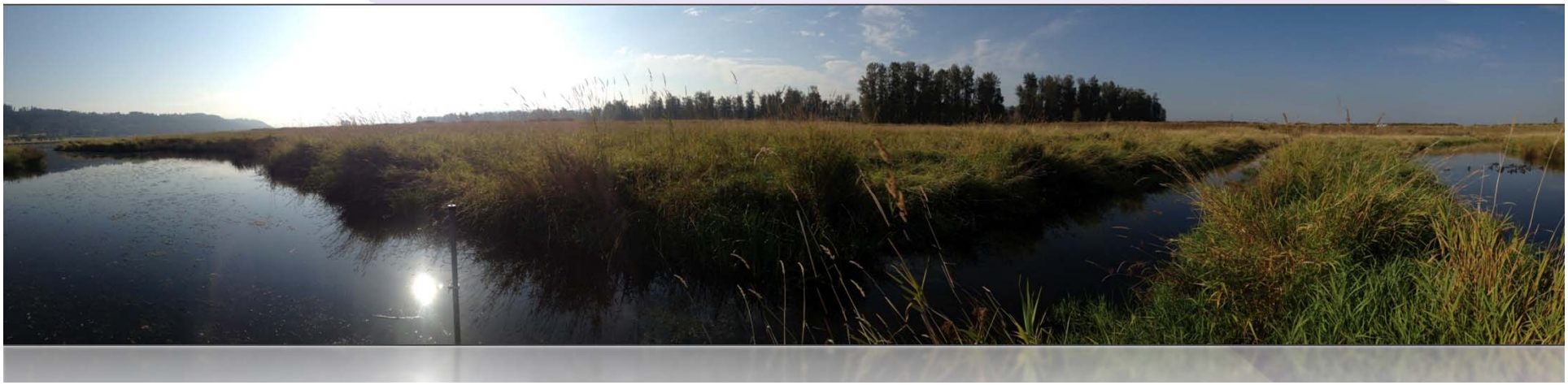
Lower Columbia Estuary Partnership

Restoring the Lower Columbia River Ecosystem – Where do we go from here?

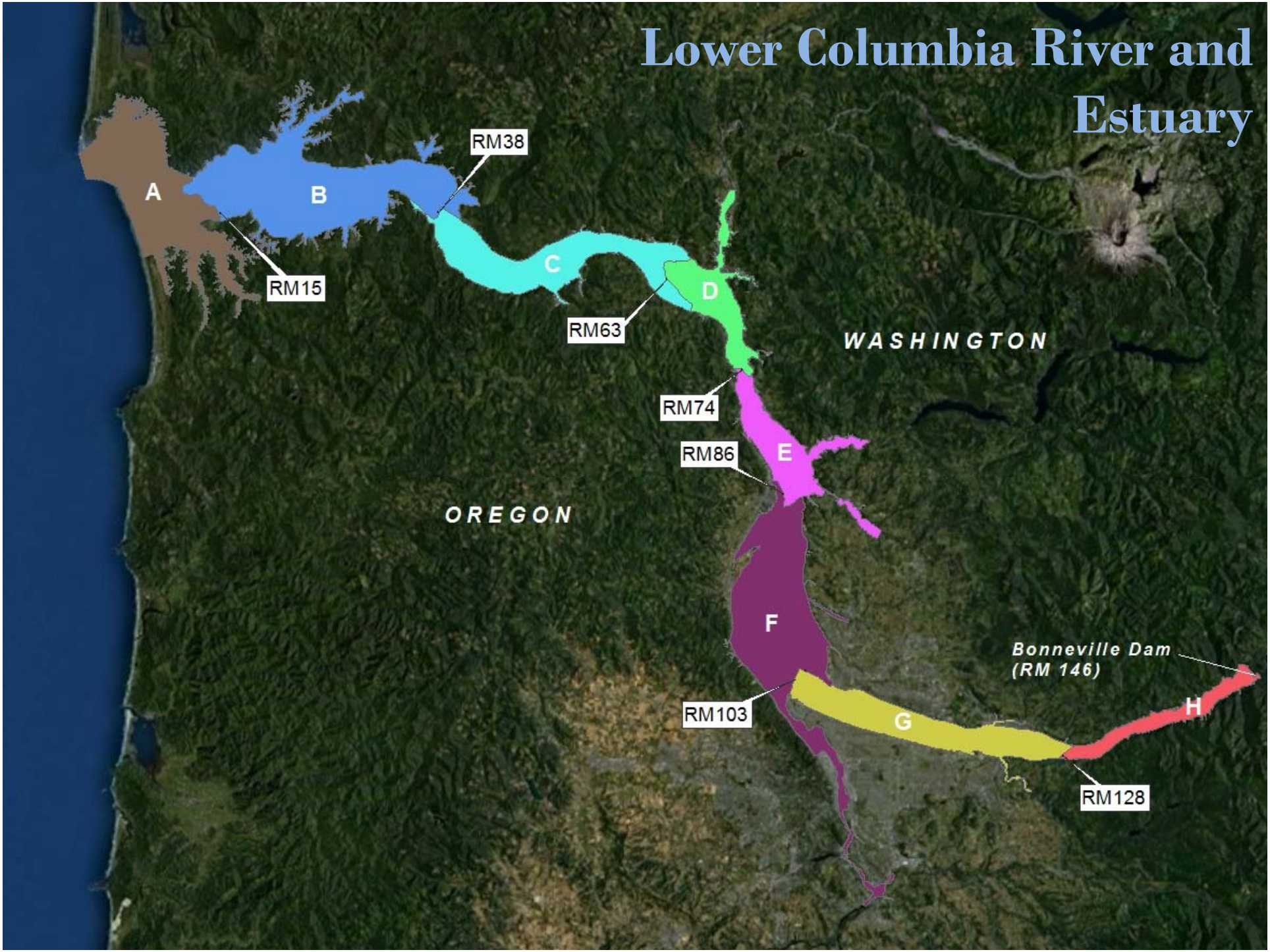
Catherine Corbett, Keith Marcoe

May 28, 2014

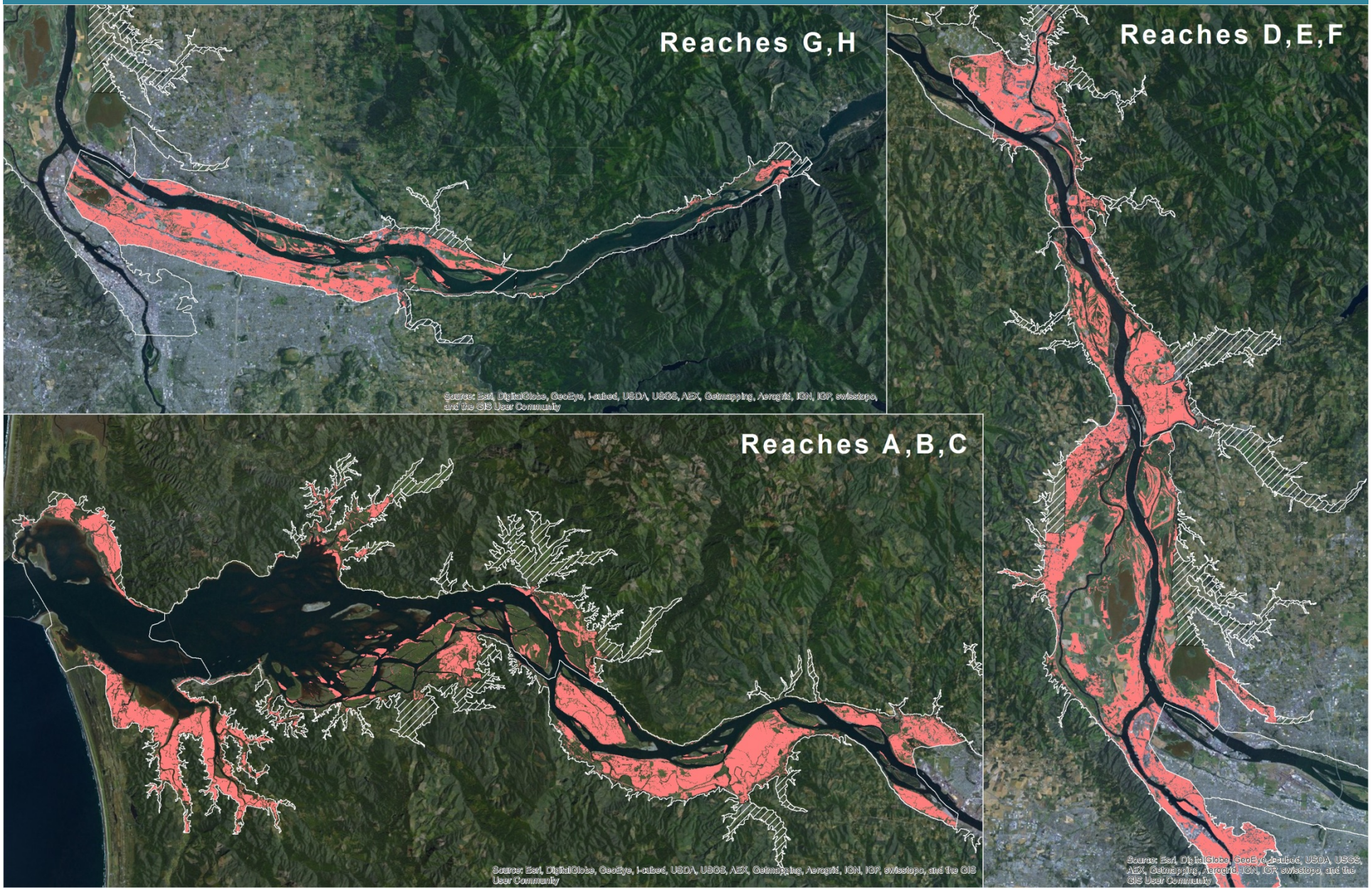


Central Message

- Protection and restoration have historically been focused on single species, faunal guilds
  - Ex: Waterfowl, Columbia White-tailed Deer, Pacific salmon and steelhead
- Need a multi-species approach going forward
  - restoration is expensive
  - limited funding
  - many imperiled species w/ differing habitat needs
- Integration of climate change impacts

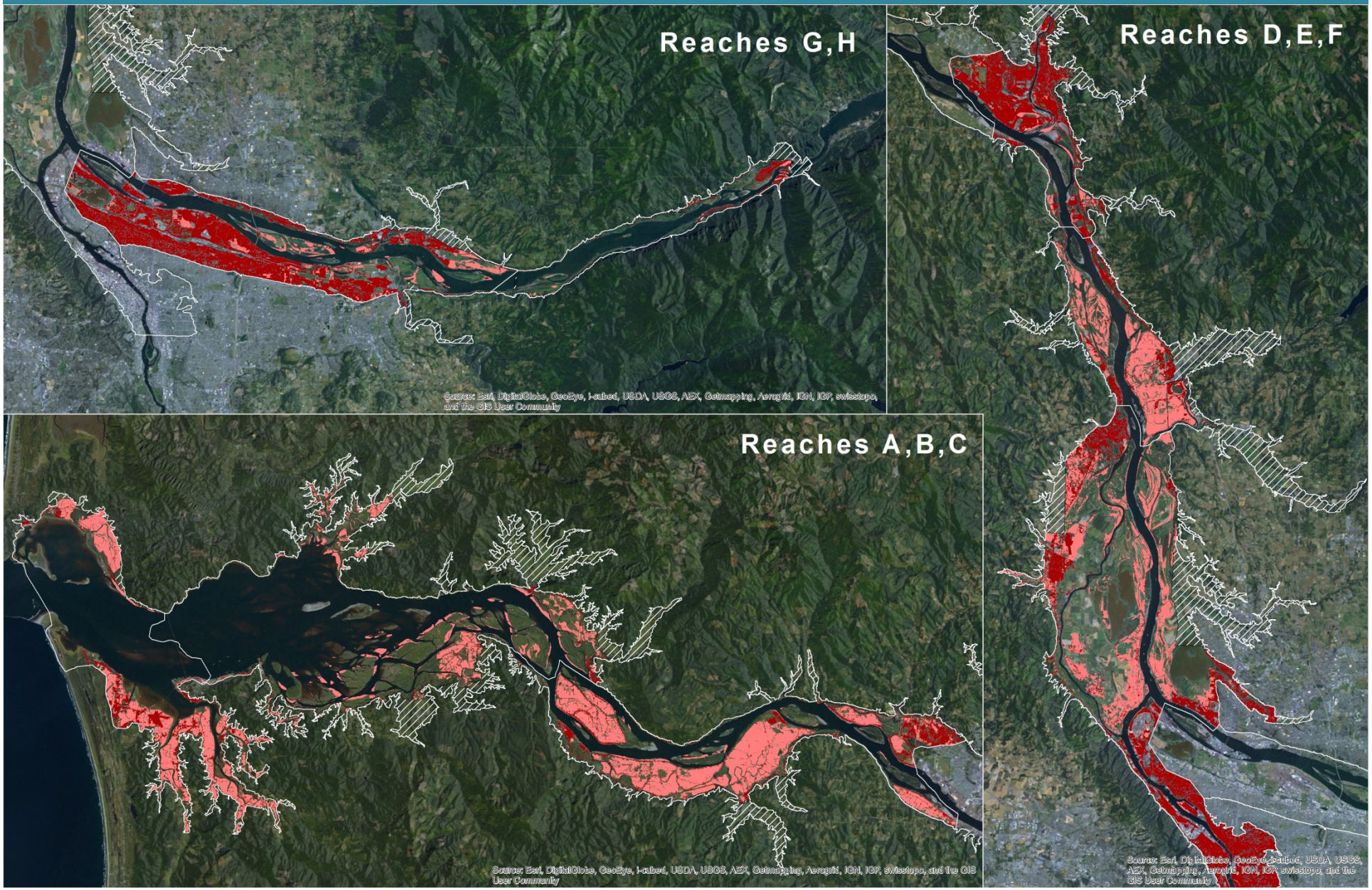

Lower Columbia River and Estuary
A
B
C
D
E
F
G
H
RM38
RM15
RM63
RM74
RM86
RM103
RM128
WASHINGTON
OREGON
Bonneville Dam
(RM 146)

Pink – Native habitats lost since 1870 – 114,050 acres



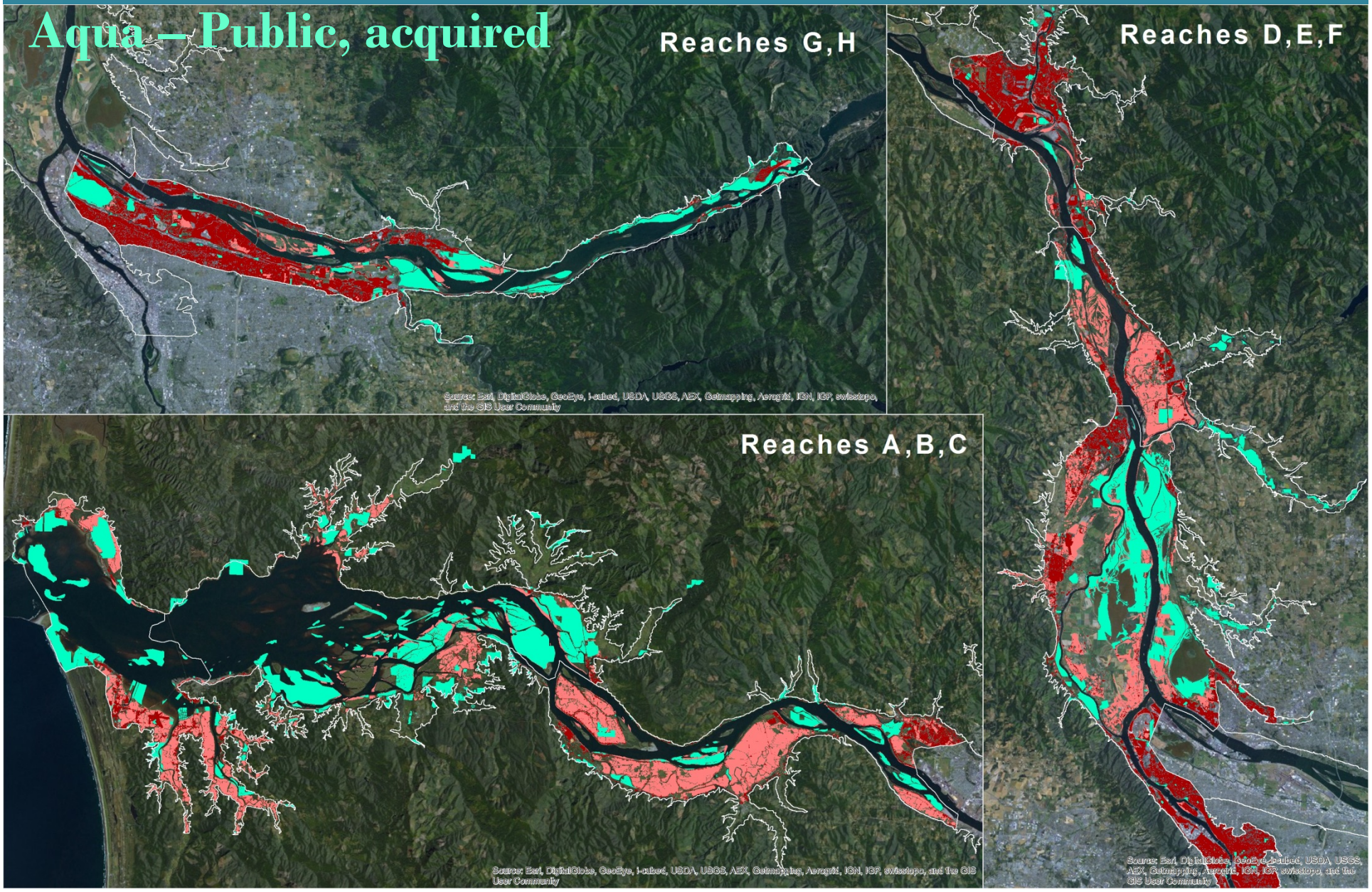
Pink – Native habitats lost since 1870 – 114,050 acres

Red – "non-recoverable"



Pink – Native habitats lost since 1870 – 114,050 acres

Red – "non-recoverable"

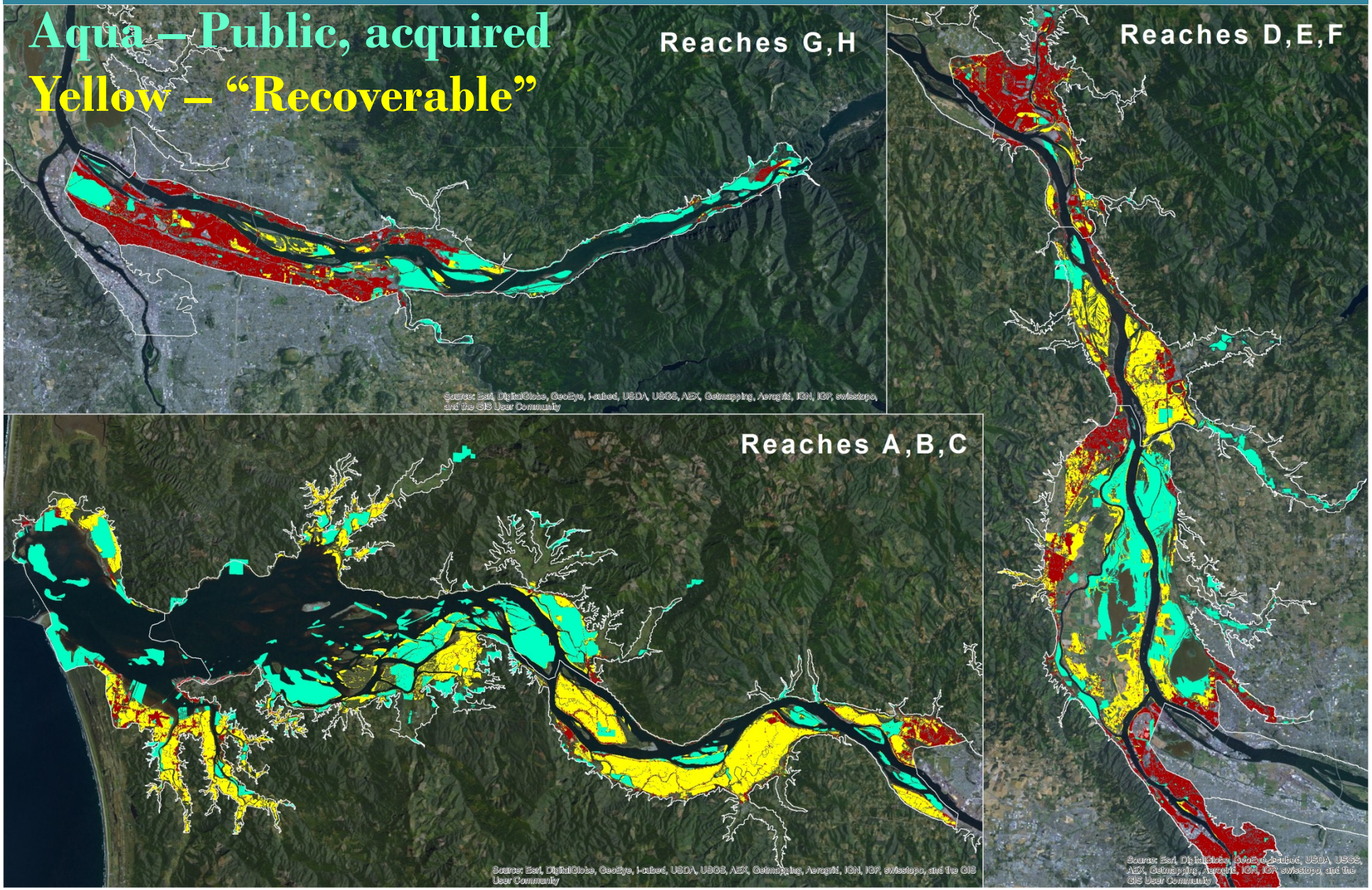


Pink – Native habitats lost since 1870 – 114,050 acres

Red – "non-recoverable"

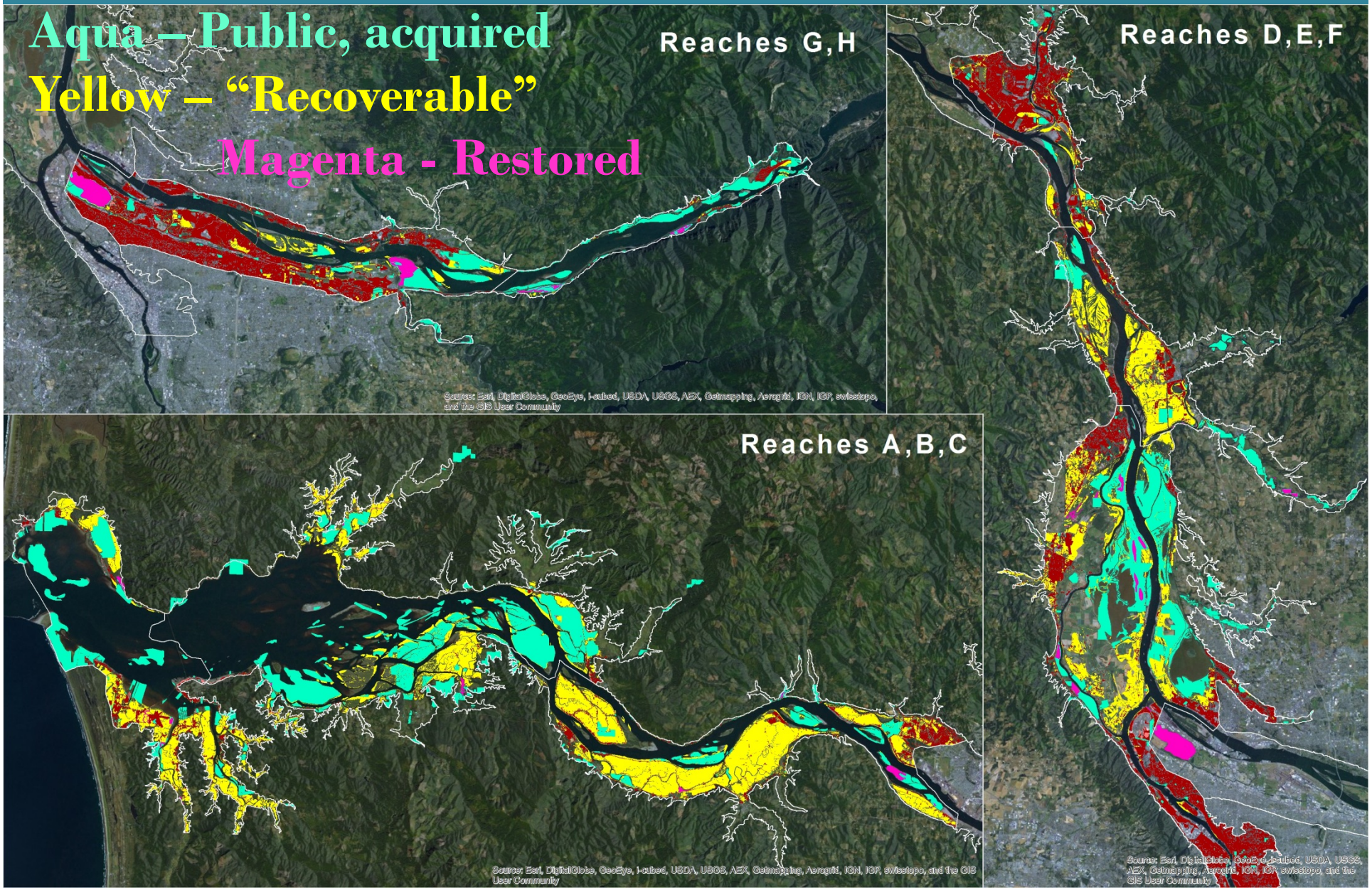
Aqua – Public, acquired

Yellow – "Recoverable"



Pink – Native habitats lost since 1870 – 114,050 acres

Red – "non-recoverable"



Management Plan - Biological Integrity is Ultimate Goal

➢ Biological Condition Gradient for Assessment

(USEPA: Davies and Jackson 2006)

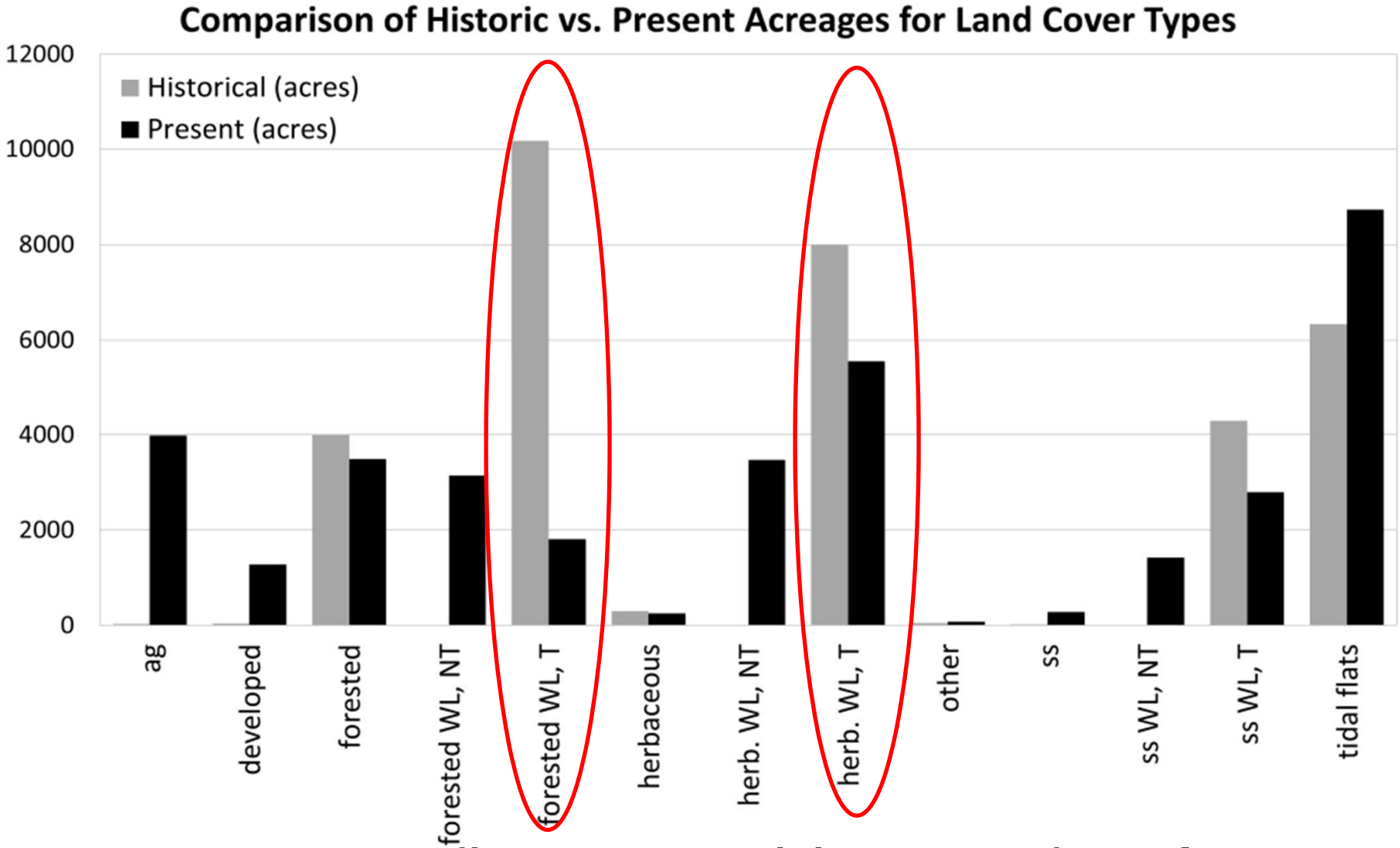
- Similar to Index of Biological Integrity (Karr 1981)
- Used in freshwater streams; USEPA adapting it to estuaries
- ***Science Community identifies key ecosystem attributes***
  a. **Natural Habitat Diversity, Historical Habitat Mosaic**
  b. **Focal Species:** e.g., Pacific salmonids, Col. White-tailed deer, Pacific Flyway species (NPCC 2004)
  c. **Water Quality**
  d. **Ecosystem Processes**

Define Quantifiable Conservation Targets

a. Natural Habitat Diversity, Historic Habitat Mosaic

- **Integral for other attributes (e.g., focal species)**
  - Native species evolved with historic habitat conditions; restoring to those conditions should be protective of those native species
- **Completed Habitat Change Analysis comparing 1870s habitat coverage to 2010**
  - Historic habitat coverage is proxy for natural habitat diversity
  - Identify significant losses and types
  - Protect remaining intact habitats; recover lost habitats in areas where practical

Prioritized Habitats by Severity of Loss by Reach, Region and Entire Lower River



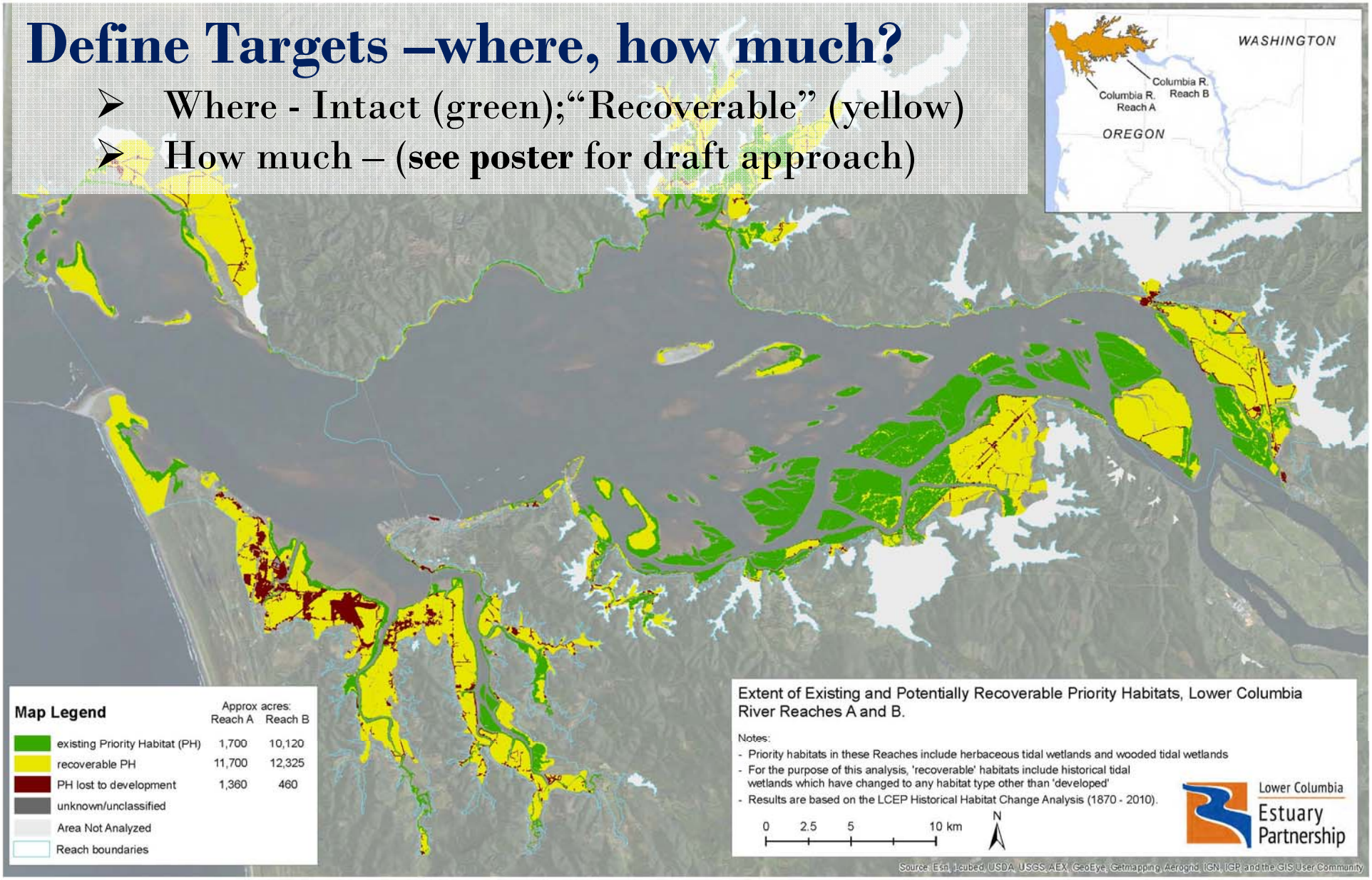
Comparison of historic vs. current habitat coverage for **Reach B**

Priority Habitats to Recover Historic Habitat Diversity:

Reach	Priority Habitats			
	1	2	3	4
A	herbaceous tidal WL	wooded tidal WL		
B	wooded tidal WL	herbaceous tidal WL		
C	wooded tidal WL	herbaceous tidal WL		
D	herbaceous tidal WL	wooded tidal WL	forested	herbaceous
E	herbaceous	forested	shrub-scrub	herbaceous tidal WL
F	forested	herbaceous	herbaceous WL	shrub-scrub
G	forested	herbaceous	herbaceous WL	
H	wooded WL			

Define Targets –where, how much?

- Where - Intact (green);"Recoverable" (yellow)
- How much – (**see poster** for draft approach)



Application of Lines of Evidence 1 – Priority Habitats for Recovering Habitat Diversity

Available from website: http://www.estuarypartnership.org/historical-habitat-change

Recommended Habitat Coverage Targets

- **No net loss of native habitats (2009 baseline; 114,050 acres lost since 1870)**
- **Recover 30% of historic extent for priority habitats by 2030; 40% of historic extent by 2050**
  - *Representation* of priority habitats ("coarse filter")
  - *Representation* of rare, vulnerable habitats ("fine filter")
  - Ensure many examples of habitats in each region for *redundancy*
  - Restore quality, condition of habitats - *resiliency* of habitats to persist through disturbance
- **Other aspects:**
  - Multiple large "reserves"
  - Smaller patches interspersed that fill gaps, ensure corridors, increase connectivity
    - *Identify minimum size criterion*
    - *Identify minimum number of occurrences of habitats by region*

Next Steps

- **Identify minimum size criterion for larger "reserves" and small patches of habitats**
  - Encourage implementation of anchor areas
- **Identify minimum number of occurrences of habitats by region**
- **Identify gaps in habitats, key corridors**
- **Determine if these targets are protective of common species**
  - ensure # discrete locations 10->80 for use by common species
- **Have targets peer reviewed (e.g., ISRP)**
- Track implementation of targets
- Monitor effectiveness of targets in reaching goal (i.e., *restoring biological integrity of lower Columbia*)
- *Develop targets for focal species attributes and revisit these targets to ensure they don't conflict*

Geographic Priorities for other Attributes (focal species, water quality, ecosystem processes)

1. **Juvenile salmonid Habitat Suitability Index model *(complete)***
   - Identify locations in mainstem of optimum water velocities, temperature, and depth, adapting regional criteria, employing OHSU SELFE model results
2. **Priority tributaries in OR and WA Salmonid Recovery Plans *(complete)***
   - Tidal reaches of tributaries priority for chum and fall/late fall Chinook (subyearling life history strategy that rear extensively in tidal areas); weighted system on mainstem based on Skagit data
3. **Columbia White-tailed deer habitat (USFWS) (*complete*)**
4. **Priority Toxic Contaminant Clean up sites (Yakama Nation) (*draft*)**
5. **Habitats Priority for Pacific Flyway, Avian (USFWS) (*planned*)**
6. **Amphibian habitat suitability (states, USFWS) (*planned*)**
7. **Climate change impacts**
   - Sea level rise and inland migration of wetlands (***planned***)
   - Mapping and assessment of cold water refugia (***planned***)
   - Changes to habitat structure with increased CO2, temperature, changes in precipitation (***planned***)

That's Great, But…

Climate change impacts:

- **Sea level rise –**
  - Submersion and conversion of habitats
- **Changing precipitation patterns** –
  - More precipitation falling as rain, lower snow packs in mountains
  - Higher winter flows, lower summer flows
  - Altered timing and rates of change in flow events
  - More intense storms, increased wave energy, increased erosion
- **Changes in upwelling patterns** off coast -
  - Increased potential intrusion into estuary of hypoxia and acidification
  - Increased influence with lower summer flows w/precip changes
- **Warmer water (and air) temperatures**–
  - Less habitat for cold water species
  - Species shifts, migration, mortality, increased competition

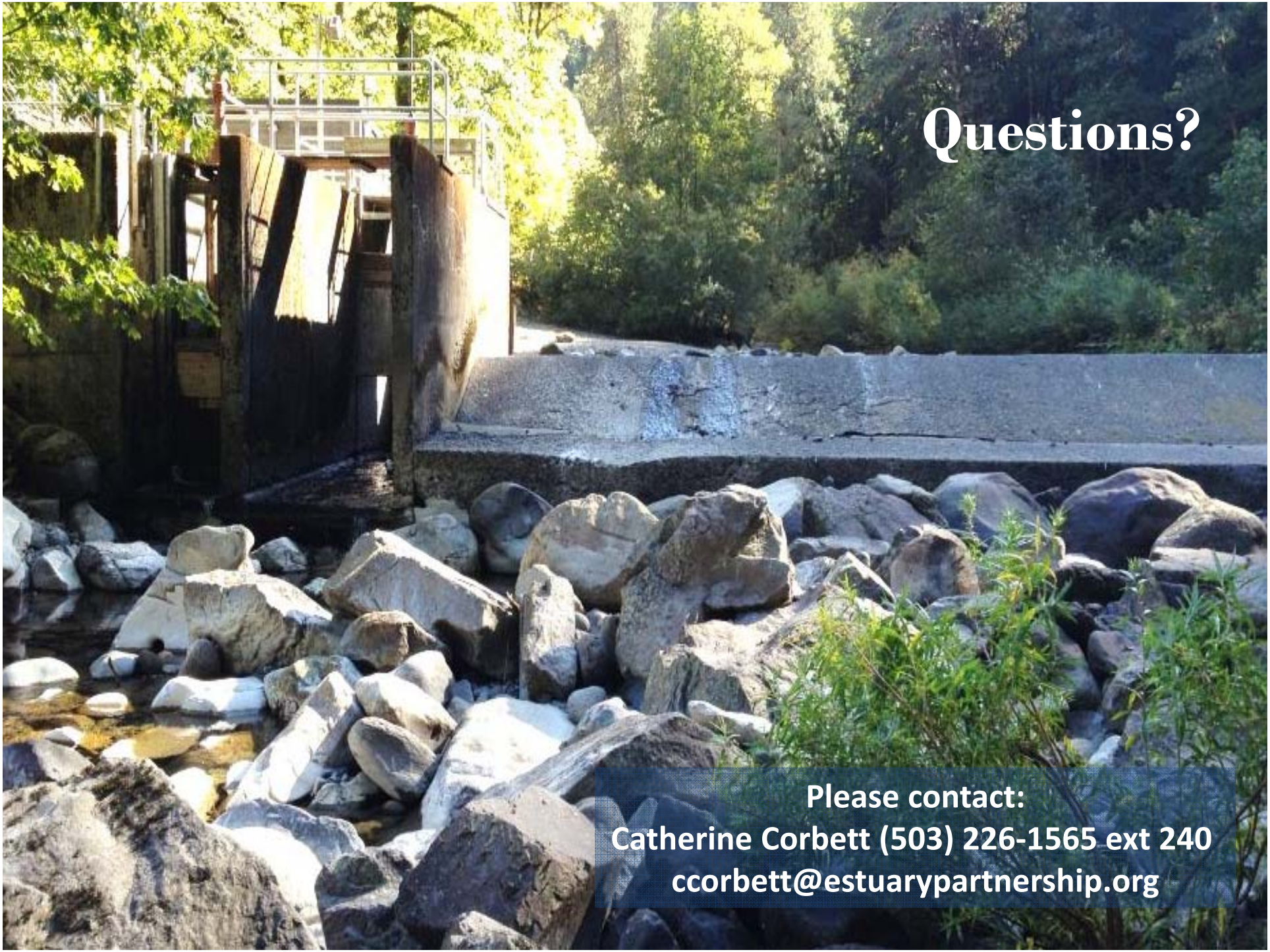
Paradigm Shift

Mitigating for Climate Change:

- To maintain floodplain wetlands, will need to **allow wetlands to migrate inland**
  - Assess sea level rise, marsh erosion, submersion
  - Identify areas - urban, productive agricultural - that will be protected
  - Protect more inland, upland areas behind current habitats
  - Strategic levee and dike modification
- Identify ways to support **species ability to adapt**
  - Provide diversity of habitats to support resiliency of species using them
  - Protect, restore base flow, groundwater inputs to tributaries, alluvial fans to provide cold water refugia
  - Understand likely changes in habitat structure with increasing temperatures, changing precipitation and inundation, flow patterns
  - Understand likely species shifts, migration, mortality, competition
  - *Adapt land and species management strategies* – focus on restoring historic conditions might not be protective of native species

Challenge for Restoration in Short Term

- **Incorporate multiple species into restoration project designs**
  - Funding may be focused on single species (e.g., Pacific salmon and steelhead, waterfowl), BUT
  - Responsibility of project sponsors to not cause harm to other native species (e.g., amphibians, turtles)
  - Sponsors can integrate aspects into design to benefit other species
    - Ex. - survey for frog egg masses and design intertidal reconnections so that tidal fluctuations will not cause desiccation of eggs
    - Ex. - add large wood for turtles, beaver, others
- **Protect, restore cold water refugia**
  - Protect, restore instream baseflow to tributaries
  - Remove diversions, weirs that dewater downstream areas
    - Re-assess practices (e.g., some hatcheries) that use weirs if they dewater downstream areas
  - Remove barriers, improve riparian conditions, and increase complexity
- **Work to fill gaps in habitat diversity, build onto protected areas for larger "anchor areas" for resiliency**


Questions?
Please contact:
Catherine Corbett (503) 226-1565 ext 240
ccorbett@estuarypartnership.org