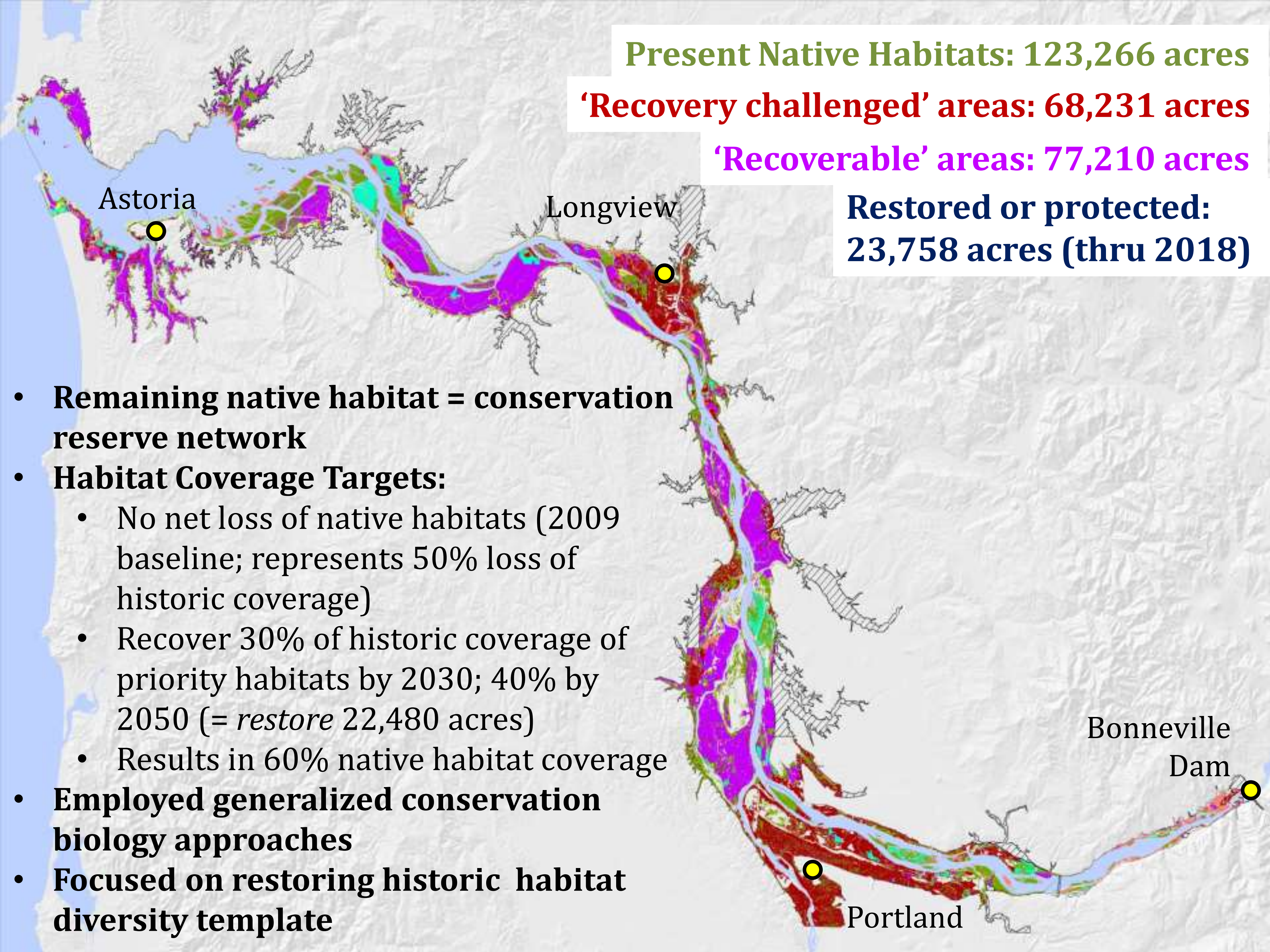
Lower Columbia Estuary Partnership

Integrating Climate –Smart Conservation into our Ecosystem Restoration Program for the Lower Columbia River

Catherine Corbett

April 16, 2019



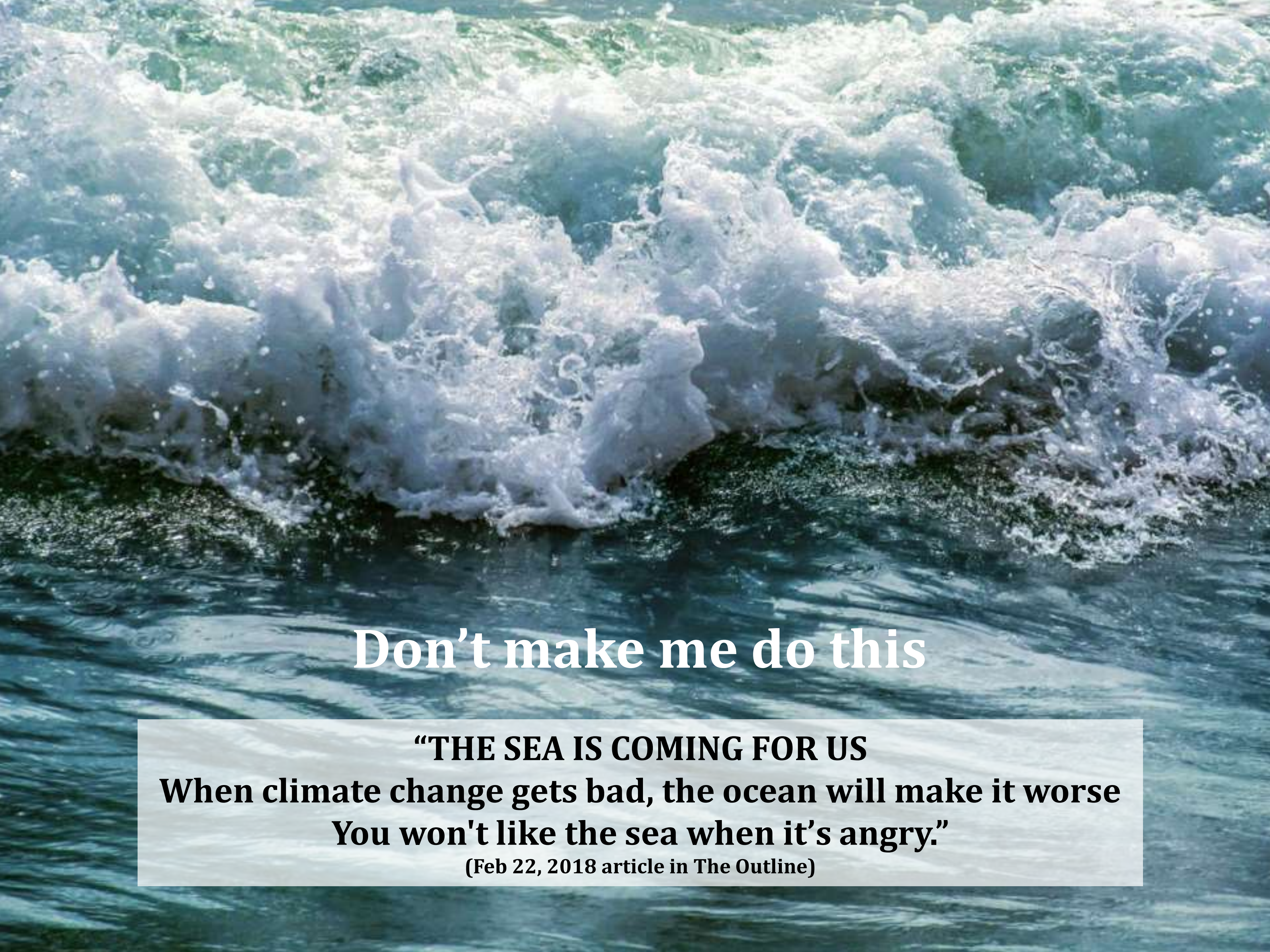
Present Native Habitats: 123,266 acres

'Recovery challenged' areas: 68,231 acres

'Recoverable' areas: 77,210 acres

Restored or protected: 23,758 acres (thru 2018)

- **Remaining native habitat = conservation reserve network**
- **Habitat Coverage Targets:**
  - No net loss of native habitats (2009 baseline; represents 50% loss of historic coverage)
  - Recover 30% of historic coverage of priority habitats by 2030; 40% by 2050 (= *restore* 22,480 acres)
  - Results in 60% native habitat coverage
- **Employed generalized conservation biology approaches**
- **Focused on restoring historic habitat diversity template**


Don’t make me do this
“THE SEA IS COMING FOR US
When climate change gets bad, the ocean will make it worse
You won't like the sea when it’s angry.”
(Feb 22, 2018 article in The Outline)

Shifting Ecosystem Conditions:

- **Sea level rise** and more intense storms, increased wave energy, increased erosion (National Climate Assessment 2017)
  - **Further loss of floodplain habitats -** Increased flooding, conversion, submersion and erosion of floodplain habitats
  - **Ocean acidification and hypoxia** (OAH) – Changes to shellfish, ocean food web, fish behavior
- **Marine heatwaves** changing ocean food web, predation, disease
- **Changes to California Current-** patterns of upwelling, timing and duration;
  - Changes to thermal stratification, ocean acidification and hypoxia
- **Warmer temperatures, changing precipitation patterns**
  - More intense events, more variable weather
  - More precipitation falling as rain, lower snow packs in mountains
  - Increased drought
- **Increased pest invasions**, tree dieoffs, and

  larger, more severe forest fires

➢ ***Widespread ecosystem shifts are likely and may be abrupt (e.g., large disturbances such as wildfires, insect outbreaks, diseases)***

Moving from Managing for Preservation to Managing for Change:

- Conservation has traditionally focused on preserving conditions and suite of species that occurred before major human alterations

- Historical targets no longer make sense when climate change will profoundly alter the site and which species can survive at that site

- Major shifts in climate will occur no matter how vigorously greenhouse-gas emissions are reduced (NRC 2010; IPCC 2018)

➢ **Idea that ecosystems fluctuate within a defined and constant range of variability (or "stationarity") is DEAD** (from Stein et al. 2013)

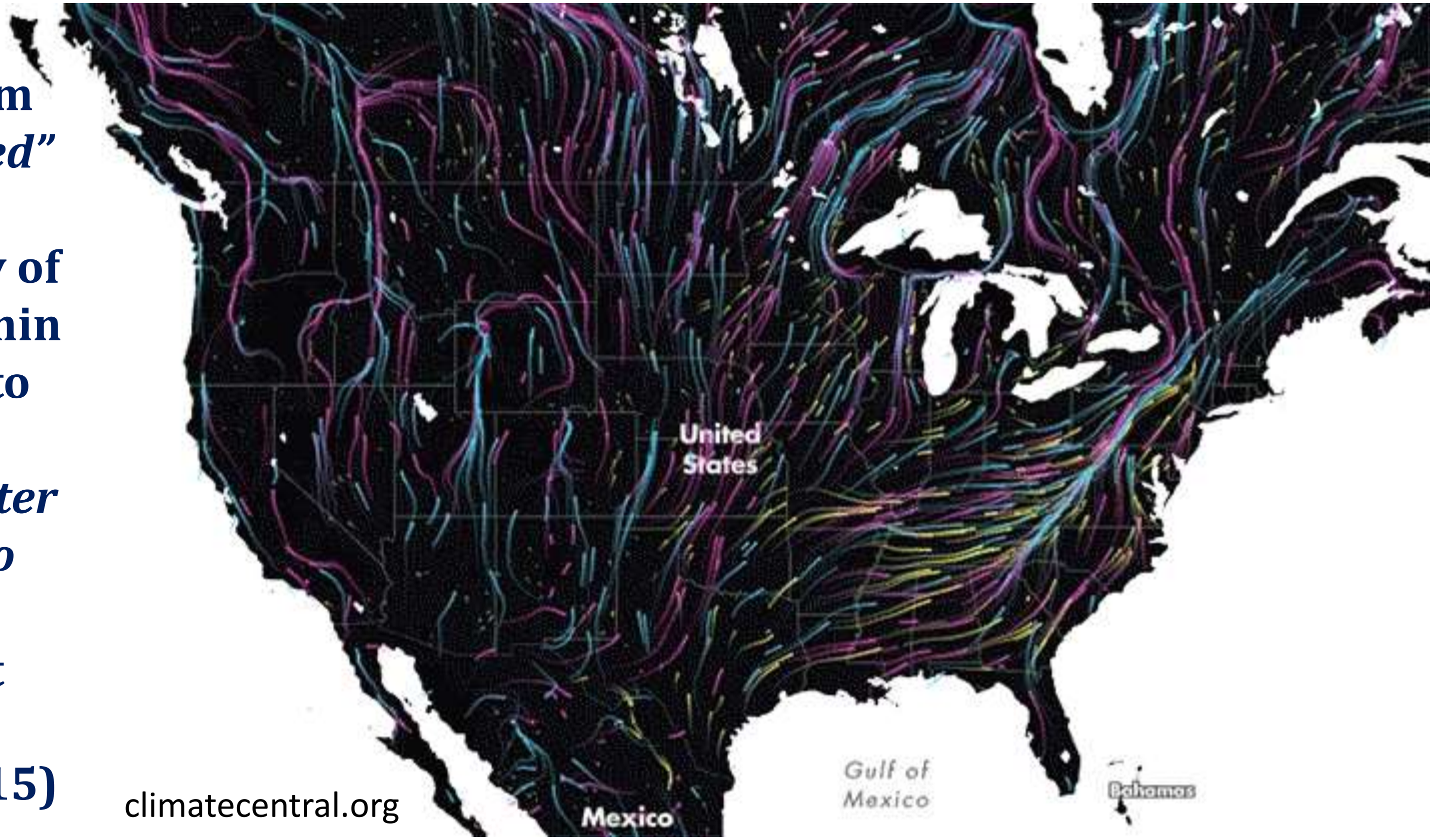
➢ **Cumulative impact of existing stressors - habitat loss, pollution, invasive species, and overharvest - and rapid, directional changes in environmental conditions from climate change are disrupting ecosystem processes, increase risk of species extinctions and contribute to biome changes** (Stein et al. 2014)

Moving from Managing for Preservation to Managing for Change:

- **Plant and animal ranges are shifting or expanding, often poleward and to higher elevations**
  - Higher elevations at a median rate of 0.011 km per decade
  - Higher latitudes at median rate of 16.9 km per decade (Chen et al. 2011)
- **Earlier timing of life-history events (e.g., phenological changes)**
  - Plants leafing out and blooming earlier
  - Wildlife breeding or migrating earlier (research cited in Stein et al. 2014)
- **Changing hydrological conditions are effecting life-cycle events**
  - Shifts in "monsoon" rains delaying blooming in arid regions of Southwest
  - Earlier peak streamflow in snowmelt-driven rivers disrupting timing of fish migration (research cited in Stein et al. 2014)

Moving from Managing for Preservation to Managing for Change:

- **Critical connections between timing and location that species have adapted/evolved to over millenia are being disrupted by rapid directional climate and environmental changes**
- **Conservation will increasingly need to manage for *novel* climates, ecological conditions, and species assemblages**
- **Conservation will require a shift from *classic "place-based" strategies* that maintain integrity of local reserves within fixed boundaries to more dynamic strategies that *foster ability of species to move across landscapes* so that they can persist (Schmitz et al. 2015)**



climatecentral.org

“Conservation planning is always an exercise in decision making in the face of limited and uncertain data, and especially so in the case of planning for climate change.”

(Carroll et al. 2017)

- Uncertainties in CO_2 emission reductions
- Uncertainties with model predictions of climate change
- Uncertainties how ecosystems will respond to aspects of climate change
- Uncertainties how ecosystems will respond to conservation actions we take

Climate-Smart Conservation

- **Needs to be intentional** – Move away from trusting traditional practices are sufficient
- **Needs to be integrated into every aspect of conservation programs**
  - Reconsider goals, objectives, targets, actions within the face of climate change
- ***Manage for change*, not just persistence**
- **Forward-thinking goals -** allow for ecosystem transformations and novel species assemblages

➢ ***Anticipatory vs reactionary adaptation***

Good resource is: Stein, B.A., P. Glick, N. Edelson, and A. Staudt (eds.). 2014. *Climate-Smart Conservation: Putting Adaptation Principles into Practice.* National Wildlife Federation, Washington, DC

Climate Adaptation Framework

(from Schmitz et al. 2015)

1. Protect current patterns of biodiversity

- Need this to protect species now, under current conditions
- Traditional methods are still critical “no-regrets” strategies

2. Protect large, intact, natural landscapes and ecological processes

- Or assembling connected portfolio of smaller, undeveloped spaces
- More “resilient” to disturbances, changes, and protect larger assemblages of species

3. Maintain and establish ecological connectivity

- Connecting areas with corridors, stepping stones, or working lands to create permeability for species movement, range shifts

➢ Identify where species might move to meet climate niche and evaluate current corridors, landscape permeability to identify whether they can move or whether additional lands are needed

Climate Adaptation Framework

(from Schmitz et al. 2015)

4. Identify and protect areas providing future climate space for species expected to be displaced by climate change

- Identify where species might move to meet climate niche
- Identify if these areas are managed to protect these species or ecological conditions

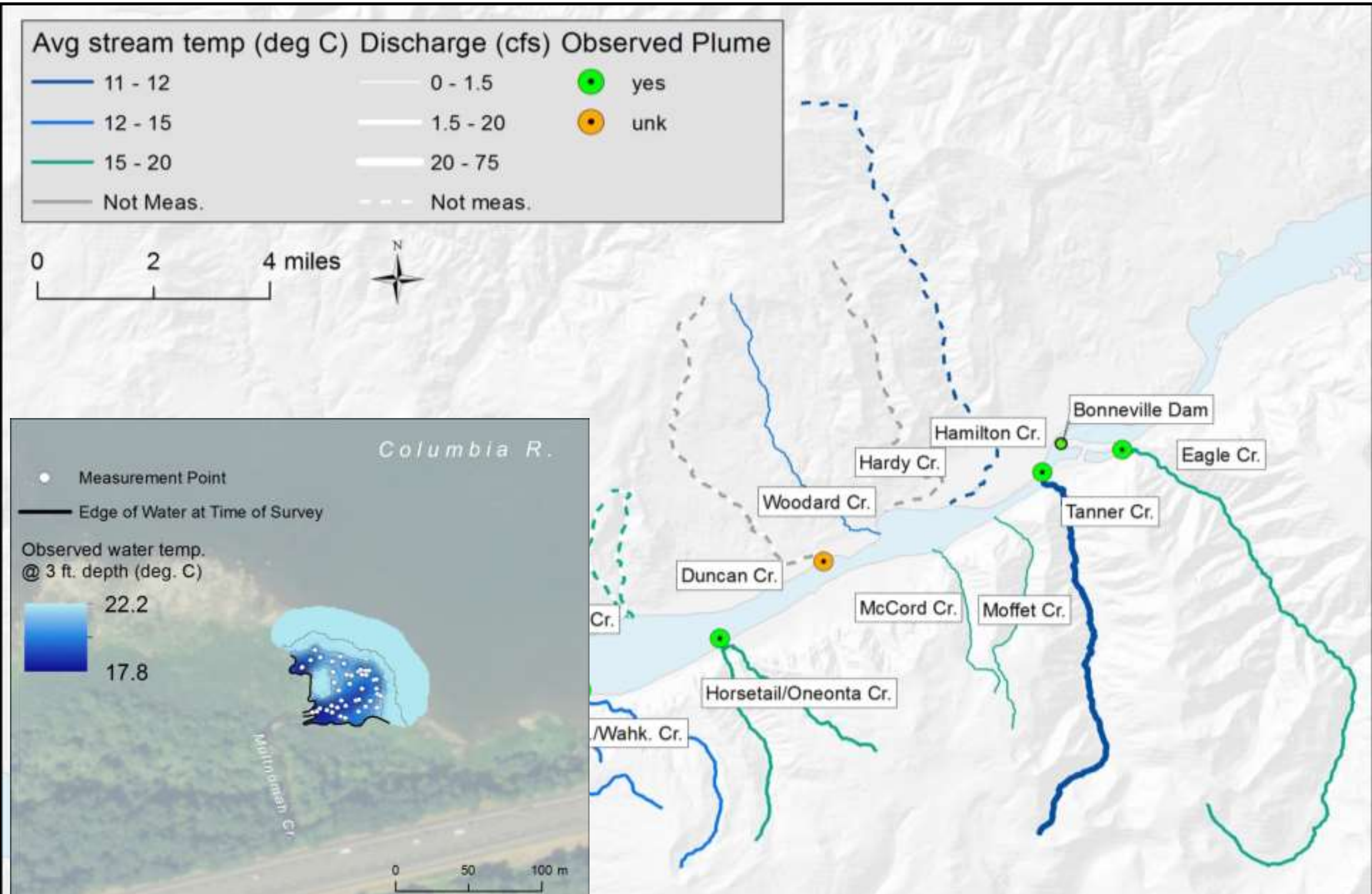
5. Identify and protect climate refugia

- Specific places where climate and associated conditions are likely to remain stable OR
- Areas that change but will still be suitable to species in surrounding region

6. Protect geophysical settings (land facets)

- Species presence depends on suite of factors, e.g., soil chemistry, topographic positions, aspect, slope, elevation
- Premise is that as climate changes, these locations are enduring features because geology and soils will not change
- TNC used soil order, elevation and slope to map in Columbia Plateau

Initial Climate-Smart Conservation Actions for the Lower Columbia River



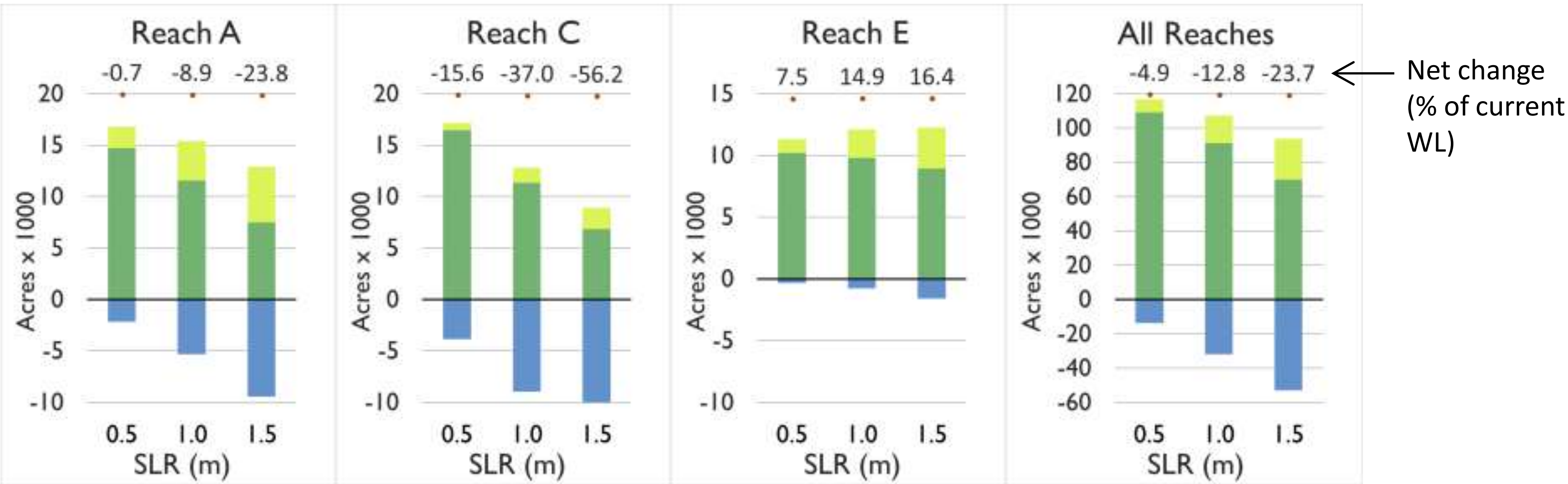
Initial Climate-Smart Conservation Actions for the Lower Columbia River

- **Identify where in target species' life-histories they are vulnerable to climate change**
  - Mapped cold water refuge locations and identified spatial gaps (completed)
  - Testing technique to enhance tributary confluences to fill gaps

- **Reconsider goals and objectives in light of climate change:**
  - Assess vulnerability of lower Columbia River floodplain habitats to sea level rise (complete) & increased fluvial flooding (planned)
  - Constraints to meeting habitat coverage targets (underway)
  - Develop engineering design criteria, best practices for conservation activities that integrate SLR and fluvial flooding (planned)
  - Test drought-tolerant vegetation mixes to ensure *functions* (e.g., pollination) (planned)

Future Wetlands Adjusted for SLR, Phase 1 Results

Net changes in wetland area by Hydrogeomorphic Reach



- Issues:
  - **Developed lands (not likely to become WL)**
  - **Levees (isolate diked WL from rising water levels)**
  - **Subsided areas**

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Questions?

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