

Tier 3: Habitat Suitability for Juvenile Salmon

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PURPOSE

➤ Estuary Partnership and PNNL developed a Habitat Restoration Prioritization Framework for restoration projects on the Lower Columbia River (Thom et al. 2011)

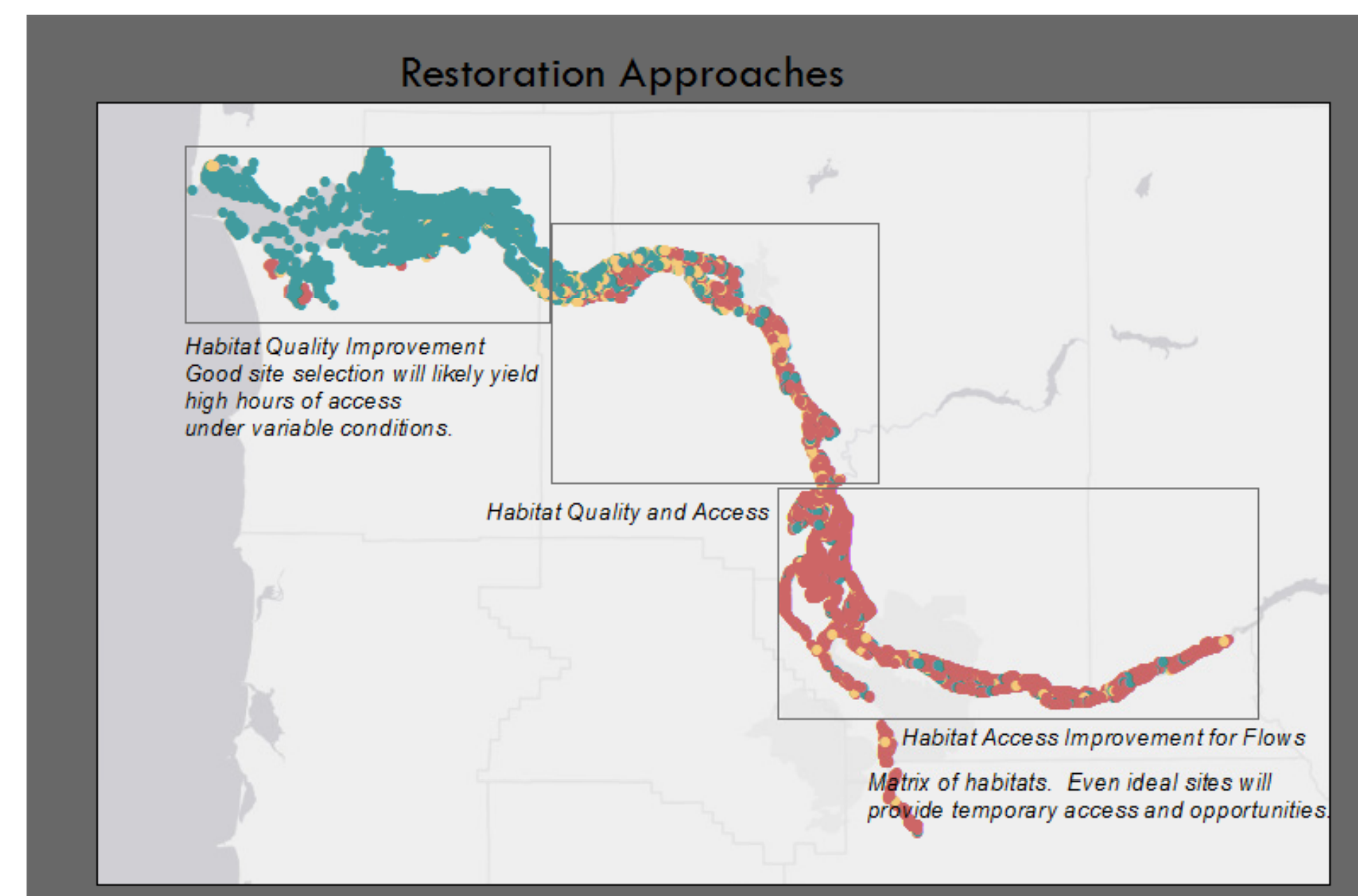
➤ Existing framework did not explicitly assess priorities with respect to needs for salmon

➤ We developed a GIS based estuary-wide assessment of key areas for restoration to enhance refuge and foraging habitat for juvenile Chinook salmon.

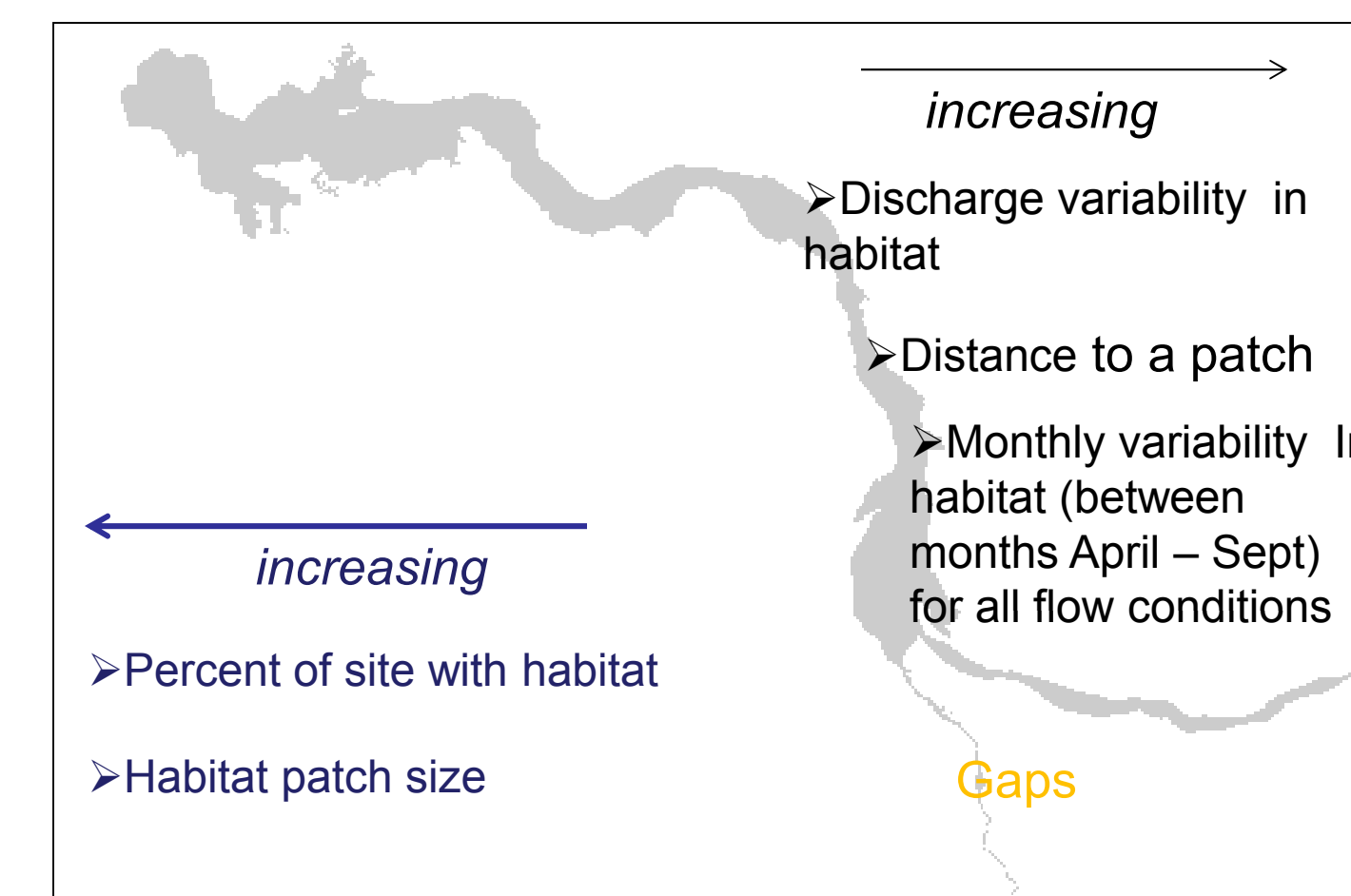
➤ Examined three goals:

- Protect sites that currently are functioning
- Restore for a diversity of life history strategies (quantity, timing, and matrix of habitats)
- Restore for the individual - minimize spatial gaps between resources

The Tier 3 Assessment was created as part of the Estuary Partnership's Habitat Restoration Prioritization Framework, and provides a landscape approach to identify key areas for restoration and protection in the Lower Columbia River estuary with respect to enhancing foraging and refuge habitat for "ocean-type" juvenile salmon. The assessment first develops a habitat suitability index based on OHSU's SELFE hydrodynamic model for key time periods and varying flow conditions. Second, habitat suitability patches are mapped under these different conditions based on meeting an area and index threshold. Finally, both summary and distance metrics are assessed between dynamic patches and across the estuary. Results are interpreted based on four restoration needs: protection of current functioning areas, growth of the total amount of access in terms of area and time available, identification of spatial gaps in habitat, and protection and restoration of a matrix of habitats. Findings indicate that the accessible areas near the dam are spatially variable with both flow and season, while patches near the mouth are more consistent with large areas of mud/tidal flat areas. Low flow conditions see fewer and more disperse areas with some areas of long travel distance. Restoration and protection opportunities that focus on a preserving a matrix of close patches at differing elevations in higher reaches may be critical in maintaining habitat access opportunities. Reducing gaps between habitats particularly in the higher reaches during low flow conditions may be beneficial to juvenile salmon. Finally, tidal and mud flat enhancements in the lower reaches may be an interesting consideration for restoration. Draft results will be available at: <http://coastgis.pnnl.gov/salmonatlas>



RESULTS

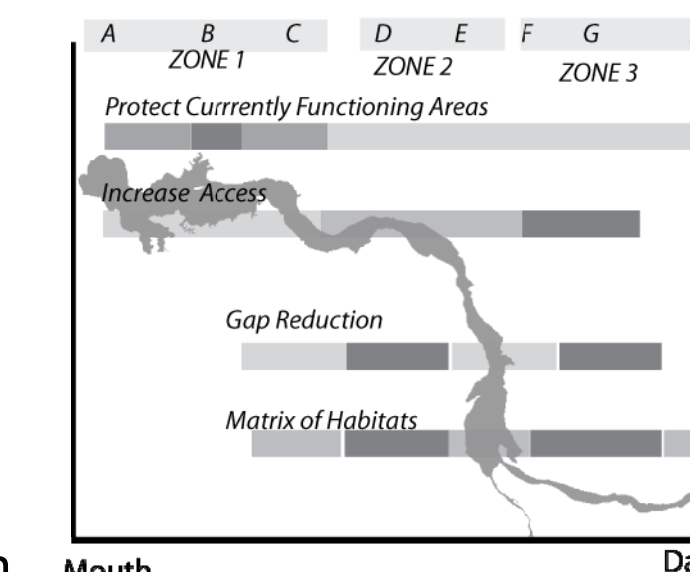


<http://www.coastgis.pnnl.gov/salmonatlas>

APPLICATION

Potential application includes:

- Identifying key areas for restoration and protection
- Ecosystem metric
- Use with other Tiers and information for prioritization of restoration



METHODS

1 DEVELOP HABITAT SUITABILITY INDEX

Defined Criteria

What are optimal conditions for sub-yearling Chinook, (temperature, water level, velocity) and when do these matter?

When and where are criteria met?

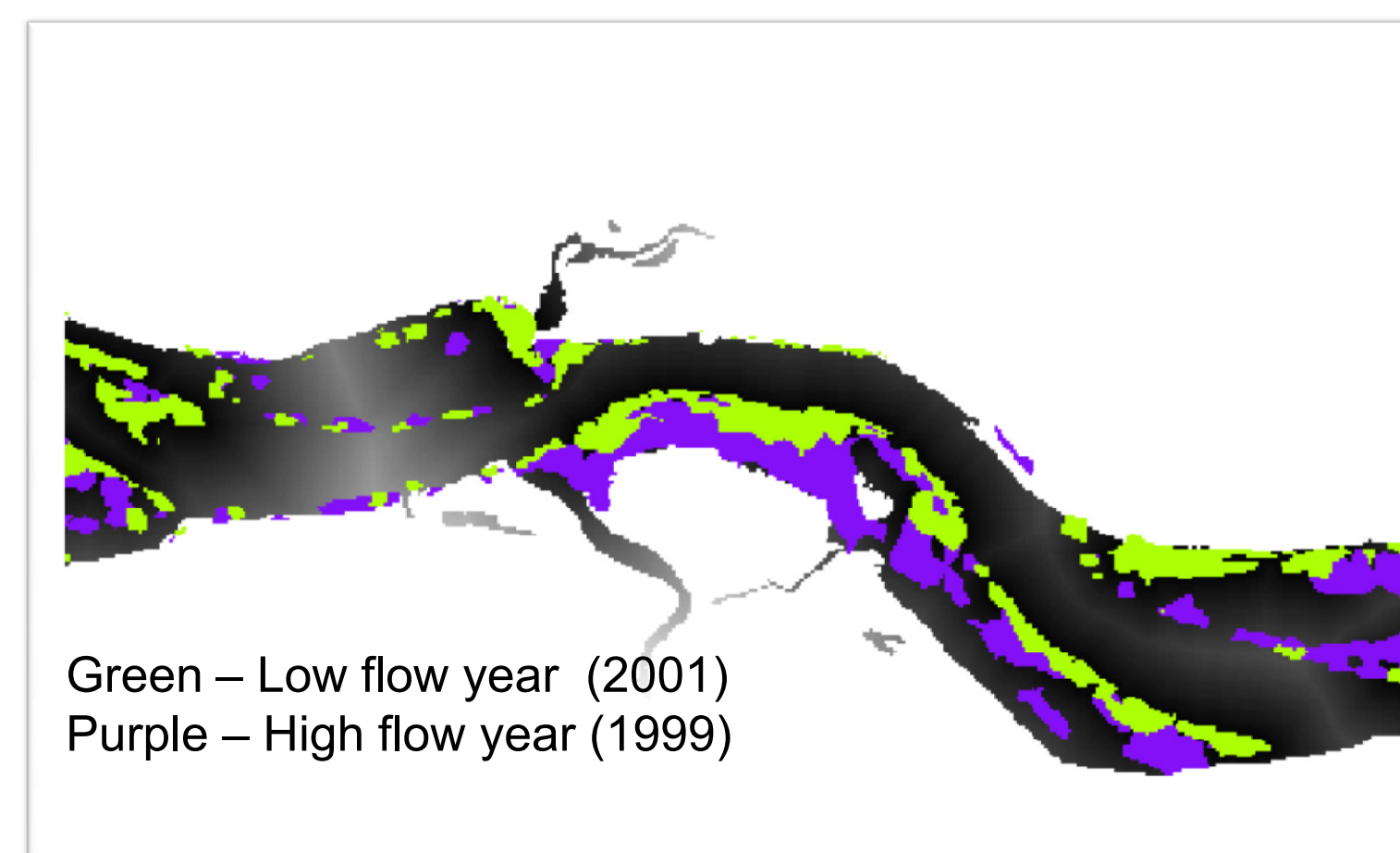
Using OHSU's SELFE hydrodynamic model, determine for every node and time period evaluated (high, low, moderate flow, monthly frequencies from April - Sept), how often (frequency) criteria are met

Develop an index to characterize suitability for each node.

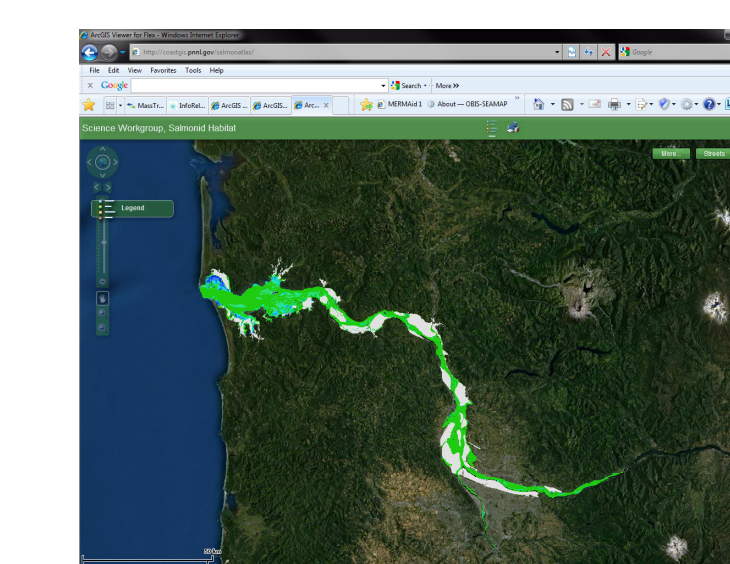
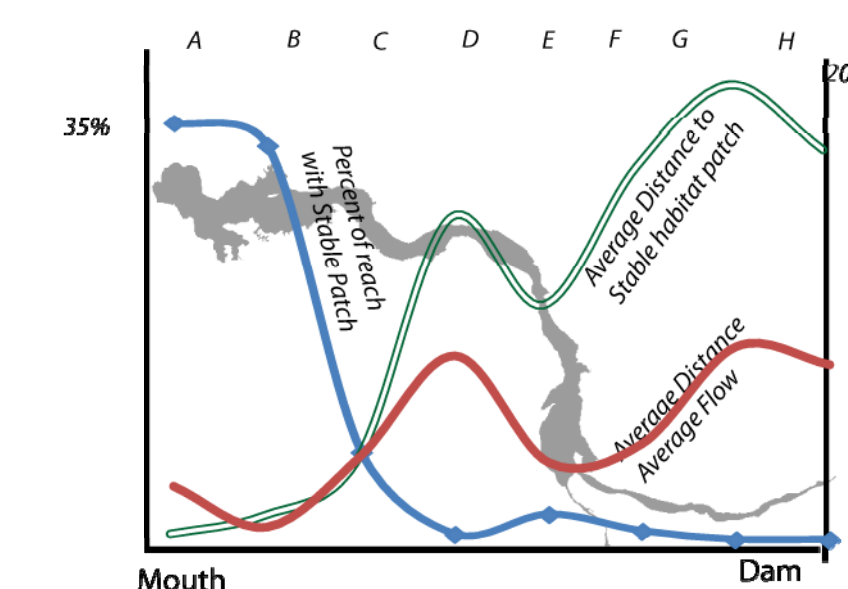
Binned into 5 classes based on frequency
Habitat Suitability Index (HSI) = (RWL * RVT)/25
RWL= Reclassed Water Level Frequencies
RVT= Reclassed Velocity and Temperature
Range of values from 0.0-1.0

2 MAP HABITAT SUITABILITY PATCHES

- Cutoff for HSI score (.1) and minimum contiguous area (1 ha)



3 CALCULATE LANDSCAPE AND DISTANCE METRICS



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For more information about the science you see here, please contact:

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