

# Assessing Habitat and Effectiveness of Restoration Actions

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Science Work Group Meeting

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Lower Columbia

Estuary  
Partnership

# The Struggle:

When you take a site that looks like this:

- Simplified channel, full of invasive species, warm temperatures

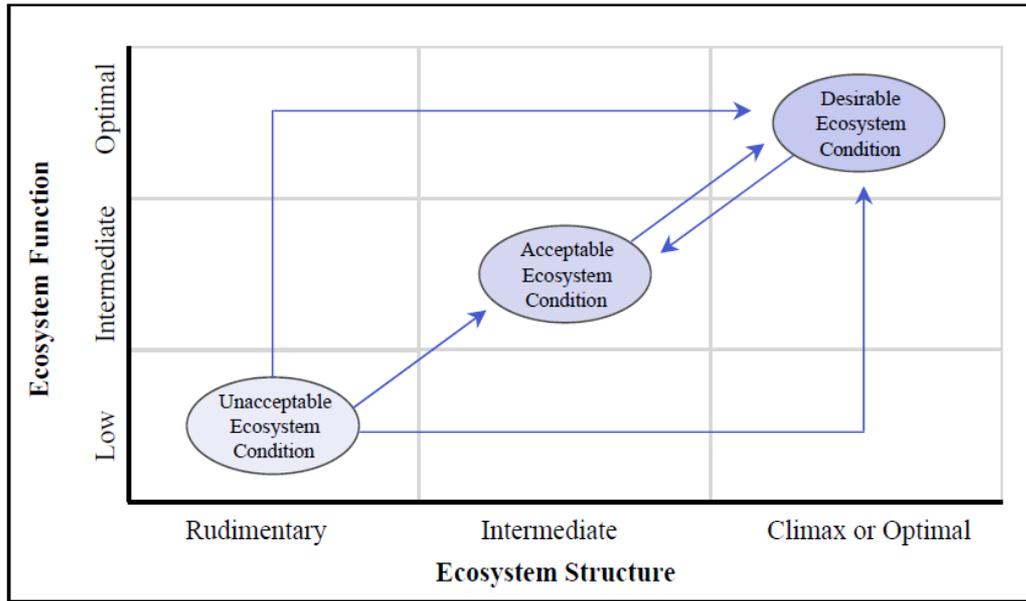
Spend a ton of thought, money and time to restore it to this:

- More habitat complexity; mix of native and invasive species; cooler temps



**How do you know if you are successful?  
How do you quantify benefits? For which species?**

# Concepts for consideration:



From Johnson et al. 2003

**Figure 2.1.** General Model of Ecosystem State. An ecosystem or habitat that is in rudimentary condition with low functioning develops into a system with optimal structure and functioning (after Thom 2000). Development can take several pathways and can oscillate between system states.

- Conceptual Model – Enhancement and Restoration involves taking a site from an unacceptable to a desirable condition

# Concepts for consideration:

<b>FUNCTION</b>	<b>Optimal</b>	<ul style="list-style-type: none"> <li>•functions are independent of structure</li> <li>•functions are best at early stage of development</li> <li>•anomalous condition</li> </ul>	<ul style="list-style-type: none"> <li>•functions are best at intermediate stage of development</li> </ul>	<ul style="list-style-type: none"> <li>•function and structure are fully developed</li> <li>•stable ecosystem</li> <li>•self-maintaining</li> <li>•resilient</li> </ul>
	<b>Intermediate</b>	<ul style="list-style-type: none"> <li>•functions are intermediate at early stage</li> <li>•early stage of development</li> <li>•moderate disturbance/disruption</li> </ul>	<ul style="list-style-type: none"> <li>•functions are intermediate at intermediate stage</li> <li>•intermediate stage of development</li> <li>•moderate disturbance/disruption</li> </ul>	<ul style="list-style-type: none"> <li>•moderate function at full structural development</li> <li>•moderate correlation of function with structure</li> <li>•moderate disturbance/disruption</li> </ul>
	<b>None - Low</b>	<ul style="list-style-type: none"> <li>•early in development</li> <li>•failed structure</li> <li>•high disturbance/disruption</li> </ul>	<ul style="list-style-type: none"> <li>•functions are low at intermediate stage</li> <li>•incorrect community</li> <li>•moderate disturbance/disruption</li> </ul>	<ul style="list-style-type: none"> <li>•low function at full structural development</li> <li>•incorrect community</li> <li>•anomalous condition</li> </ul>
		<b>Rudimentary</b>	<b>Intermediate</b>	<b>Climax</b>
		<b>STRUCTURE</b>		

From Thom 2000

Fig. 4. Generalized system-development matrix showing the 9 states a restored system can occupy during development (redrawn from Thom, 1997).

- Conceptual Model – Enhancement and Restoration involves taking a site from an unacceptable to a desirable condition
- ***Ultimate Goal – Going from the Conceptual Model to a Quantifiable Assessment Tool***

# Goal 1 - Quantifying Improvements to a Site



When we might only collect data at a subset of that site

## Goal 2 - Quantifying Improvements to a Landscape



**Goal 3 – Knowing When/If Additional Intervention is Needed (species related?)**

# Overview of the Oregon Rapid Wetland Assessment Protocol (ORWAP)



# Manual for the Oregon Rapid Wetland Assessment Protocol (ORWAP)



Version 3.1  
Paul Adamus, Ph.D., Adamus Resource Assessment, Inc.  
Kathy Verble, CPSS, Oregon Department of State Lands

November 2016



**This manual should be cited as:**

Adamus, P., K. Verble, and M. Rudenko. 2016. Manual for the Oregon Rapid Wetland Assessment Protocol (ORWAP, revised). Version 3.1. Oregon Dept. of State Lands, Salem, OR.

**The actual protocol should be cited as:**

Adamus, P., J. Morlan, K. Verble, and A. Buckley. 2016. Oregon Rapid Wetland Assessment Protocol (ORWAP, revised): Version 3.1 calculator spreadsheet, databases, and data forms. Oregon Dept. of State Lands, Salem, OR.

**The supporting website should be cited as:**

Rempel, M., P. Adamus, and J. Kagan. 2015. Oregon Explorer - Oregon Rapid Wetland Assessment Protocol (ORWAP) Map Viewer: an internet tool for ORWAP wetland assessment support and data archiving. Oregon State University Library and Institute for Natural Resources, Oregon State University, Corvallis, OR. Internet:  
[http://tools.oregonexplorer.info/oe\\_map\\_viewer\\_2\\_0/Viewer.html?Viewer=orwap](http://tools.oregonexplorer.info/oe_map_viewer_2_0/Viewer.html?Viewer=orwap)

This manual, the calculator spreadsheet, supporting data files, data forms and other wetland assessment guidebooks may be downloaded from the Oregon Department of State Lands' Technical Resource web page (under construction at time of printing) or [www.oregonstate.edu/~adamusp/](http://www.oregonstate.edu/~adamusp/).

Updates also will be posted periodically at these locations.

For more information about this protocol and opportunities to be trained in its use, please contact:

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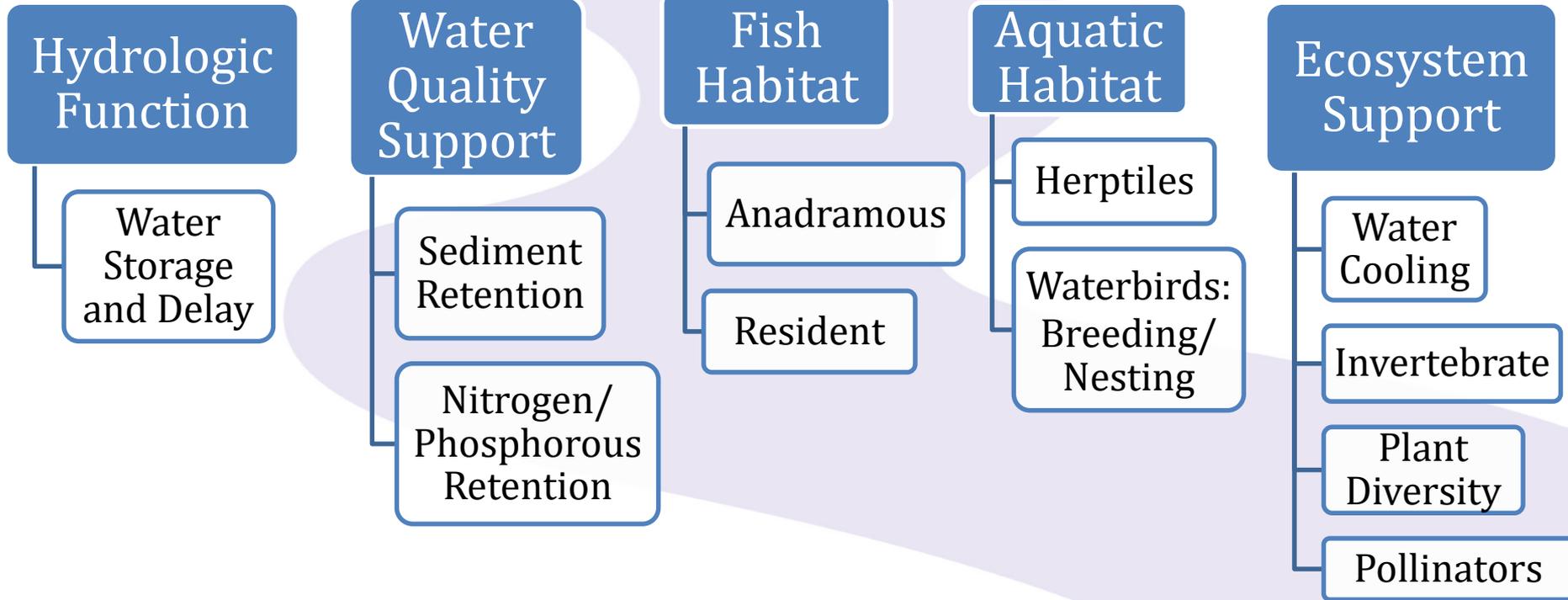
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# ORWAP Overview

- Standardized Protocol
- Rapid Assessment in a Single Site Visit
- Based on Peer-Reviewed Literature
- Repeatable and Accurate



# ORWAP: What Does it Measure?



# ORWAP: How is it Built?

- Literature reviews of indicators
- Selecting relevant indicators/ranking importance
- Excel-based logic model
- Normalized scores



# ORWAP: Using the Results

- Design Tool
  - Adaptive Management
  - Monitoring trajectory
- ...but some caveats



# ORWAP Conceptual Model



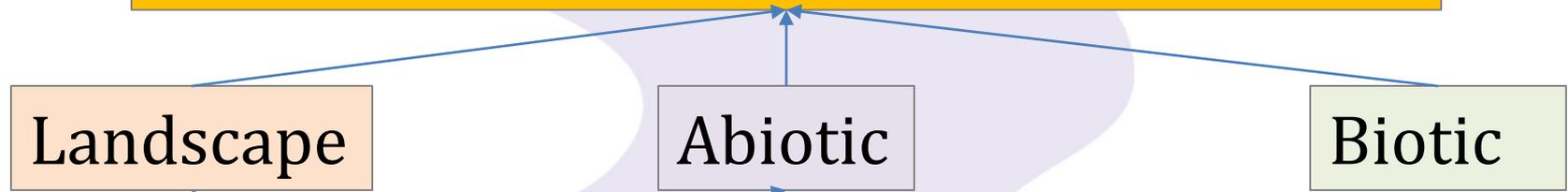
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# ORWAP Model Outputs

<b>Site Name:</b>		<b>Batwater Station (POST)</b>						
<b>Investigator Name:</b>		<b>DE</b>						
<b>Date of Field Assessment:</b>								
<i>Scores will appear below after data are entered in worksheets OF, F, T, and S. See Manual for definitions and descriptions of how scores were computed and ratings assigned.</i>								
<b>Normalized Scores &amp; Ratings for this Assessment Area (AA):</b>								
<b>Specific Functions or Values:</b>	<b>Function Score</b>	<b>Function Rating</b>	<b>Rating Break Proximity</b>	<b>Values Score</b>	<b>Values Rating</b>	<b>Rating Break Proximity</b>	<b>Function Score (raw)</b>	<b>Values Score (raw)</b>
Water Storage & Delay (WS)	0.00	Lower		0.00	Lower		0.00	0.00
Sediment Retention & Stabilization (S)	8.69	Higher		6.49	Higher	MH	8.75	4.94
Phosphorus Retention (PR)	7.31	Higher		6.03	Moderate	MH	7.69	4.82
Nitrate Removal & Retention (NR)	8.62	Higher		4.79	Moderate		8.89	4.82
Anadromous Fish Habitat (FA)	7.68	Moderate	MH	10.00	Higher		6.74	10.00
Resident Fish Habitat (FR)	7.85	Higher		3.33	Moderate		6.74	3.33
Amphibian & Reptile Habitat (AM)	8.41	Higher		3.74	Lower		7.63	3.74
Waterbird Nesting Habitat (WBN)	0.00	Lower		0.00	Lower		0.00	0.00
Waterbird Feeding Habitat (WBF)	6.97	Higher		10.00	Higher		5.77	10.00
Aquatic Invertebrate Habitat (INV)	3.81	Lower	LM	7.33	Higher		4.90	7.50
Songbird, Raptor, Mammal Habitat (S)	10.00	Higher		5.00	Moderate		10.00	5.00
Water Cooling (WC)	0.00	Lower		0.00	Lower		0.00	0.00
Native Plant Diversity (PD)	0.00	Lower		0.00	Lower		0.00	0.00
Pollinator Habitat (POL)	8.34	Higher		3.09	Moderate		7.19	2.50
Organic Nutrient Export (OE)	6.79	Moderate	MH				6.01	
Carbon Sequestration (CS)	6.13	Moderate	MH				5.37	

# Anadromous Fish Conceptual Model

## Anadromous Fish Habitat Function Scores

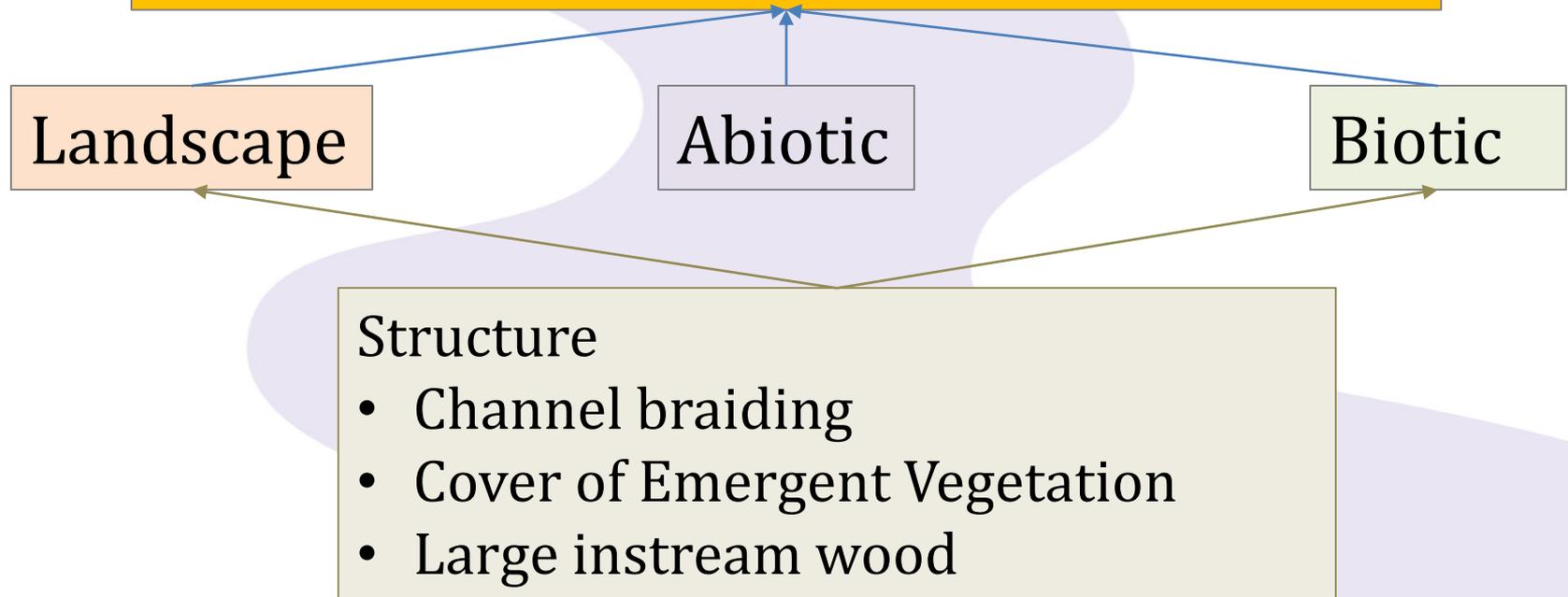


### Hydrologic Regime

- Duration of Connection
- Presence of flowing water
- Presence of ponded water

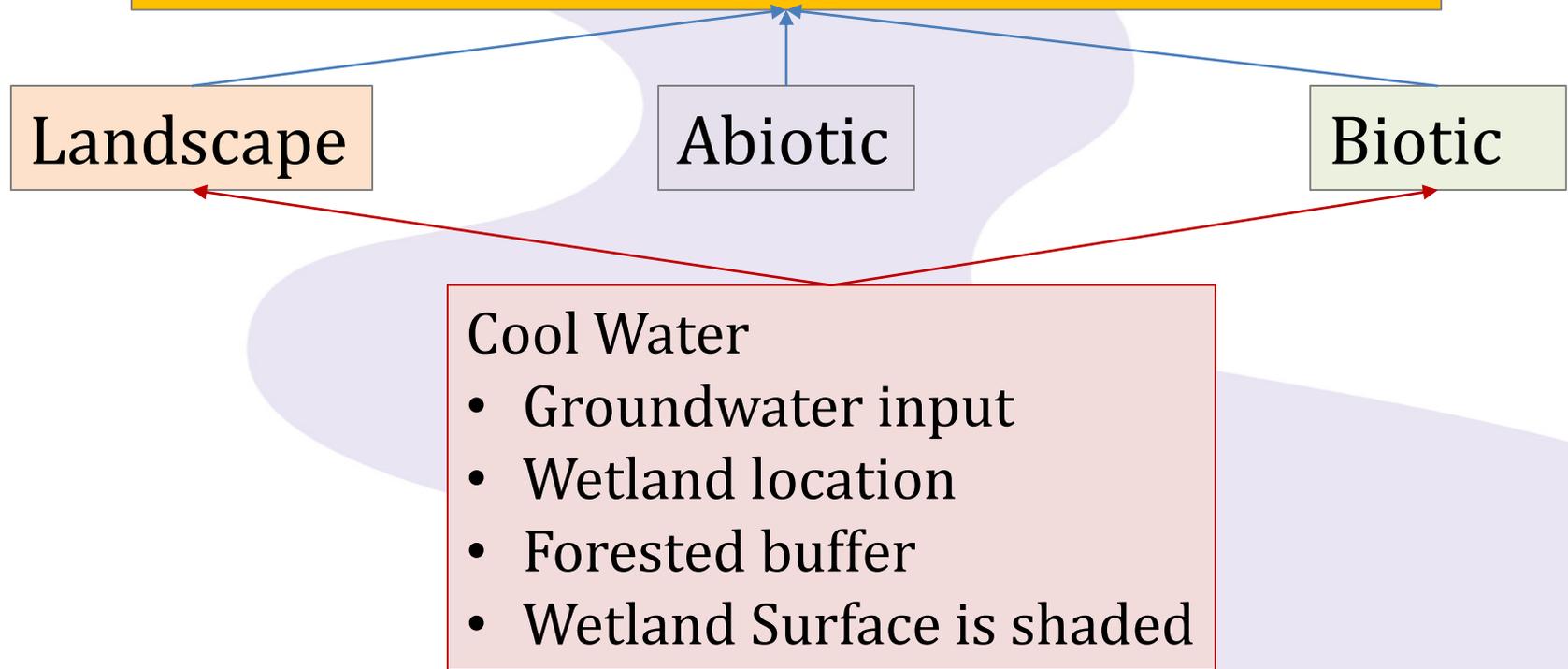
# Anadromous Fish Conceptual Model

## Anadromous Fish Habitat Function Scores



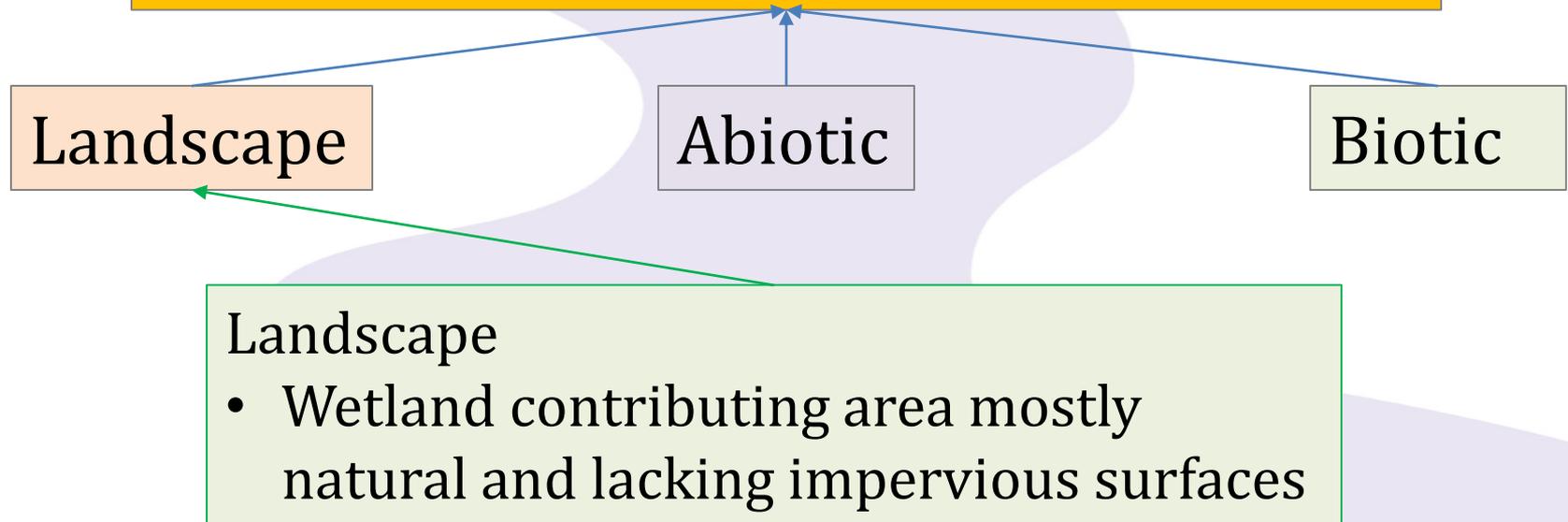
# Anadromous Fish Conceptual Model

## Anadromous Fish Habitat Function Scores



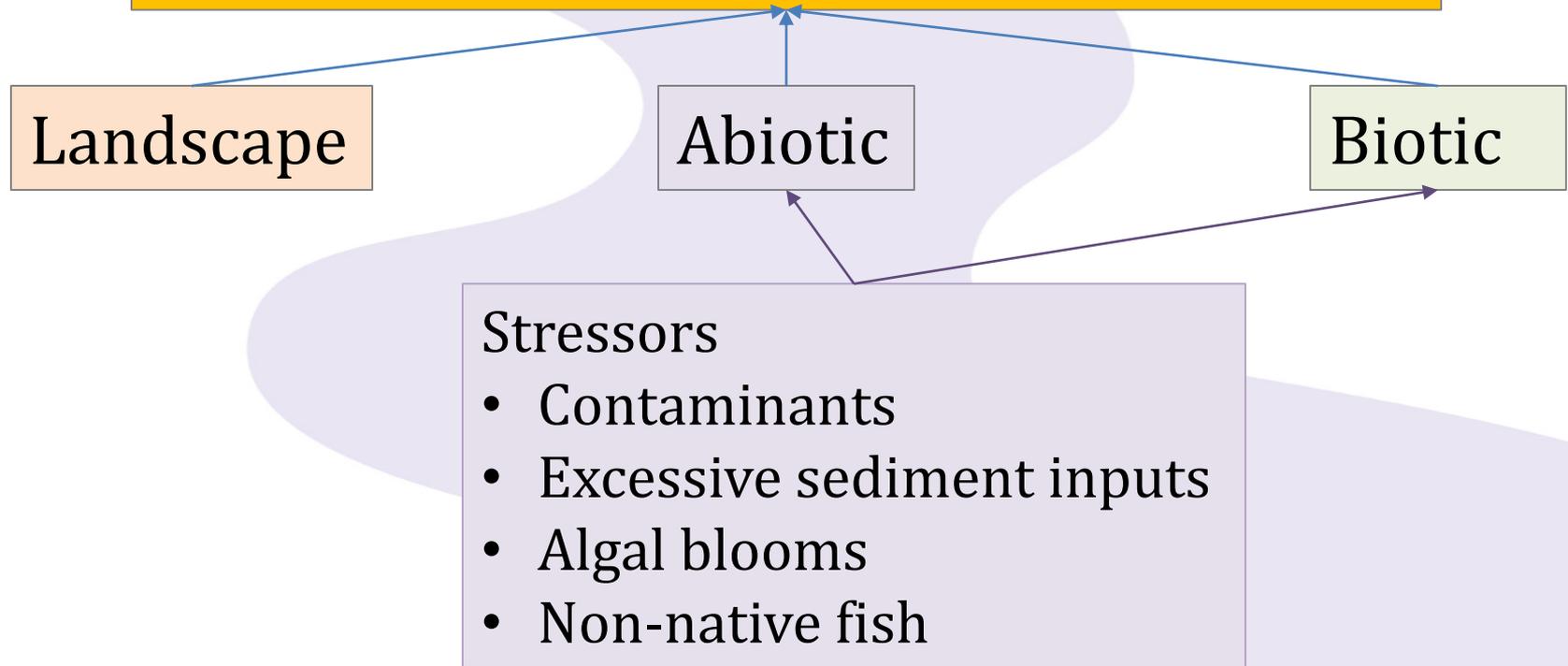
# Anadromous Fish Conceptual Model

## Anadromous Fish Habitat Function Scores



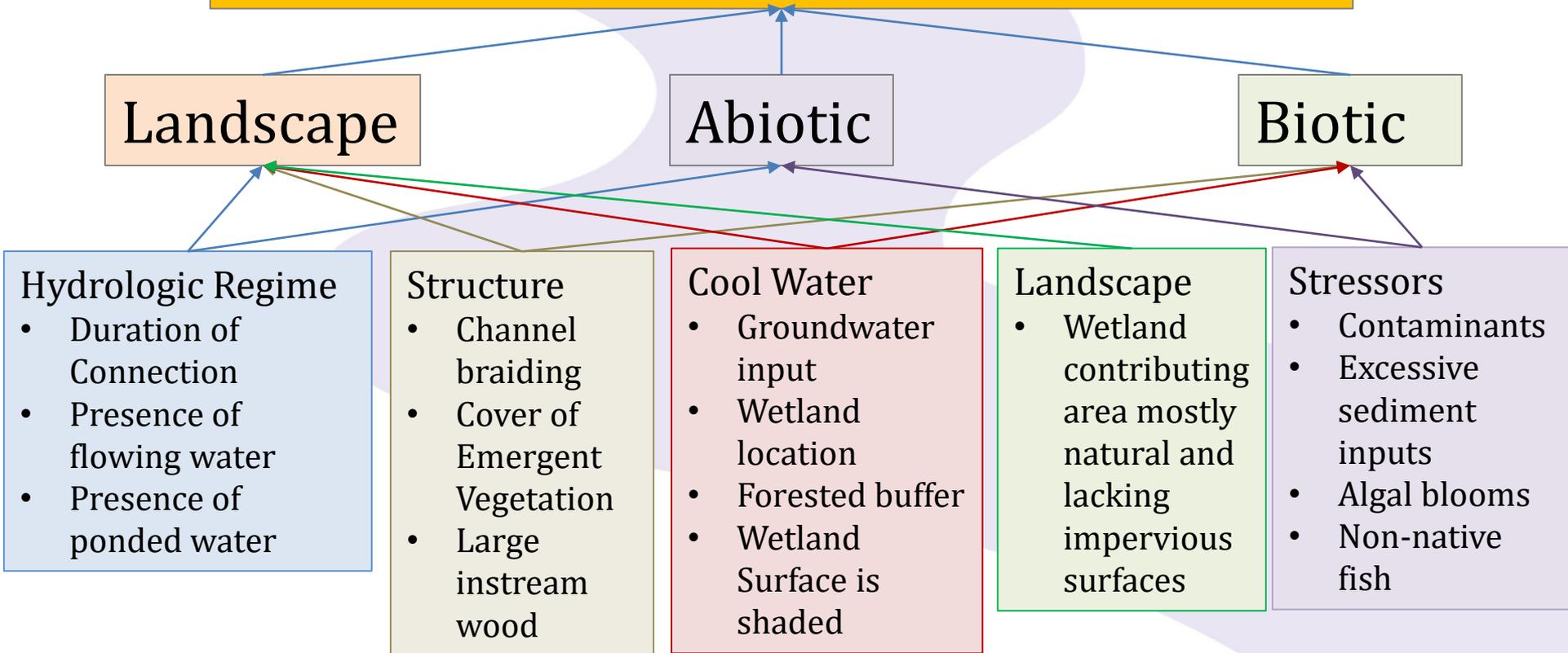
# Anadromous Fish Conceptual Model

## Anadromous Fish Habitat Function Scores



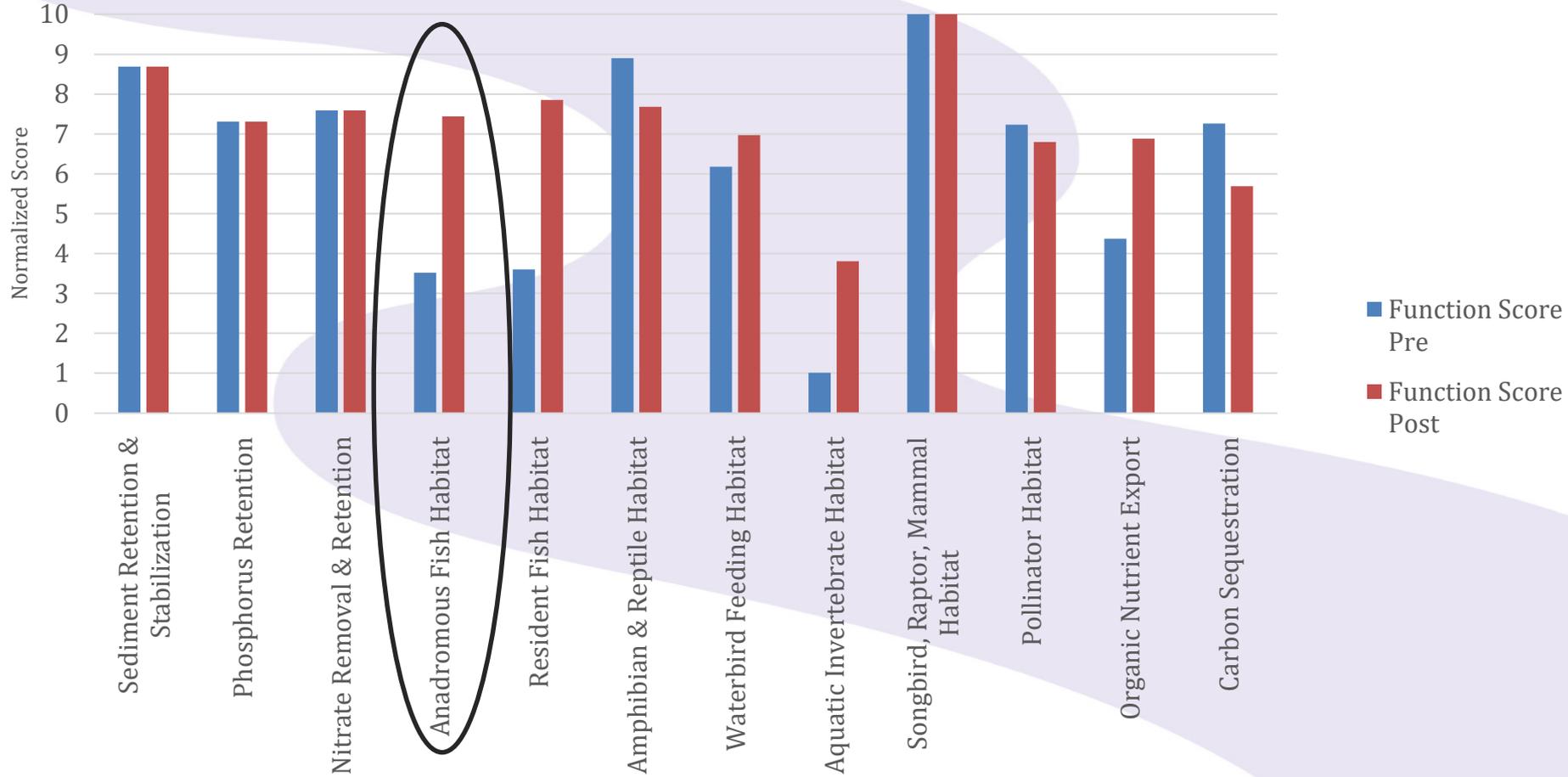
# Anadromous Fish Conceptual Model

## Anadromous Fish Habitat Function Scores





# Function & Value Scores



# Next Steps

- Use the existing ORWAP framework to create a model specific to the lower Columbia River and estuary
- Review appropriateness of questions related to species in our region
- Determine how current AEMR and/or EMP data can be used to improve scoring
- Self validate model
- Generate scores of for wetlands by reach

# Questions & Discussion

