A sketch of prospective management of double-crested cormorants in the Columbia River estuary

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Double-crested cormorant (DCCO)

- Native colonial waterbird
- ~23% of regional population nested in Columbia River estuary in 2021
- All colony sites in estuary are human-made/modified habitats

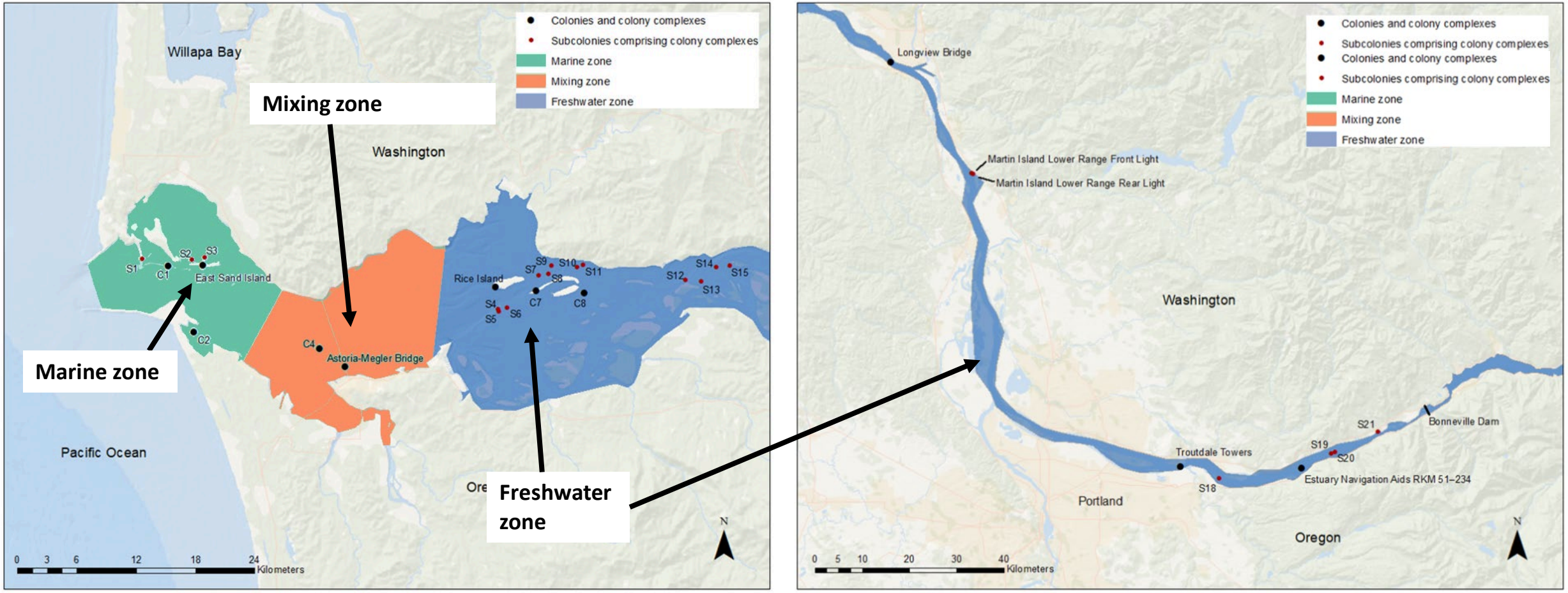
M. Baird

DCCO attracted to estuary by abundant food

- Marine fish predominate in lower estuary
- Salmonids abundant in spring/early summer

Shester/Oceana

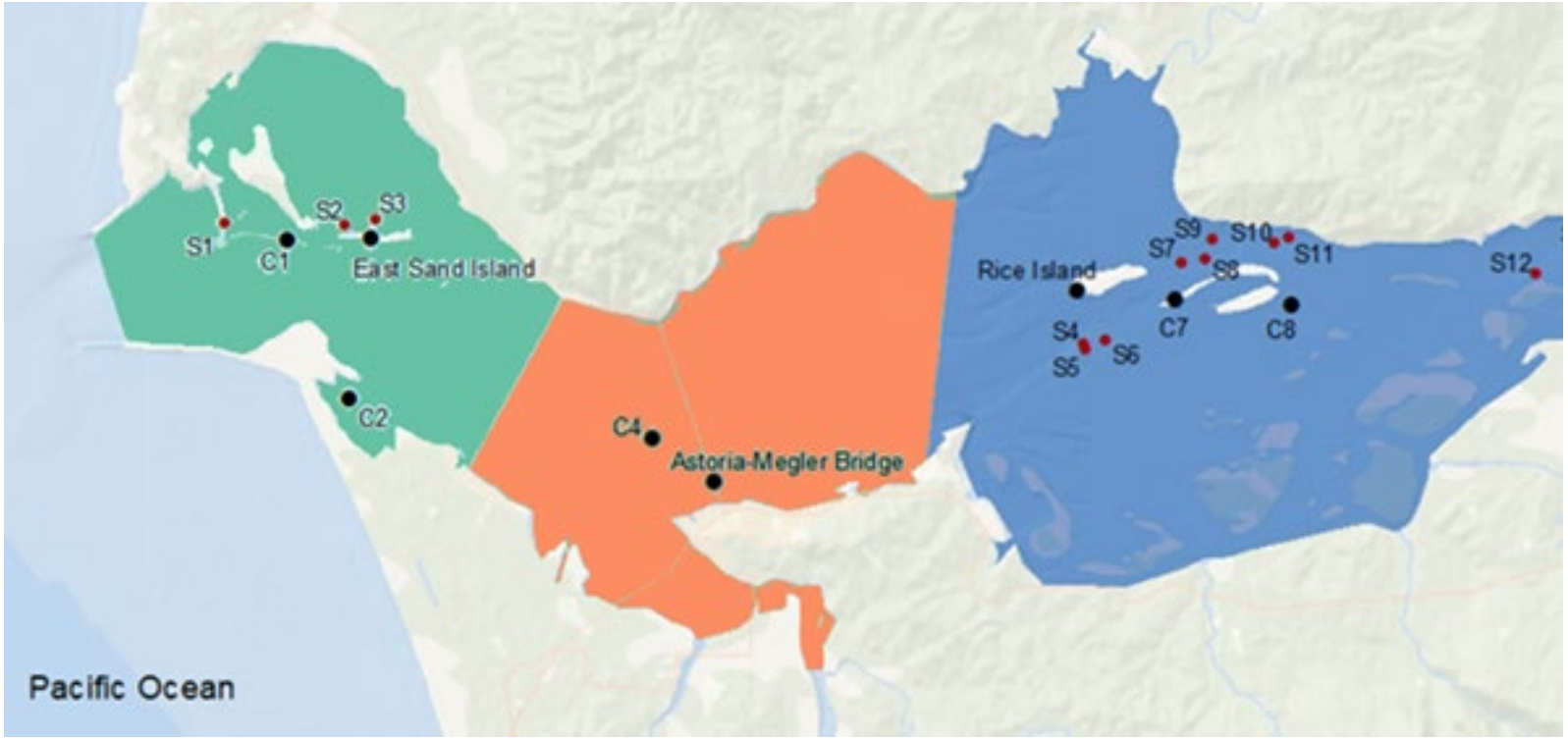
Three salinity zones in the estuary



Per cormorant impacts higher as salinity declines

Proportion salmonids in avian diet

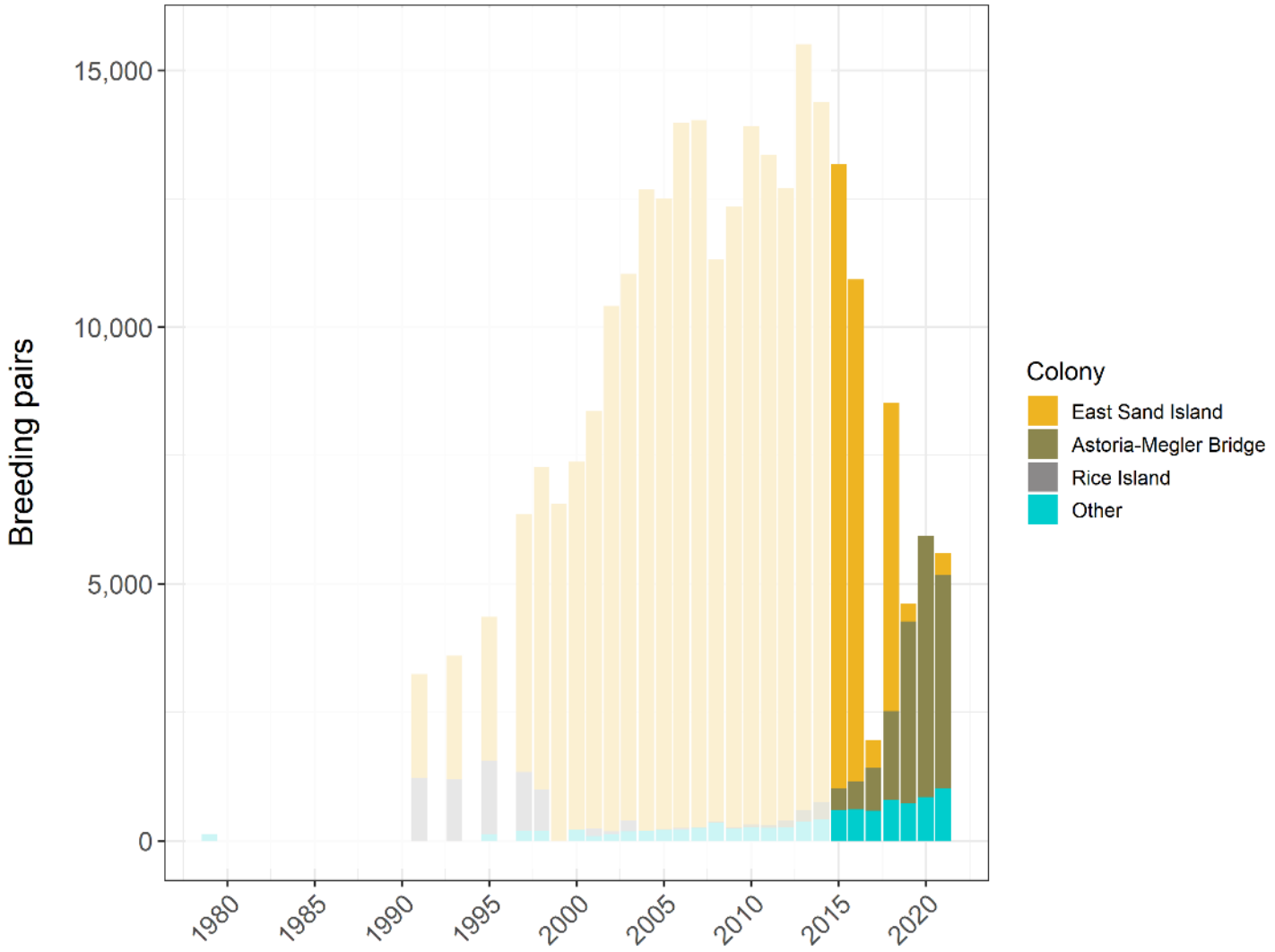
Less → **More**



OREGON Fish & Wildlife

Federal management a major factor in changes to abundance and distribution since 2015

- DCCO emigrated from East Sand Island to upriver colonies, mostly associated with management.
- Astoria-Megler Bridge currently supports most breeding individuals.
- Other colonies are mostly upriver of Astoria-Megler Bridge.



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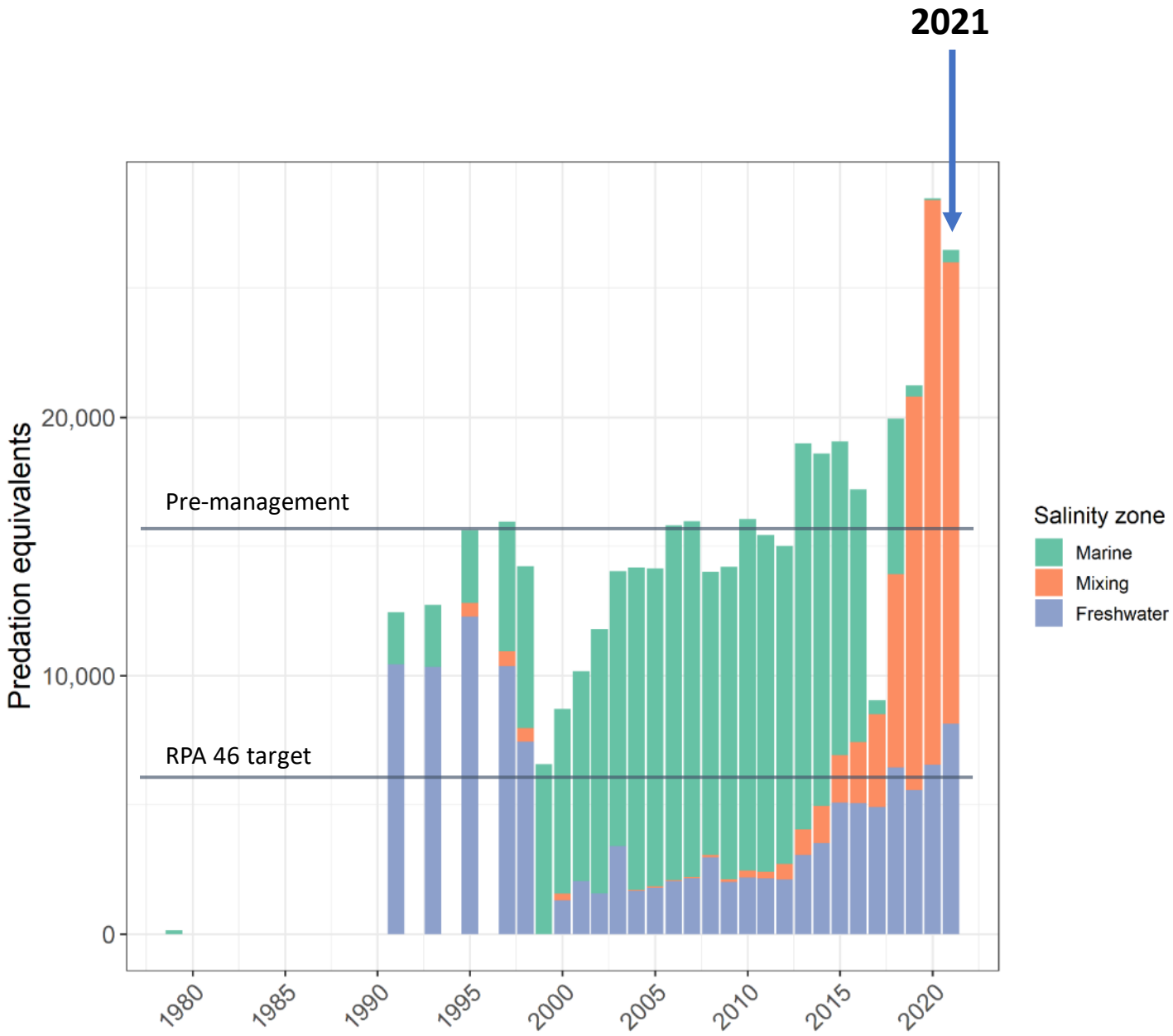
ODFW modeling suggests predation 169% of pre-management



Estimated predation rates on steelhead far higher than pre-management

Run	DCCO predation rates, East Sand Island, 2003-2014	ODFW-estimated predation rates, Columbia River estuary, 2022*	% difference
SR ST	7.2%	12.3%	**171%**
UCR ST	6.3%	14.4%	**229%**
MCR ST	7.5%	13.2%	**176%**

*Based on colony location and reported colony-specific predation rates in Evans et al. 2023

Management

- Estuary-wide management goal uncertain, but RPA 46 could be guideline (~3% predation rate on steelhead)
- Oregon DOT value engineering study, Columbia Basin Collaborative
- Astoria-Megler Bridge focus

Final Value Engineering Study Report

Astoria-Megler Bridge
Double-Crested Cormorant S

Oregon Department of Transport

Project No. B37331

November 2023

Prepared by
Value Management Strategies, Inc.

Predation Work Group Recommendation: Management of Double-crested Cormorants in the Columbia River Estuary

Prepared by the following for consideration by the Columbia Basin Collaborative Predation Workgroup:

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1. **Problem Statement:** The abundance of double-crested cormorants nesting upriver of East Sand Island in the Columbia River estuary has grown dramatically in recent years, causing concern for the recovery of imperiled salmonid runs. Most of this growth occurred during 2015–2020, coincident with implementation of a federal management plan for the nearby East Sand Island colony (ESI management plan), where 97% of double-crested cormorants within the estuary nested during 2004–2014 (pre-management period). During 2020 and 2021, however, the colony associated with the Astoria-Megler Bridge supported most breeding individuals in the estuary, although substantial numbers also occurred at a variety of other sites, mostly upriver of East Sand Island (Lawonn 2023a, 2023b). Although the intent of the ESI management plan was to reduce double-crested cormorant predation of juvenile salmon and steelhead (salmonids) listed under the federal Endangered Species Act (ESA), increases in predation associated with colonies besides East Sand Island have substantially offset the recent management-caused reduction in predation at the East Sand Island colony (Evans et al. 2022). This result is somewhat paradoxical because the abundance of double-crested cormorants in the Columbia River estuary has declined about 56% since implementation of the ESI management plan. However, per capita predation of salmonids is far higher at the upriver locations where most double-crested cormorants currently nest compared to East Sand Island. This is because salmonids make up a far larger share of the cormorant diet at upriver locations because there are fewer alternative sources of prey nearby compared with the marine zone of the estuary, where East Sand Island is located. As a result, predation by double-crested cormorants may now be equivalent to, or even substantially higher than, the pre-management period (Lawonn 2023a).

4 essential components of any credible management plan

1. **Dissuasion**: “push” birds from Astoria-Megler Bridge (≥4 y)
2. **Social Attraction**: “pull” birds to East Sand Island (≥4 y)
3. **Monitoring**: evaluate response of birds and fish (long-term)
4. **Adaptive Management**: adjust management techniques and effort based on outcomes (long-term)

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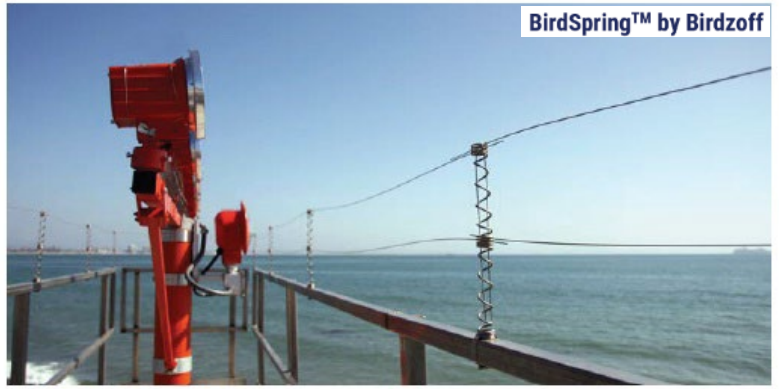
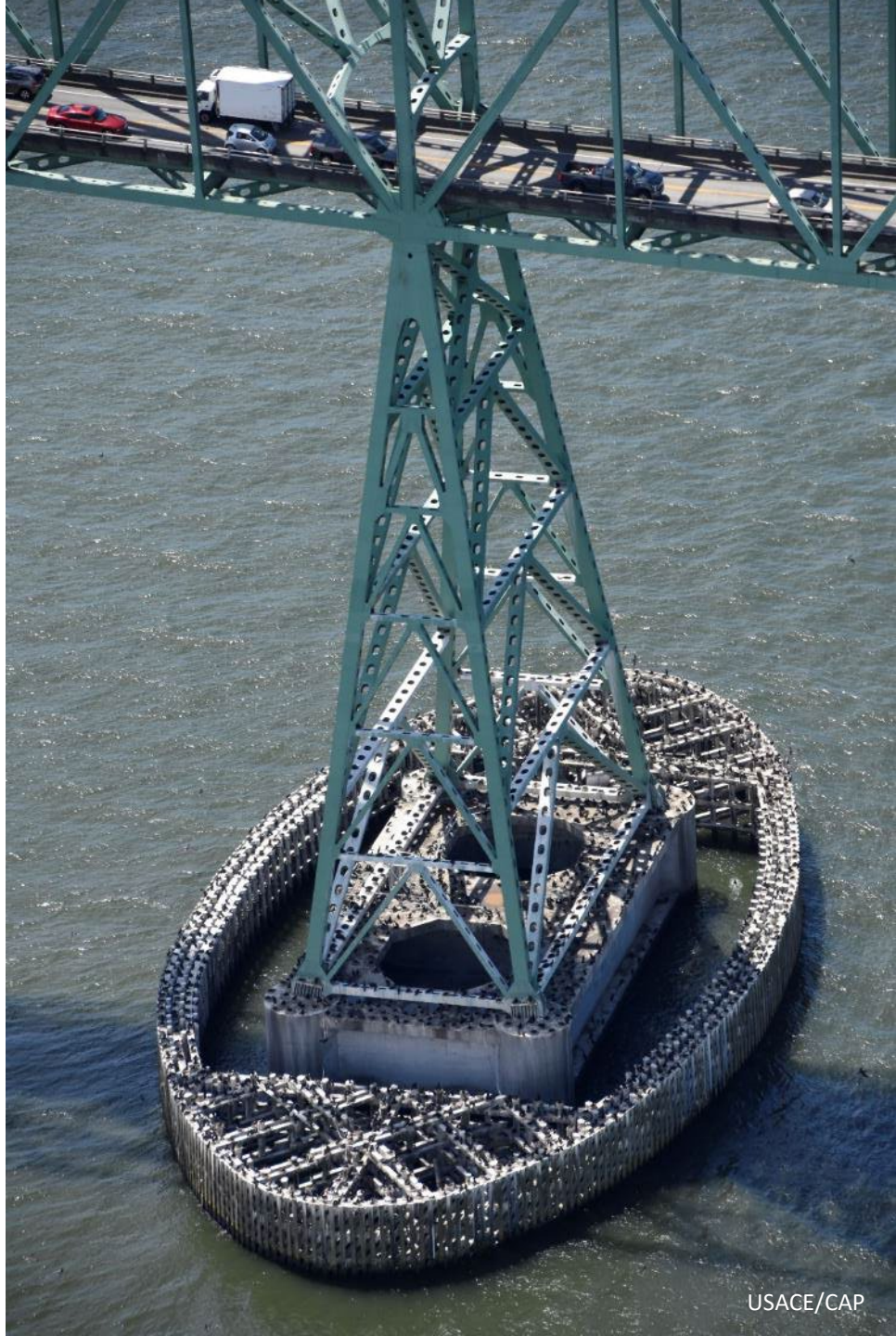
1. Dissuasion (passive)

- Anti-perch wires, netting, wire grids, UV LED
- Requires maintenance
- Possible engineering constraints



1. Dissuasion (active)

- Pyrotechnics, high pressure water, handheld laser
- Needs near-continuous effort to be effective
- Substantial nest take possible



USACE/CAP

2. Social attraction

- Attract 1,000-5,000 pairs back to East Sand Island (VE study)
- Various proven social attraction techniques
- Some experimental techniques

3. Monitoring

- Nesting abundance at basin colonies should be monitored annually
- Predation rates should be monitored at colony-specific and estuary-wide levels
- On site colony monitors on East Sand Island (also expected to reduce eagle disturbance)

4. Adaptive Management

- Manage for desired predation rate
- Will likely need to occur over very long term
- Large amount of unused nesting habitat in estuary

Can you identify the potential colony sites?

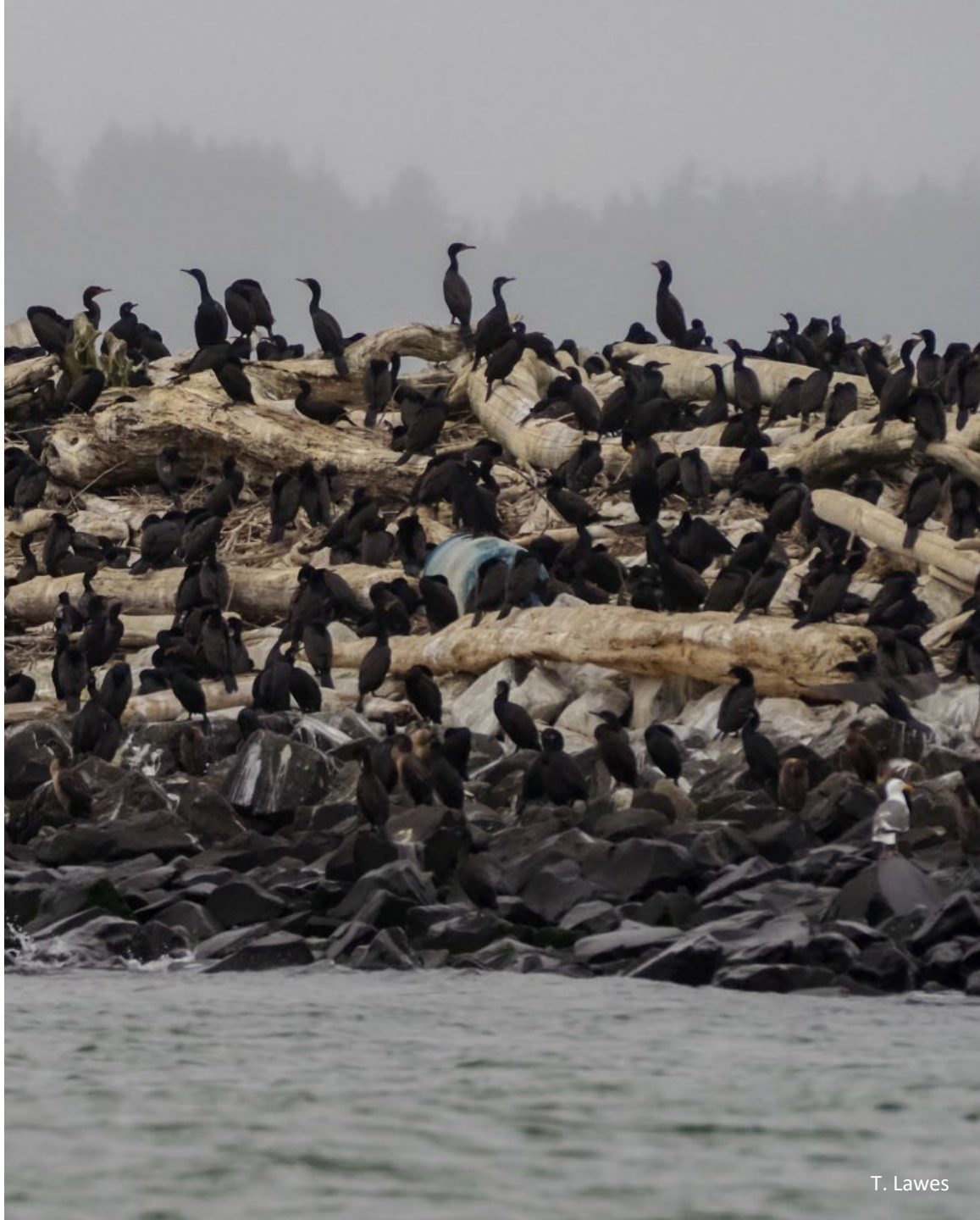
Dispersal to undesired colony sites an obvious threat

- Avian plans in the basin subject to whack-a-mole effect
- Potential colony sites lie across a complex administrative and jurisdictional landscape
- Adaptive management could be complex

What happens ~~if~~ when dispersal occurs?

- Who will coordinate response?
- Not all colony sites may be accessible
- Use of lethal tools may be needed at alternative sites

Exhaustive social attraction on East Sand Island is likely the single most important management action to prevent dispersal



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Questions and discussion

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Discussion

- How could management go wrong?
- What can we do about it over short, intermediate, and long-term time horizons?

Final thoughts

- Scientists have an incomplete understanding of estuary and plume food webs. It is therefore unclear how effective DCCO management will be at improving life-cycle survival
- However, even a small or uncertain survival gain for salmonids is potentially important as part of a broad-based recovery strategy
- Careful cost-benefit analysis will be important for future decision-making