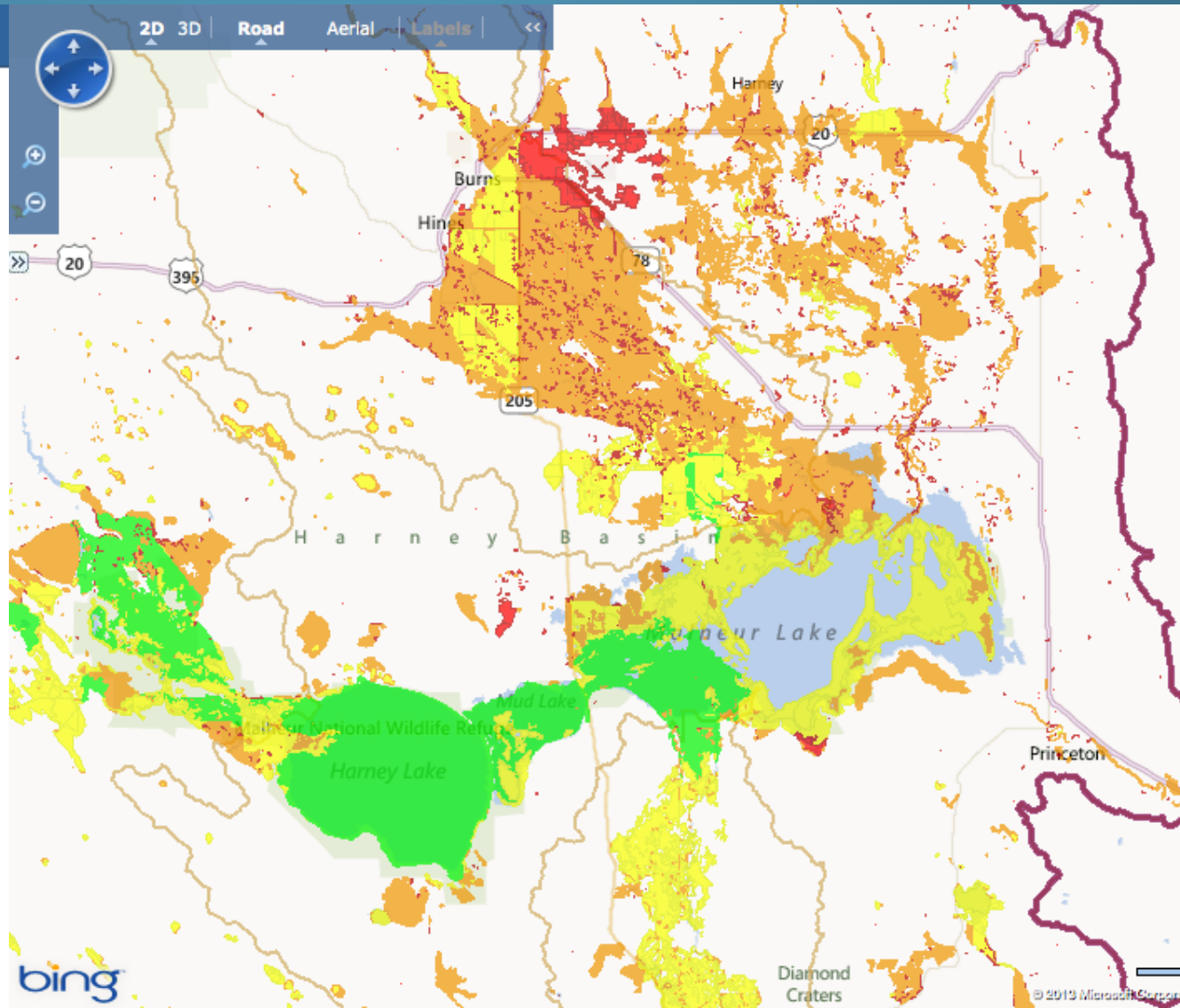
- ✓ Wetland-based geospatial data layers
 - ✓ Landscape condition
 - ✓ Wetland condition
 - ✓ Conservation significance
- ✓ Statewide
- ✓ High, Medium, Low opportunities for restoration & mitigation use



OR Wetland Restoration Planning Tool

Map Layers

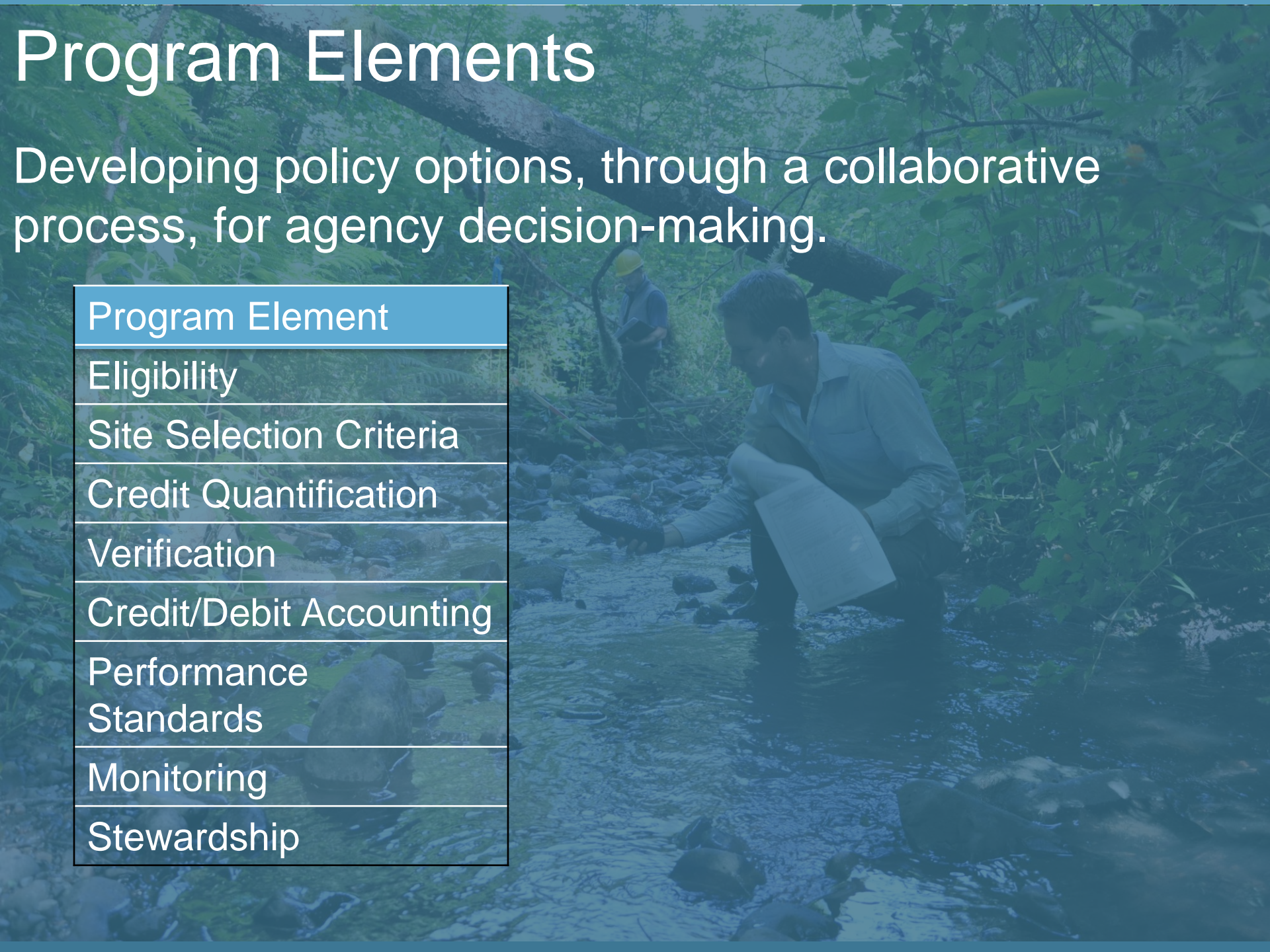
- Wetland Scores [-- more info --](#)
- Existing Wetland Conditions
 - Landscape Integrity
 - Ecosystem Services
 - Conservation Significance
 - Wetland Condition
- Wetland Restoration & Management
 - Restoration/Mitigation Potential
 - Highest potential
 - High potential
 - Medium potential
 - Low potential
 - Not evaluated
- Wetland Type
- Rare Wetlands
- Wetland Mitigation Bank
- Wetland Reserve Program
- Hydric Soils
- 4th Level Watersheds (8 digit)
- Regions
- Streams
- Oregon Counties



Program Elements

Developing policy options, through a collaborative process, for agency decision-making.

Program Element
Eligibility
Site Selection Criteria
Credit Quantification
Verification
Credit/Debit Accounting
Performance Standards
Monitoring
Stewardship



Program Elements

Developing policy options, through a collaborative process, for agency decision-making.

Program Element	<i>ES Framework</i>
Eligibility	<i>Spatial framework</i>
Site Selection Criteria	<i>Spatial framework</i>
Credit Quantification	<i>Quantification</i>
Verification	<i>Verification</i>
Credit/Debit Accounting	<i>Tracking and Accounting</i>
Performance Standards	<i>Sustaining Benefits</i>
Monitoring	<i>Sustaining Benefits</i>
Stewardship	<i>Sustaining Benefits</i>

Ingredients of Success



- *A priori* criteria: credible, transparent, practical
- ES Model: transparent & demonstrated success
- “The Year 2020”
- Agency commitment
- Champions!

Questions?

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