Northwest **Power** and **Conservation** Council

September 1, 2026

MEMORANDUM

TO: **Council Members**

FROM: Kate Self, Fish and Wildlife Program Scientist
Windy Schoby, Fish and Wildlife Policy Analyst- Idaho

SUBJECT: **Avian Predation on Salmon and Steelhead in the Columbia River Basin:**

- **Annual Report – updated findings, lessons learned, successes, and emerging issues**
- **Current impacts and management considerations for colonies located on federal lands**

BACKGROUND:

Presenters: Allen Evans, Fisheries Scientist, Real Time Research, Inc.
James Lawonn, Avian Biologist/Predation Specialist, Oregon Department of Fish and Wildlife, Informal Columbia Basin Avian Predation Workgroup Facilitator/Chair

Summary: Allen Evans has been involved with studies of avian predation on ESA-listed salmonids in the Columbia River Basin for over two decades. Evans will lead us through some highlights of the 2025 annual report published by Real Time Research along with some preliminary results from the ongoing 2026 season. He will also provide an update on recent changes in the size and species composition of piscivorous waterbirds on Crescent Island.

James Lawonn is an avian biologist and predation specialist for Oregon Department of Fish and Wildlife. Lawonn has been working on avian predation in the Columbia River Basin for over a decade. He is currently facilitating an informal Columbia Basin Avian Predation Workgroup consisting of diverse state, federal, private, and tribal stakeholders. He will report on recent observations based on updated data with attention to the lower Columbia River and estuary. He will also lead a discussion introducing the uncertainty around the management of avian colonies located on federal lands.

Relevance: One of the Council's emerging priorities from the 2014 Fish and Wildlife Program calls for "preserving program effectiveness by supporting expanded management of predators." The 2020 Fish and Wildlife Program Addendum also highlights the concern about the impacts of avian predators on Columbia River salmon and steelhead and calls for adequate funding to implement activities to reduce avian predation on juvenile salmon and steelhead. The 2026 Program significantly expands the predator management strategy and includes predator management as a near-term priority once again. The Program includes systemwide and regional coordination strategies that focus on agreed-upon metrics and adaptive management when dealing with predation on salmonids and other native species, in addition to more immediate actions to reduce predation rates. Additionally, the Council calls upon the U.S. Army Corps of Engineers (USACE) and others to take action both at federally owned projects and in tributaries and to develop (when needed) and implement all avian management plans as written.

Background: To address concerns about the impact of avian predation on the survival of smolts, the U.S. Fish and Wildlife Service, USACE, and their management partners developed and implemented three separate management plans to reduce predation on smolts by piscivorous colonial waterbirds nesting at four breeding colonies in the Columbia River basin: the largest Caspian tern and double-crested cormorant breeding colonies in the world (those on East Sand Island in the Columbia River estuary), and the two largest Caspian tern colonies in the Columbia Plateau region (those on Crescent Island in McNary Reservoir and on Goose Island in Potholes Reservoir).

The primary goal of these management initiatives was to reduce predation rates (proportion of available smolts consumed) on ESA-listed salmonid populations by reducing the size or eliminating the colonies identified in management plans. As part of the management plans, adaptive management actions have been conducted at various other colony locations where birds that were displaced from the managed colonies have relocated to nest.

The primary goal of the annual report Evans will present was to investigate piscivorous colonial waterbird predation on juvenile salmonids in the Columbia River basin. Piscivorous colonial waterbird species investigated included Caspian

terns, double-crested cormorants, Brandt's cormorants, California gulls and ring-billed gulls, American white pelicans, and great blue herons and great egrets.

Specifically, the project goals were to:

(1) estimate colony sizes for colonies within foraging range of smolts in the middle Columbia River, lower Snake River, lower Columbia River, and the Columbia River estuary.

(2) estimate colony-specific predation rates (percentage of fish consumed) on Endangered Species Act (ESA) listed smolts.

(3) estimate the cumulative or system-wide effects of predation from all colonies combined on smolts.

(4) estimate the additive effects of predation on smolt survival.

(5) evaluate the efficacy of ongoing management plans aimed at reducing predation on smolts.

Some takeaways from the 2025 report:

1. Terns: The ongoing management of tern colonies in the CPR as part of the Inland Avian Predation Management Plan has resulted in a shift in the number and location of tern colonies in the region.
2. Terns: One of the primary goals of the Inland Avian Predation Management Plan is to reduce predation rates on smolts by terns to less than 2% per ESA-listed salmonid population, per colony. In 2025, that objective was achieved, except for a colony on Banks Lake, WA, where an estimated 2.2% (1.5–3.3%) of UCR steelhead were consumed. However, the predation rates by terns that have re-nested on Crescent Island will require further adaptive management to achieve Plan goals in the future.
3. Other species: An investigation of predation on smolts by other piscivorous waterbird species indicated that smolt consumption rates were highly variable depending on the predator species, colony location, colony size, and salmonid species. Predation rates by gulls has surged in some locations.
4. Collectively, results indicate that the cumulative effects of avian predation/consumption remain a substantial source of smolt mortality in the CRB, particularly for ESA-listed steelhead and sockeye populations.
5. Finally, RTR with Oregon State University, has worked to refine the additive modelling approach to simultaneously assess both gull and tern additivity on UCR steelhead smolts during outmigration from Rock Island Dam to Bonneville Dam, 2008–2025. Updated results indicated that higher levels of gull consumption were associated with lower levels of steelhead survival, even after accounting for the additive effects of tern predation.

Taken together, results suggest that continued system-wide avian predation research, monitoring and evaluation (RM&E), coupled with comprehensive adaptive management actions, are necessary to achieve the goals and objectives of management plans and to address emerging predation issues and concerns in the future.

A diverse group of state, tribal, and federal fish and wildlife managers from around the basin have been meeting monthly, working together to utilize the results of this and other RM&E to formulate actions and adaptively manage in-season hazing and take efforts. The group has also identified additional emerging issues including predation concerns in the tributaries that may be impacting the efficacy of other off-site mitigation actions including habitat improvements and hatchery releases.

For more background information, please see the 2025 presentation to the Council (Packet|Video) by Evans, Orban, and Lawonn. It provided a brief history of the avian predation RM&E that Oregon State University, Real Time Research, and the U.S. Geological Survey have conducted, summarized the implementation of the three avian predation management plans, assessed the efficacy of each plan in achieving management goals, and highlighted lessons learned and emerging issues.

More information:

Avian Predation in the Columbia River Basin 2025 Annual Report

Caspian Tern Management Plan

Double Crested Cormorant Management Plan

Inland Avian Predation Management Plan

2025 Council Presentation by Allen Evans and James Lawonn

OPB Interview with James Lawonn on Astoria-Megler Bridge Cormorants

OPB Interview with James Lawonn on American White Pelicans

Washington Avian Salmon Predation Working Group (ASPWG)'s 2025 report to the legislature

Avian Predation on Salmon and Steelhead in the Columbia River Basin: 2025 Update of Research, Monitoring, and Evaluation Studies

Northwest Power and Conservation Council

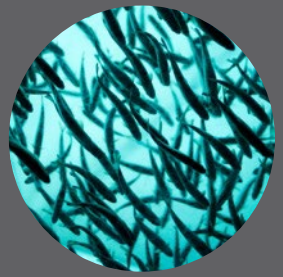
September 10, 2026

OSU Oregon State University

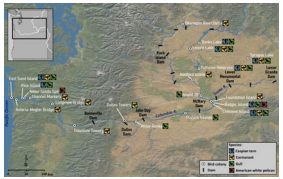
RTR REAL TIME RESEARCH

BACKGROUND





AVIAN PREDATION IN THE COLUMBIA BASIN



Breeding colonies of fish-eating waterbirds are widespread in the Basin and the **nesting season overlaps** with the **smolt out-migration period**.

Primary species: Caspian Terns, Double-crested Cormorants, California and Ring-billed gulls, and American White Pelicans; all native species protected by the Migratory Bird Treaty Act.

Other fish-eating waterbird species: Brandt's Cormorants, Great Blue Herons, Great Egrets, Forster's Terns, mergansers, and others. Colonies are often smaller in size, and predation concerns more localized. Data is more limited but is becoming available for select species, like herons and egrets.

AVIAN PREDATION MANAGEMENT PLANS

Caspian Terns and Double-crested Cormorants nesting on East Sand Island (ESI) in the **Columbia River estuary** predated up to 25 million smolts annually, or roughly **15% of available fish, prior to management** (2000 – 2007 for terns, 1997 – 2014 for cormorants).

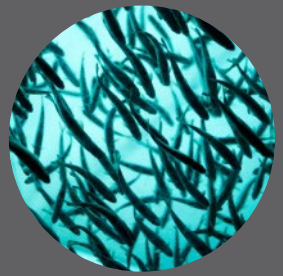
Terns nesting on Crescent and Goose islands in the **Columbia Plateau region** consumed annually from **5% to 30% of smolts** from ESA-listed steelhead populations **prior to management** (2007–2013).

Regional management of terns and cormorants to **reduce the size of colonies** on ESI (terns and cormorants), Crescent Island (terns), and Goose Island (terns).

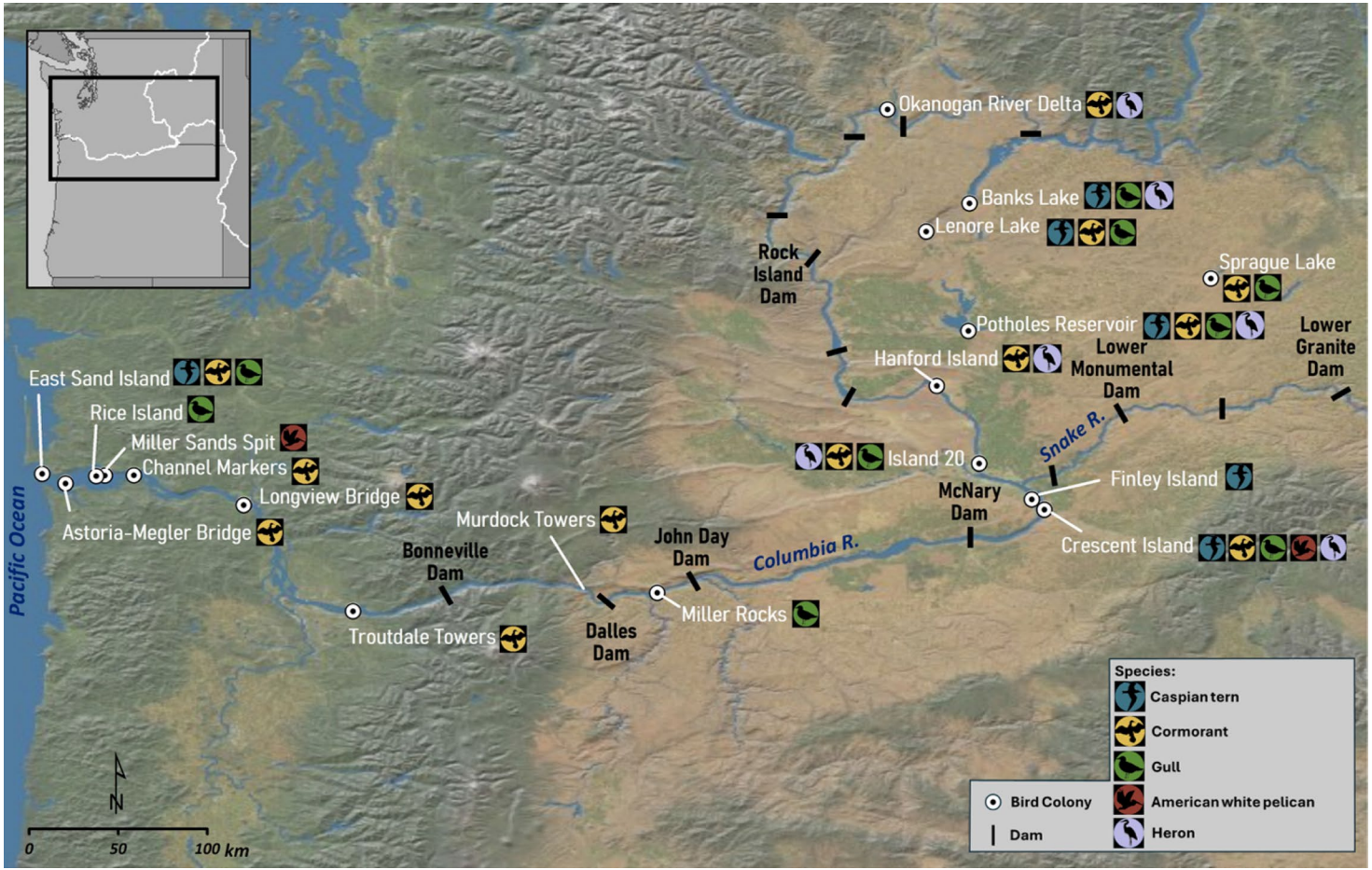
No federal plans for other colonies. Recent management of gulls on Miller Rocks Island in the plateau by the Yakama Nation and management of individual birds at or near dams.

2025 Avian Predation RM&E Update





2025 MONITORED BREEDING SITES IN COLUMBIA BASIN



CASPIAN TERN PREDATION

COLONY SIZE & LOCATION

Six breeding sites in 2025. The largest colonies were on ESI (634 pairs) and Crescent Island (147 pairs). ESI colony (formerly largest colony in the word) has **declined 94%** (since 2008); declines that **threaten the Pacific Flyway population** (Emerging Issue)

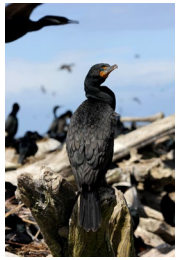
PREDATION IMPACTS

Greatest impacts in 2025 were on Upper Columbia River and Snake River steelhead, with individual tern colonies consuming upwards of **2% of available steelhead smolts**.

MANAGEMENT IMPACTS

Tern **predation rates in 2025 greatly reduced** (upwards of 80%) relative to years past due to successful management at ESI and Goose Island. Tern colony on Crescent Island, however, has been re-established (Emerging Issue).

DOUBLE-CRESTED CORMORANT PREDATION



COLONY SIZE & LOCATION

Eleven breeding sites in 2025. Largest colony on the **Astoria-Megler Bridge** (5,310 pairs; amongst the highest number observed to-date; Emerging Issue). Other colonies in upper estuary and Columbia Plateau Region are also increasing in size. Largest inland colony now on **Crescent Island** (534 pairs; Emerging Issue).

PREDATION IMPACTS

Predation rates by cormorants on the **AMB greater than 10%** on multiple ESA-listed steelhead and salmon populations, following **5% for Crescent Island**.

MANAGEMENT IMPACTS

Despite the management of the ESI cormorant colony (2015 – 2019), cormorant **predation rates in 2025 amongst the highest observed to-date** due to increases in colony sizes upstream of ESI, where per capita (per bird) predation rates are significantly higher than those previously documented on ESI.

GULL PREDATION

COLONY SIZE & LOCATION

Multiple gull species. Nine breeding sites in 2025. Largest colonies on Goose Island (11,150 individuals), Island 20 (9,189 ind.), Miller Rocks (4,915 ind.), and Crescent Island (3,215 ind.); all plateau colonies.

PREDATION IMPACTS

Colonies located on the **mainstem Columbia River** (Island 20, Crescent, and Miller Rocks) posed the greatest threat to smolt survival, with **predation rates of 5 - 11%** on multiple salmon and steelhead populations. **Predation rates in 2025 were amongst the highest observed** to-date (Emerging Issue). Predation by colonies located > 30 Km from the Columbia River, however, posed little to no threat (predation rates < 1%).

MANAGEMENT IMPACTS

No federal management plans at the colony-level. Dissuasion efforts by YN on Miller Rocks did not substantially reduced predation (as of 2025).

In 2026 gulls abandoned the breeding site on Miller Rocks in May, but an incipient colony subsequently formed 13 km upstream in The Dalles Reservoir.

AMERICAN WHITE PELICAN PREDATION

COLONY SIZE & LOCATION

Two colonies in 2025; one in the estuary on Miller Sands Spit (1,168 ind.) and one in the plateau on Crescent Island (2,816 ind.). Largest colony was formerly on Badger Island in McNary Reservoir but is now on Crescent Island (Emerging Issue). Evidence that **pelican numbers** in the Columbia River basin have **increased over the last 10 - 15 years**.

PREDATION IMPACTS

Predation rates low (< 1%) on yearling smolts in the Columbia River. Predation on **subyearling smolts** and **fish in tributary systems** (e.g., Yakima R., Umatilla R.) can, however, be **substantial (> 10%).** Predation on **adult Sockeye Salmon upwards of 8%** of the run arriving at Bonneville Dam in some years, which equates to more 40,000 adults.

MANAGEMENT IMPACTS

No federal management plans.

HERON PREDATION

COLONY SIZE & LOCATION

Multiple species. 6 breeding sites. Multiple arboreal, smaller-sized colonies. Largest colony on Island 20 in the Middle Columbia River (114 pairs). Some evidence the **number of breeding sites is increasing**, with several incipient colonies forming in the **last 10 years**.

PREDATION IMPACTS

Heron tend to forage near their breeding site (localized). In 2025, **predation rates** on smolts in the Columbia River were **low (< 1%).** Capable of consuming larger-sized fishes, but no evidence they consume adult salmon and steelhead. Data is limited compared to other avian predator species.

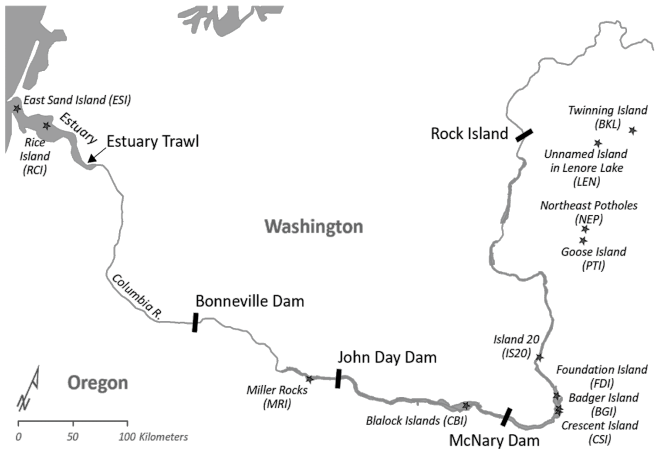
MANAGEMENT IMPACTS

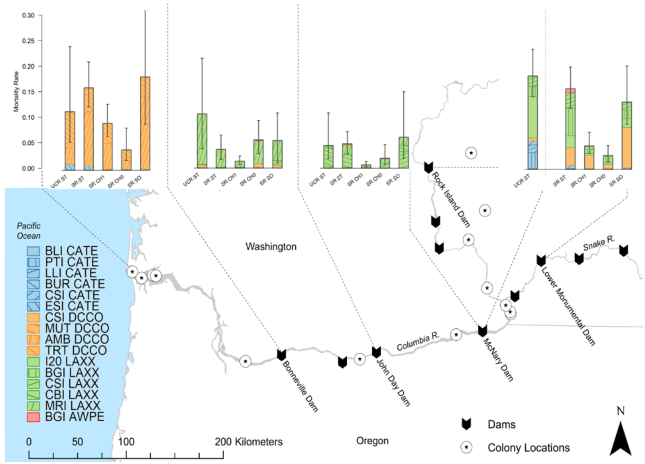
No federal management plans.

SYSTEM-WIDE EFFECTS

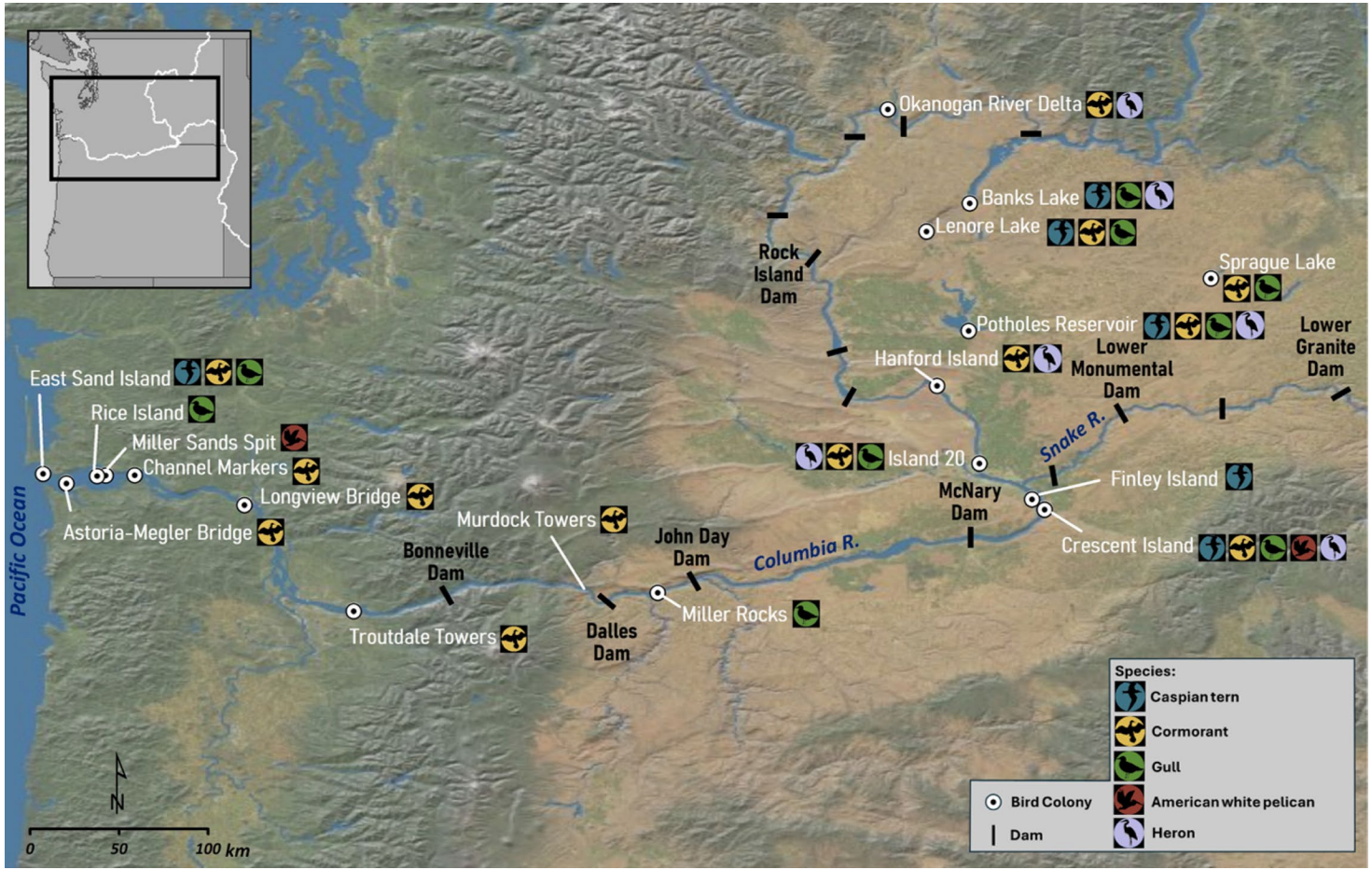
Some salmonid populations are subject to predation by **multiple avian predators** during seaward migration.

Cumulative effects of predation (all predators combined) **can be substantial**.

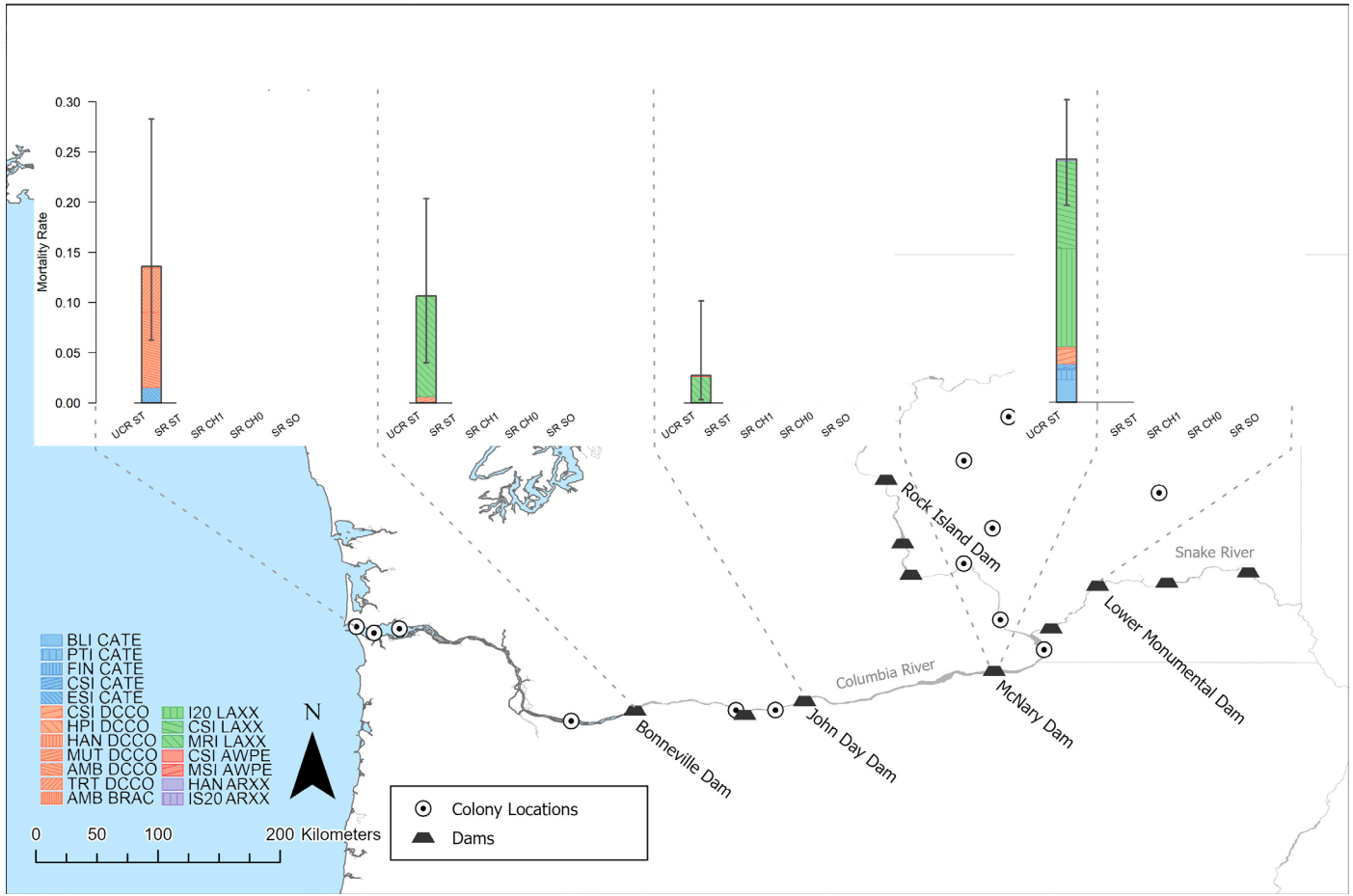




SYSTEM-WIDE PREDATION RATES



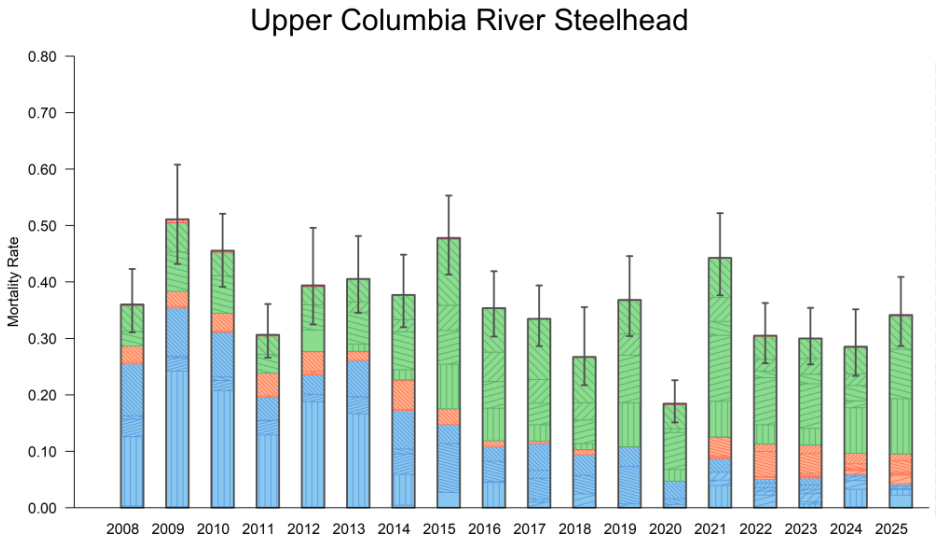
2025 REACH-SPECIFIC PREDATION RATES

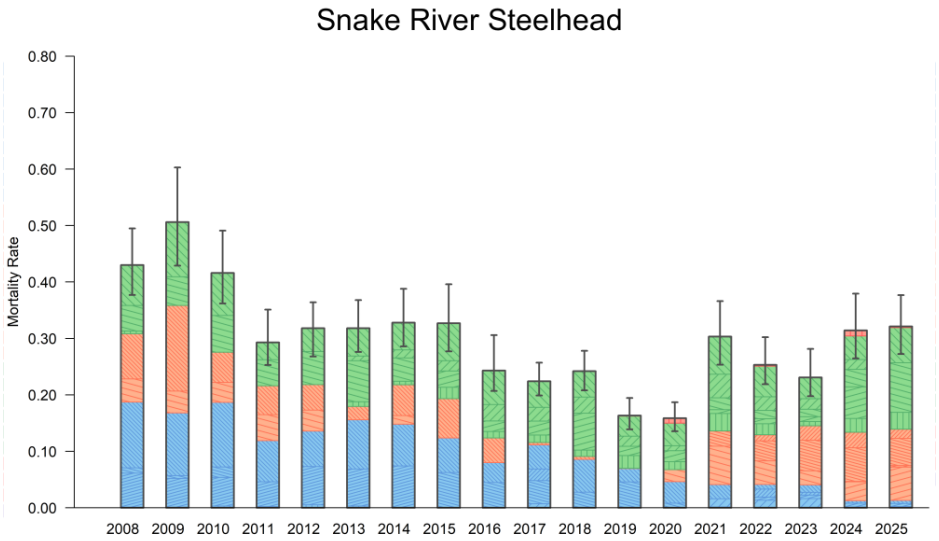


Blue = terns
Orange = cormorants
Green = gulls
Red = pelicans
Purple = herons

2025 CUMULATIVE EFFECTS OF AVIAN PREDATION

Predation on UCR and SR steelhead was **high** at ~ 35% (20 – 50% annually since 2008)

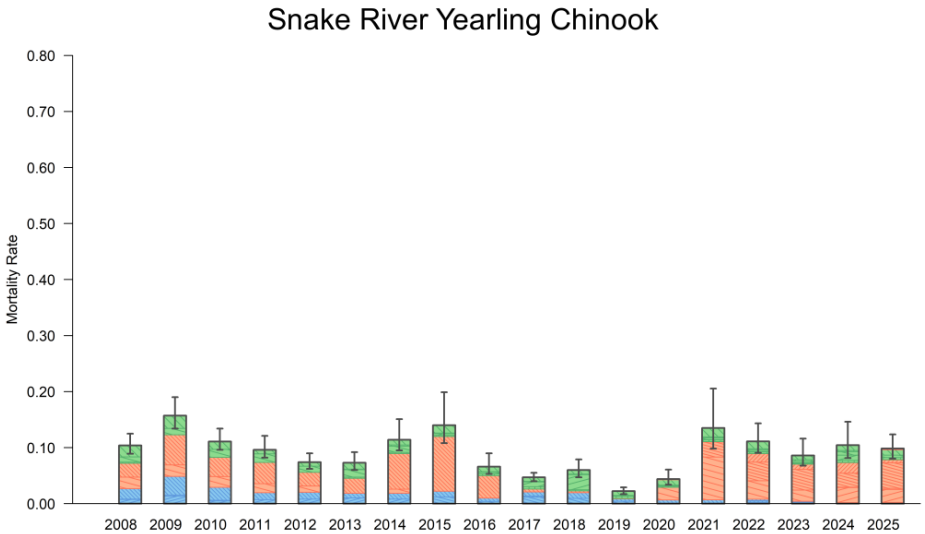


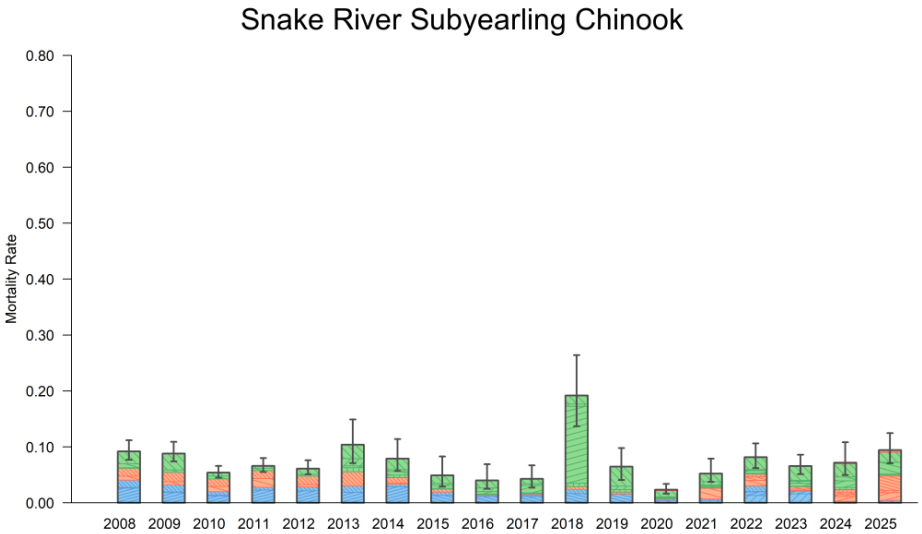


Blue = terns
Green = gulls
Orange = cormorants
Red = pelicans

2025 CUMULATIVE EFFECTS OF AVIAN PREDATION

Predation on SR Chinook was lower at ~ 10% (5 – 20% annually since 2008)

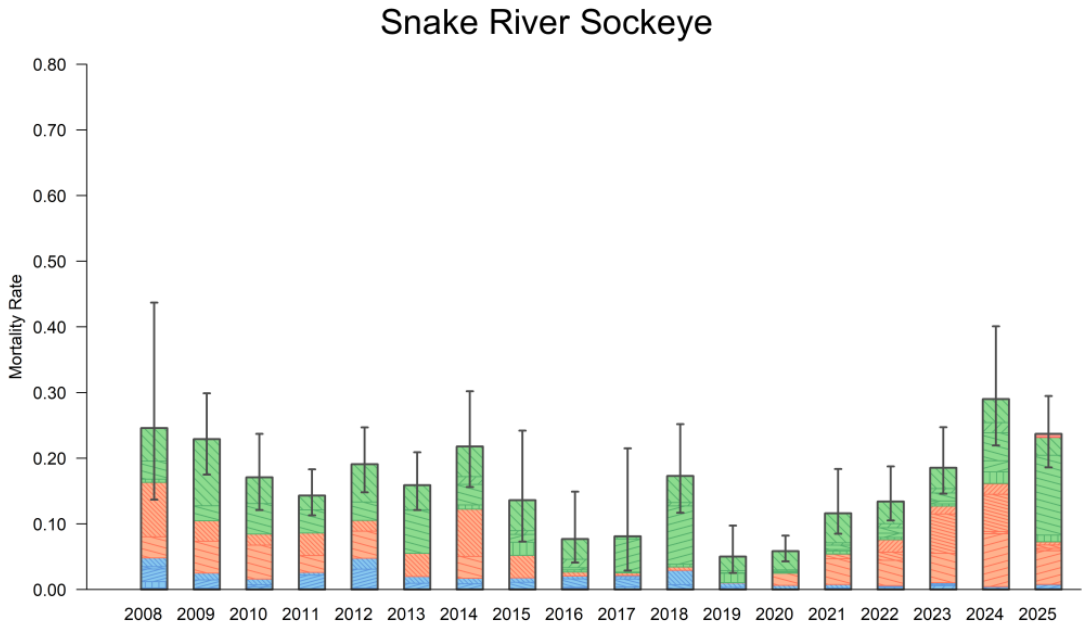




Blue = terns Green = gulls
Orange = cormorants Red = pelicans

2025 CUMULATIVE EFFECTS OF AVIAN PREDATION

Predation on SR Sockeye was ~ 25% (5 – 30% annually since 2008);
evidence of recent increases, particularly from cormorants in the estuary



Blue = terns
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Green = gulls
Red = pelicans

ADDITIVE EFFECTS OF AVIAN PREDATION ON FISH SURVIVAL

To what degree does avian predation limit fish survival?

Compensatory: All fish will die regardless of the level of predation.
Additive: All fish will survive in the absence of predation.
Partially Additive/Compensatory: Some, but not all, fish will survive in the absence of predation.

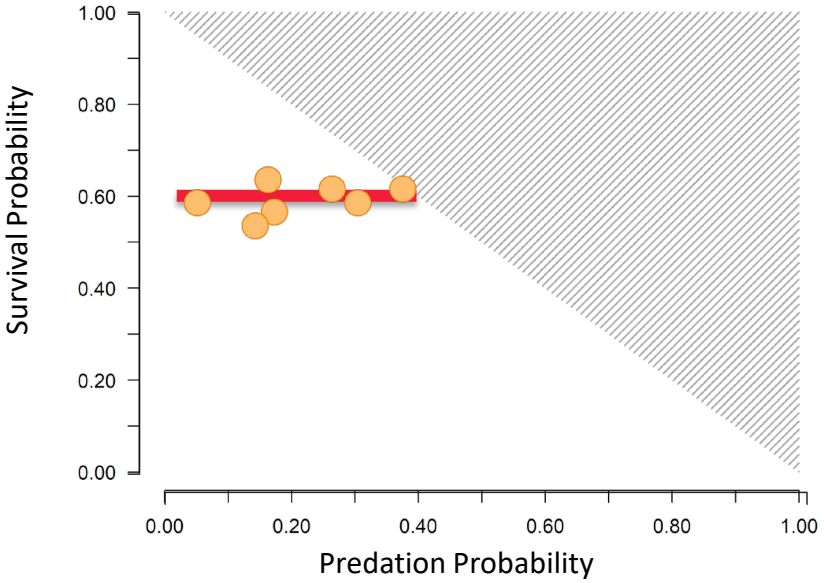
Evaluated by determining the strength and magnitude of the relationship between predation and survival.




ADDITIVE EFFECTS OF AVIAN PREDATION ON SALMONIDS

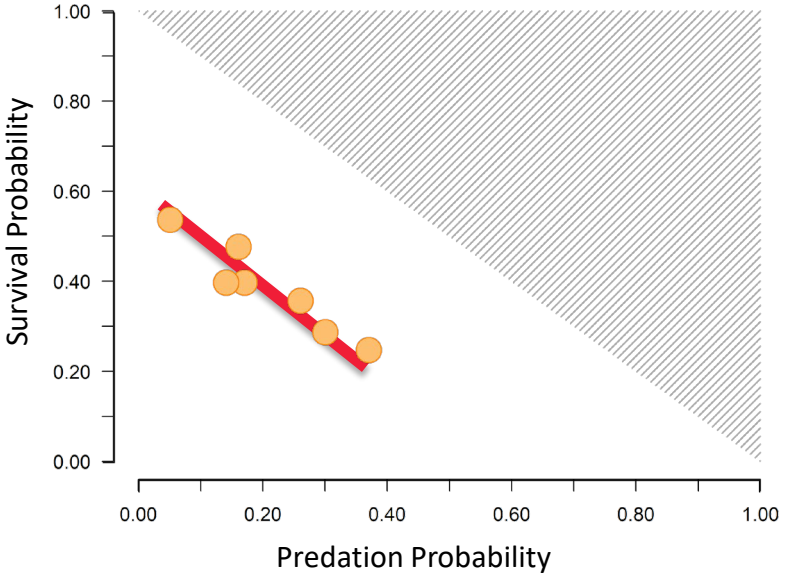
Hypothetical Results

Compensatory



Increased predation -> Same survival

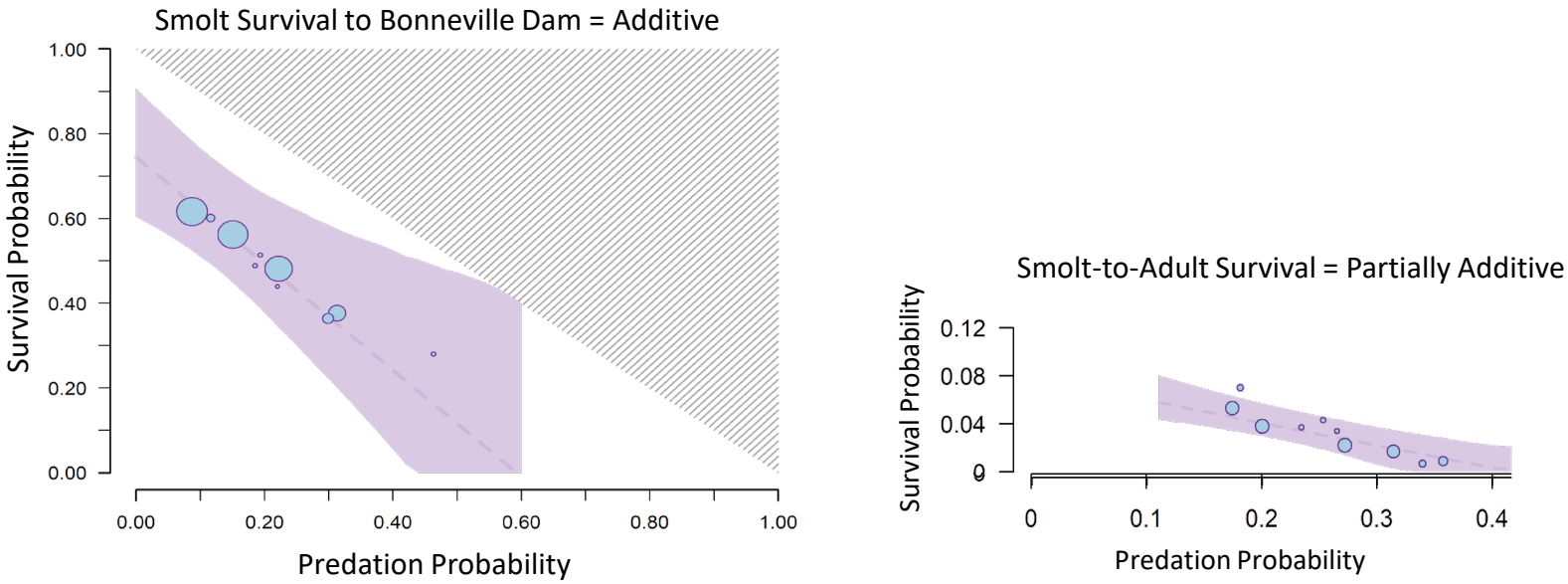
Additive



Increased predation -> Decreased survival

ADDITIVE EFFECTS OF TERN PREDATION ON STEELHEAD

Actual Results: Tern Predation on Upper Columbia River Steelhead

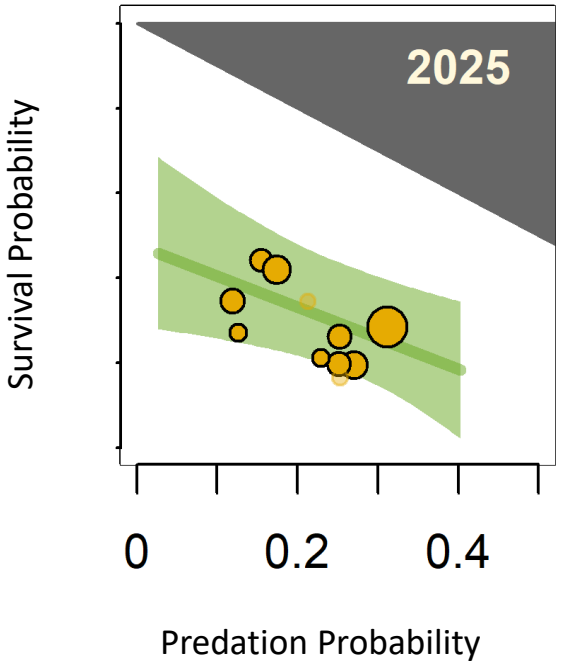


- Predation was additive during the smolt life-stage and partially additive to the adult life-stage.
- ISRP concluded that additivity was the most prudent conclusion from a management perspective based on their review of the research to-date (ISRP 2021).

ADDITIVE EFFECTS OF GULL PREDATION ON STEELHEAD

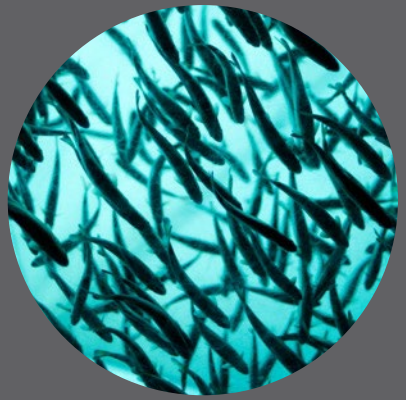
Actual Results: Gull Predation on Upper Columbia River Steelhead

Smolt Survival to Bonneville Dam = Partially additive



*Analyses to the adult life-stage in-prep.

MANAGEMENT SUCCESS AND LESSONS LEARNED



TERN MANAGEMENT PLAN FOR THE COLUMBIA RIVER ESTUARY

COLONY SIZE REDUCED

Less than 3,000 pairs starting in 2020; colony was 634 pairs in 2025 and as low as 524 pairs in 2023. Colony size objective were met (exceeded) but Pacific flyway population has decreased by ~ 70% since management commenced in 2008.

PREDATION IMPACTS REDUCED

About an 80% reduction in impacts on steelhead smolts since 2020; predation rate reductions were commensurate with reductions in colony size

HIGH FIDELITY TO ESTUARY

Persistent nesting attempts by terns elsewhere in the estuary, particularly on Rice Island; continued adaptive management needed

CORMORANT MANAGEMENT PLAN FOR THE COLUMBIA RIVER ESTUARY

CULLING ANG EGG OILING

Over 5,000 adult cormorants culled and eggs from 7,000 nests oiled (2015 – 2017)

HABITAT MODIFICATIONS

Amount of available nesting habitat on East Sand Island was reduced in 2019

COLONY MOSTLY ABANDONED

Large dispersal events from ESI occurred following management

DISPERSAL TO UPPER ESTUARY

Astoria-Megler Bridge colony has grown from 300 pairs (2014) to over 5,300 pairs (2025), plus increases at other nesting sites (Lewis and Clark Bridge, Troutdale Towers); predation is now > 10% on multiple salmon and steelhead populations

TERN MANAGEMENT PLAN FOR THE COLUMBIA PLATEAU

COLONY SIZES REDUCED

Decline in the regional breeding population of terns. Small colony (< 30 pairs) at Goose Island. Colony at Crescent Island initially eliminated (0 pairs) but is now re-established (147 pairs in 2025).

PREDATION IMPACTS REDUCED

Reduction on steelhead predation achieved at some but not all colonies; greatest benefit to UCR steelhead (~ 75% reduction) due to management on Goose Island colony.

HIGH FIDELITY TO REGION

Crescent Is. colony re-formed, persistent nesting attempts at Goose Island and other sites; adaptive management needed and has been successful in some, but not all, cases.

ADAPTIVE MANAGEMENT (North Potholes)

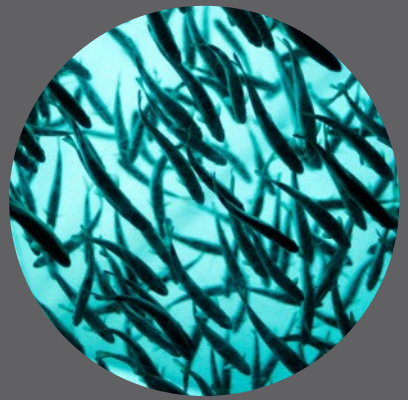
RM&E DISCOVERS NEW COLONY

Aerial survey locates a tern colony in North Potholes Reservoir

ADAPTIVE MANAGEMENT IMPLEMENTED

Active and passive dissuasion conducted by BOR via APHIS was successful within 48 hrs of colony detection.

EMERGING ISSUES



EMERGING ISSUES

Status of Caspian terns in the Pacific Flyway: ESI colony is now well below the target colony size of 3,125 pairs with little to no productivity (young). Pacific Flyway population has declined by an estimated 70%.

Double-crested cormorant predation in the estuary: Predation in the middle to upper estuary is now greater than that of predation by birds that formerly nested on East Sand Island in the lower estuary, with rates or more than 10% on multiple salmon and steelhead populations.

Double-crested cormorant predation in the plateau: Predation increasing at several colonies, primary Crescent Island (now the largest plateau cormorant colony) with predation rates of 5% on Snake River sockeye and Snake River steelhead in 2025.

EMERGING ISSUES

Gull predation in the plateau: Predation/consumption rates by gulls are highly variable depending on the colony and salmonid population. Predation rates by gulls breeding at sites located on the mainstem Columbia River in 2025 were amongst the highest ever recorded, with rates of more than 8% per colony on SR steelhead, UCR steelhead, and SR sockeye. Cumulative effects in 2025 were greater than 20% of available smolts for some species.

American white pelican predation in the plateau: Increasing numbers over the last two decades. Predation on smolts from select rivers and on adult Sockeye Salmon can be substantial; additional RM&E needed to more fully document predation and to better understand factors that influence fish susceptibility to pelicans.

EMERGING ISSUES: CRESCENT ISLAND

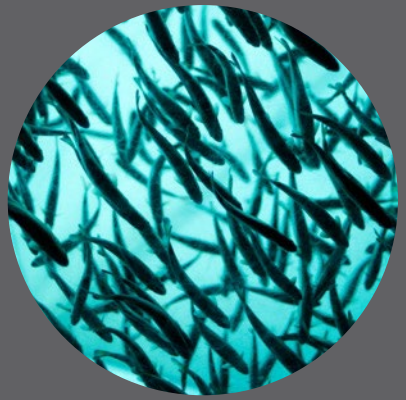
Passive and active dissuasion associated with managing Crescent Island terns was successful; island became largely vegetated, with no terns or gulls nesting.

After the removal of passive dissuasion material and a lack of active tern dissuasion, gull and tern colonies re-formed (2020 – 2025).

During this period, a cormorant colony on Foundation Island and a pelican colony on Badger Island failed (from natural causes) and birds relocated to nearby Crescent Island.

By 2025, ground vegetation was greatly reduced, and the largest inland colonies of terns, cormorants, and pelicans in the Plateau were on Crescent Island.

SUMMARY



CASPIAN TERN PREDATION REDUCED AT MANAGED COLONIES

SMOLT IMPACTS REDUCED

Impacts reduced by 70 - 80% on steelhead smolts from terns breeding on ESI and Goose Island.

STRONG FIDELITY TO REGION

Some colonies have recently reformed (Crescent Island) and terns continue to attempt to nest at historical breeding sites in the region

ADAPTIVE MANAGEMENT NEEDED

To reach management objectives and to maximize the benefits to smolts from managing avian predators

STATUS OF FLYWAY POPULATION A CONCERN

To ensure long-term viability of terns in the region, a larger colony at ESI may now be warranted, as well as increases in the size and productivity of terns at other, alterative colony sites in the Pacific Northwest

PREDATION BY DOUBLE-CRESTED CORMORANTS HAS INCREASED

SMOLT IMPACTS REMAIN SIGNIFICANT

Dissuasion of cormorants on ESI reduced the colony as intended by the Plan, but displaced cormorants relocated to colonies in the middle and upper estuary and predation impacts are now higher than those that occurred prior to management.

ADAPTIVE MANAGEMENT NEEDED

To reach management objectives, predation by cormorant nesting in the middle and upper estuary should be reduced and management of cormorants on Crescent Island should now also be considered.

PREDATION BY GULLS AND PELICAN IS A GROWING CONCERN

CONSUMPTION RATES VARY

Per capita (per bird) consumption rates by gulls and pelicans are lower than those of terns and cormorants, but predation can be substantial, particularly for colonies located near dams, diversion sites, tributaries, and other areas where fish congregate.

PELICANS CONSUME ADULT SALMONIDS

Adult Sockeye Salmon and other larger-sized fishes. Predation on adult Sockeye Salmon substantial in some years.

Data on colony sizes, connectivity, and predation impacts are less understood compared with terns and cormorants.

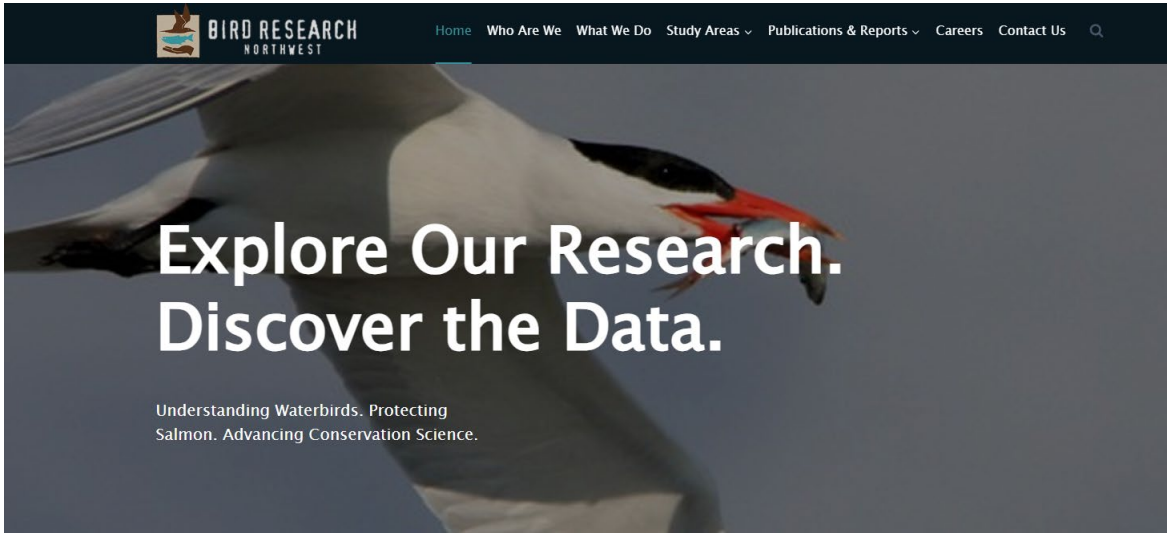
LIMITED OR NO MANAGEMENT

No federal management plans for gull and pelican colonies.

MORE INFORMATION

Bird Research Northwest

- Annual Reports
- Over 50 peer-reviewed scientific manuscripts
- In-season project updates to inform adaptive management



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ACKNOWLEDGEMENTS

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THANK YOU

QUESTIONS?

PELICAN PREDATION: ADULT SOCKEYE

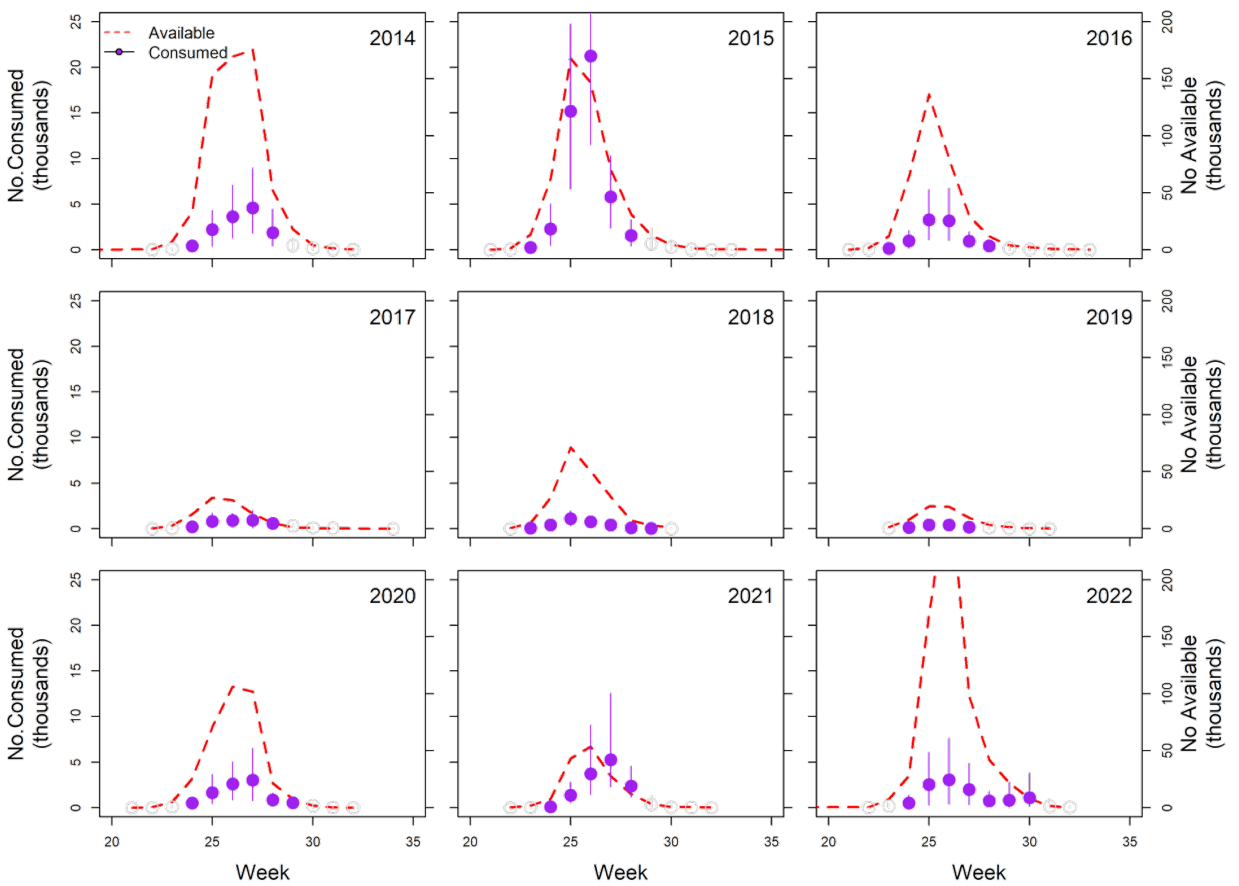
- Predation by pelicans ranged annually from 1.5% to 8.5% of available adult sockeye at Bonneville Dam; average of 4.6% (all sockeye populations).

- Number consumed by pelicans ranged annually from 1,328 to 47,265 adults; average of 13,863 fish (all sockeye populations).

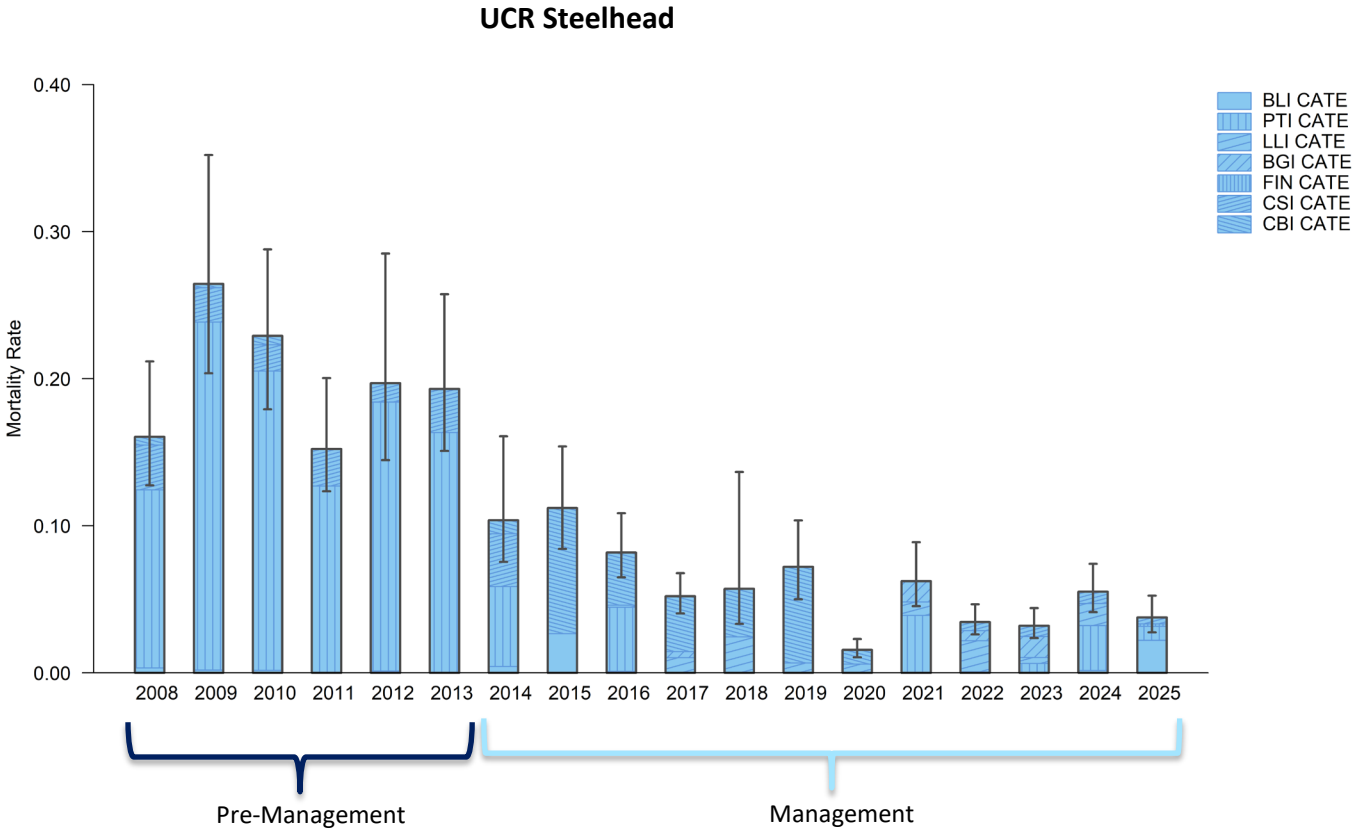
Year	Predation Probability	No. Counted	Estimated Consumption
2014	0.022 (0.013–0.032)	614,052	13,483 (7,558–19,957)
2015	0.085 (0.056–0.116)	510,497	47,265 (29,747–64,857)
2016	0.027 (0.015–0.044)	342,446	9,363 (4,924–14,945)
2017	0.049 (0.023–0.075)	87,582	3,277 (1,699–5,497)
2018	0.015 (0.007–0.024)	193,407	2,884 (1,289–4,747)
2019	0.022 (0.007–0.045)	62,828	1,328 (479–2,588)
2020	0.035 (0.018–0.051)	341,702	9,060 (5,068–14,165)
2021	0.080 (0.054–0.106)	151,631	12,425 (8,153–16,812)
2022	0.026 (0.014–0.043)	663,077	10,296 (5,393–17,189)
2023	0.083 (0.058–0.109)	327,601	23,951 (16,398–32,052)
Average	**0.046 (0.037–0.57)**	**329,482**	**13,863 (10,891–17,577)**

ADULT SOCKEYE: TEMPORAL VARIATION IN PELICAN PREDATION

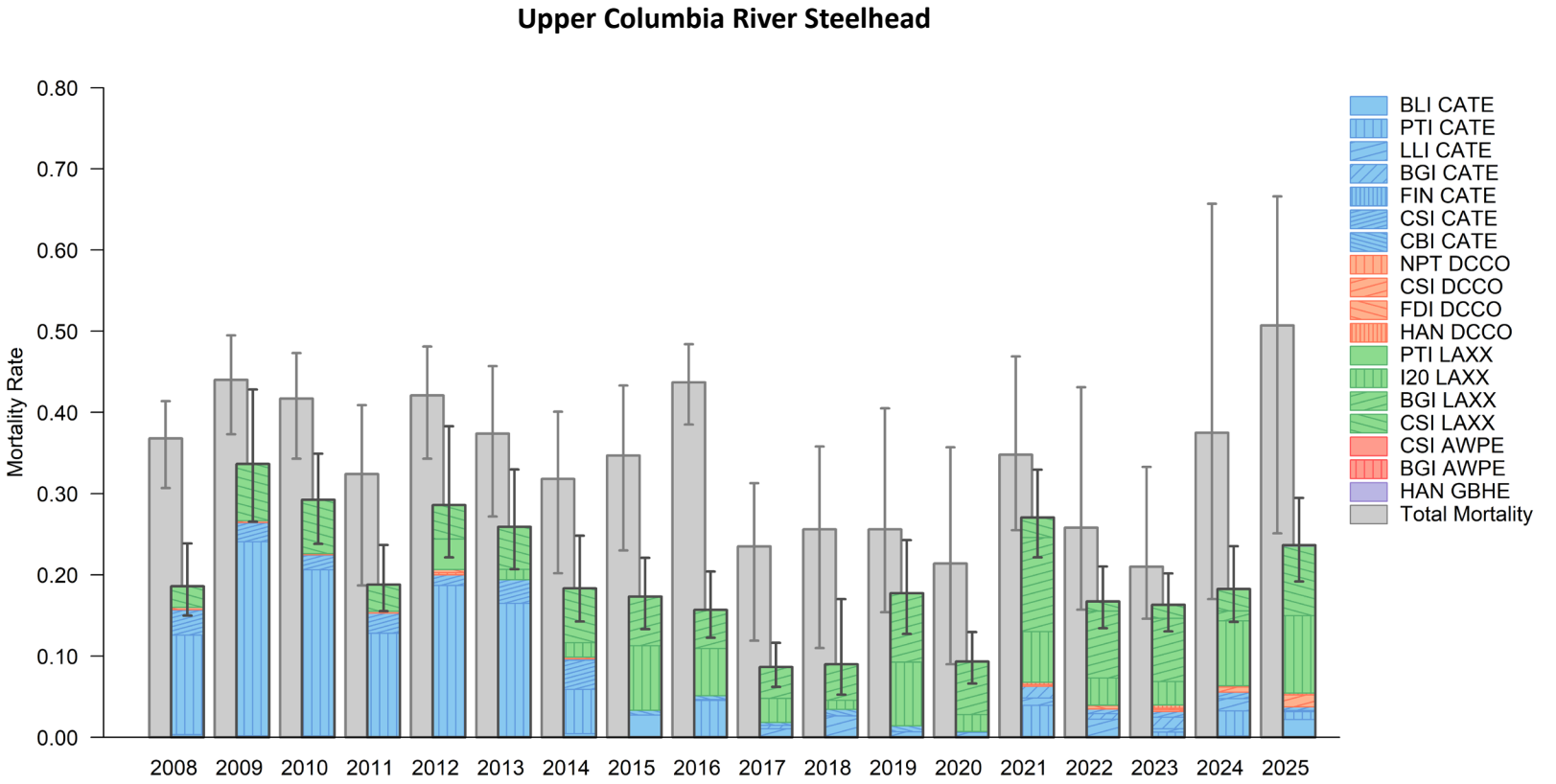
- Pelicans consumed adult sockeye throughout the run.
- Predation increased as sockeye abundance increased.
- Some evidence that late migrating sockeye were more susceptible to pelican predation.
- Some evidence predation was highest in years with poor environmental conditions (temp., flow).



TERN PREDATION RATES (CPR)

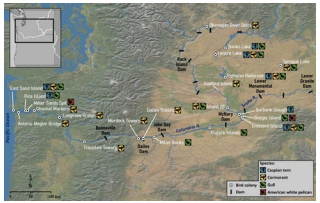


CUMULATIVE PREDATION & SURVIVAL (RIS TO McN)



*Preliminary

System-wide RM&E



Avian predation involves multiple predator species and inter-connected colonies that occur over large spatial-scales; requires system-wide studies.

RM&E is used to:

- Evaluating the efficacy of bird management actions to reduce predation.
- Developing adaptive management solutions to reduce predation.
- Identify emerging predation issues and concerns.
- Identify avian species and colonies that pose little or no threat to salmon and steelhead survival; cases where management is not warranted.
- Provides data on colony locations, sizes, and factors that limit nesting success; data critical to understanding Pacific Flyway populations and their conservation status.

Avian Predation in the Columbia River Basin: A Strategic Overview

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Outline

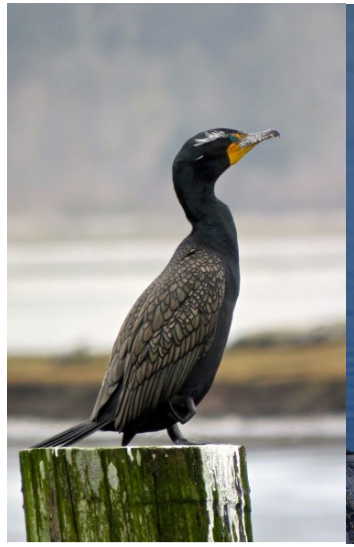
1. Species background and abundance trends
2. 2026 management and planning
3. Two key predation issues
4. Emerging perspectives

Bird abundance subsidized by anthropogenic factors

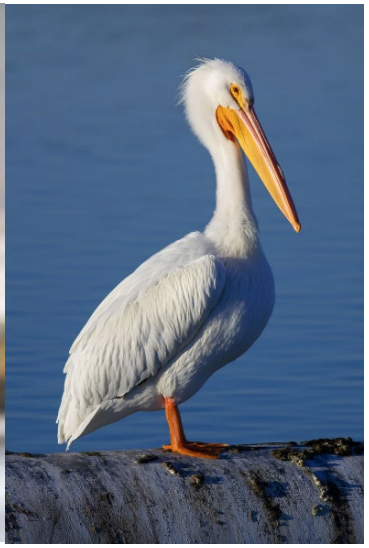
- Double-crested cormorant (DCCO), American white pelican (AWPE), Caspian tern (CATE), California gull (LAXX), ring-billed gull (LAXX)
- >50 colony sites, primarily on artificial habitats (e.g. navigation markers, dredge material islands)
- Birds benefit from reservoirs, islands, agriculture, hatchery production, and other factors

Most avian predators documented nesting in basin only after 1925

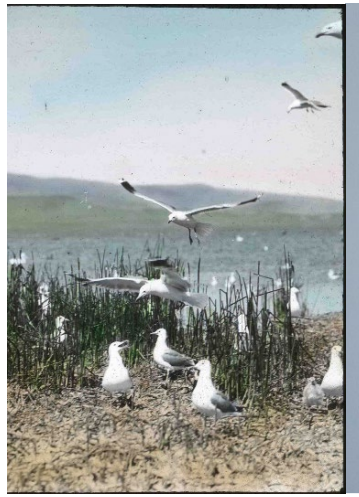
Year of first breeding record in areas of the basin that presently support anadromous salmonids:



<<1900 (almost certainly historically present)



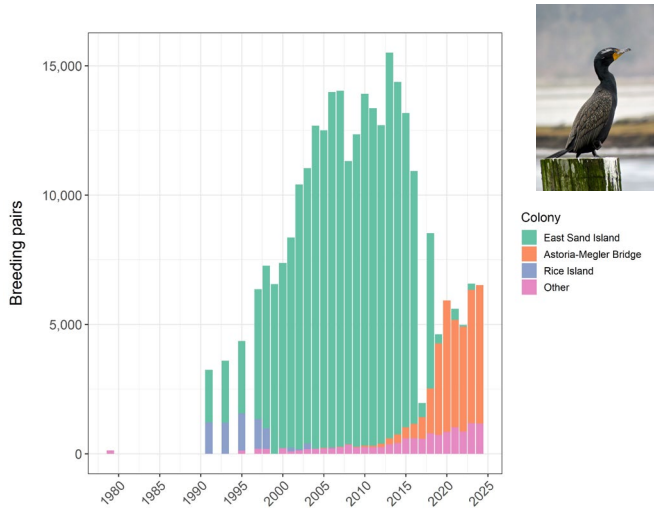
1926 (Moses Lake, 60 individuals, apparent first breeding record in WA)

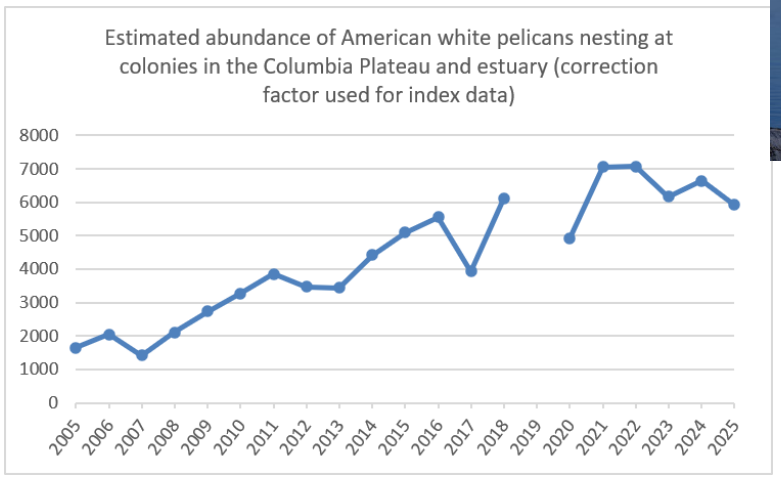


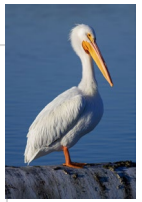
1930 – Ring-billed gull
1932 – California gull
(Both apparent first breeding records in WA)

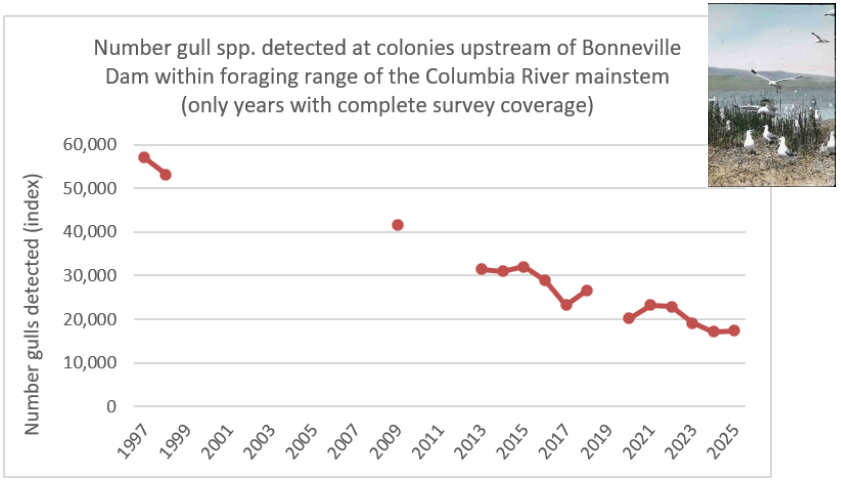
1929 (Moses Lake, 2 individuals, apparent first breeding record in WA)

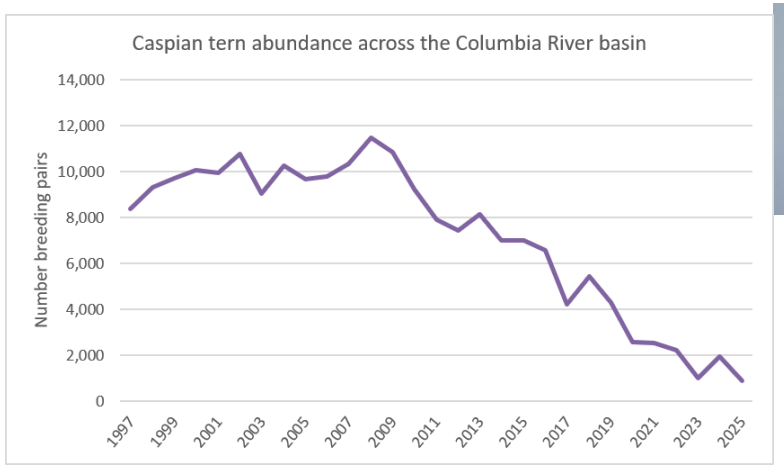
Breeding abundance trends











“Native invaders”

- *Human alteration of ecosystems may drive native species to invader status, causing ecological and economic damage rivaling that of non-native invasive species*
- Native invaders complicate management because of conflicting goals across taxa

Native invaders – challenges for science, management, policy, and society

Michael P Carey[1*†], Beth L Sanderson[1], Katie A Barnas[1], and Julian D Olden[2]

The term “invader” is typically paired with adjectives such as “non-native” and “alien”, yet native species can also cause ecological and economic impacts that rival those of well-known invasive species. By spreading within their historical range, attaining extreme abundances, and exerting severe per-capita effects as a result of predation or competition, native invaders can create an unusual set of challenges for science, management, policy, and society. Identifying when, where, and why species become invaders in their native ranges requires additional scientific inquiry, outside the current focus of invasion biology. Management strategies often mitigate the symptoms rather than address the causes of problematic native species invasions. Convincing stakeholders to comply with management actions aimed at controlling native invaders creates societal challenges and policy makers must prioritize goals from varied and often conflicting human interests. We illustrate these challenges by highlighting native species that adversely affect threatened and endangered Pacific salmon (*Oncorhynchus* spp).

Front Ecol Environ 2012; 10(7): 373–381, doi:10.1890/110060 (published online 15 Jun 2012)

Biological invasions, which join synergistically with habitat loss and fragmentation, climate change, natural resource overexploitation, pollution, and a multitude of other anthropogenic factors, are recognized as a leading threat to freshwater, marine, and terrestrial systems. The common notion of an invasive species is one that has become established in a new area and has a measured impact on the ecology and economy of the recipient ecosystem (Valéry *et al.* 2009). The terminology used to describe invasive species (also commonly called foreign, alien, or exotic species; see Valéry *et al.* 2008) has led to the perception that these organisms only originate from far-away regions and are transplanted vast distances, predominantly via human vectors. Consequently, most scientific research, management, and policy efforts associated with mitigation focus on invasive species that have been transplanted from the distant regions where they originated (Wilson *et al.* 2009).

Also common but less recognized are species that have become “invasive” in their own native range – these are aptly named “native invaders” (Simberloff 2011). Human activities may create native invaders in three ways. First, human-mediated environmental change facilitates population growth of native species via elevated survivorship and reproduction. The abundance or biomass of a native species can increase to extreme levels, beyond those previously observed, resulting in complete dominance of the community (Goodrich and Buskirk 1995; Valéry *et al.* 2008). Second, habitat modification or other changes in the environment may increase the per-capita effect of native species on the resident community, leading to predation and competition that exceed natural levels (Didham *et al.* 2007). In both cases, native species dominate the community by exploiting niche opportunities created by human activities and/or vacancies resulting from the loss or decline of other native species (Simberloff 2011). Third, human activities, such as intentional stocking, establish new populations of native species within the indigenous distribution where they evolved (Himer and Cox 2007), thus filling their range without increasing the overall extent of that range. Such invasions often go undetected but they can have considerable effects on recipient ecosystems. Both dominant and range-filling native invaders reflect notable shifts from the past as a result of human activities, and in neither case does the introduction event involve the breaching of a major biogeographic boundary.

Native species can cause similar harmful ecological and economic impacts to those commonly associated with non-native invasive species (ie the subset of non-native

In a nutshell:

- Human alteration of ecosystems may drive native species to invader status, causing ecological and economic damage rivaling that of non-native invasive species
- “Native invaders” complicate the development and implementation of countermeasures in science, management, society, and policy as a result of conflicting goals from diverse human interests
- By identifying the process by which native species become invasive, resource managers may garner support from policy makers and the public for mitigation and control activities to alleviate ecological impacts
- Recovery strategies need to explicitly address the invasive effects of a native species because the nuances of spatial and temporal impacts differ from those of non-native species

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Notable avian work in 2026

- Successful dissuasion of Miller Rocks gull colony (Yakama)
- American white pelican diet and telemetry studies (Yakama/CTUIR)
- Gull management on Rice Island (USACE, CRITFC, Yakama)
- Too many others to list!


Courtesy B. Sharp

Observations from 2026 reinforce need for integrated management

- Whack-a-mole from management at Miller Rocks (gull spp.) and Miller Sands (AWPE)
- Continued high pelican abundance at dams despite non-lethal hazing
- Shift in predation from terns to gulls on Columbia Plateau


T. Lawes

Columbia Basin Avian Predation Workgroup activities

- Developing priorities for key predation issues
- Identifying management constraints
- Aligning agencies around feasible next steps

Cormorant predation in estuary

- Estuary-wide predation rates on steelhead ~18%-21% (ODFW)
- Predation at 14+ freshwater-zone colonies approaches impact of Astoria-Megler Bridge colony (ODFW)
- Funding and permitted take are challenges

Is moving cormorants back to East Sand Island the best option?

- Reduce steelhead predation rates to ~3%
- Preserve current regional cormorant abundance
- May allow for management with minimal lethal take (initially)

Is moving cormorants back to East Sand Island the best option?

NEW INFORMATION SUGGESTS DRAWBACKS

- High predation rates upriver increase consequences of management failure
- Eagle disturbances = feasibility challenge
- ~1,500 recruits annually would try to nest at bridges
- High cost of bridge modifications
- Unreliable adaptive management?

Management objectives: 50-y time horizon

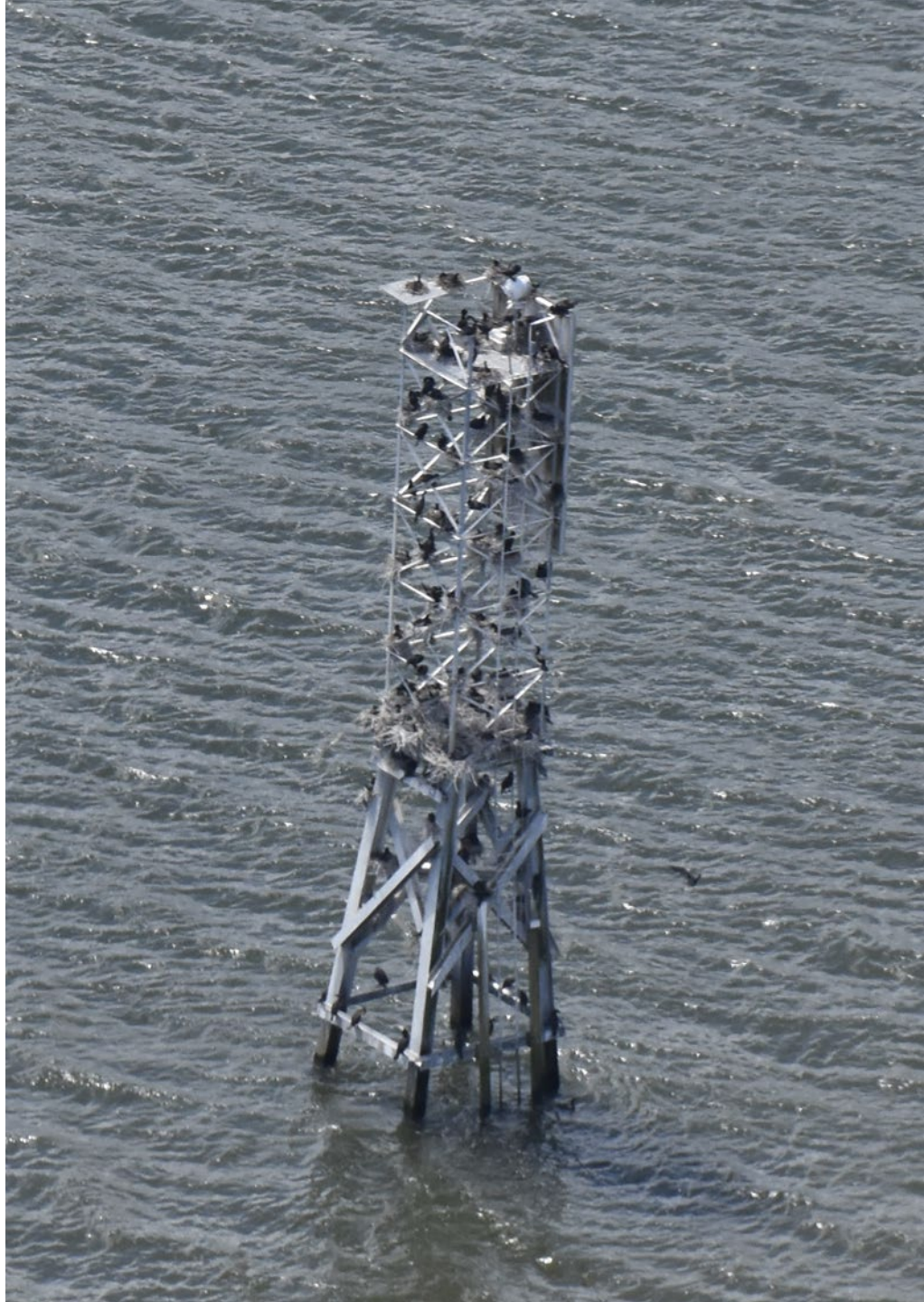
1. Reduce predation on steelhead from ~20% to ~3%
2. Implement actions on a timely schedule
3. Minimize risk of DCCO dispersal beyond target areas
4. Deliver durable conservation benefits
5. Maintain cost-effective management
6. Limit adverse impacts to DCCO population
7. Minimize necessary lethal take

There may be no perfect alternative

1. Any plan that maintains high DCCO abundance in the estuary carries a whack-a-mole risk
2. Risk of DCCO decline: ~25% of the regional population nests in the estuary
3. How will surplus recruits be managed?
4. Potential alternatives likely differ substantially in 1) cost, and 2) appeal to some publics

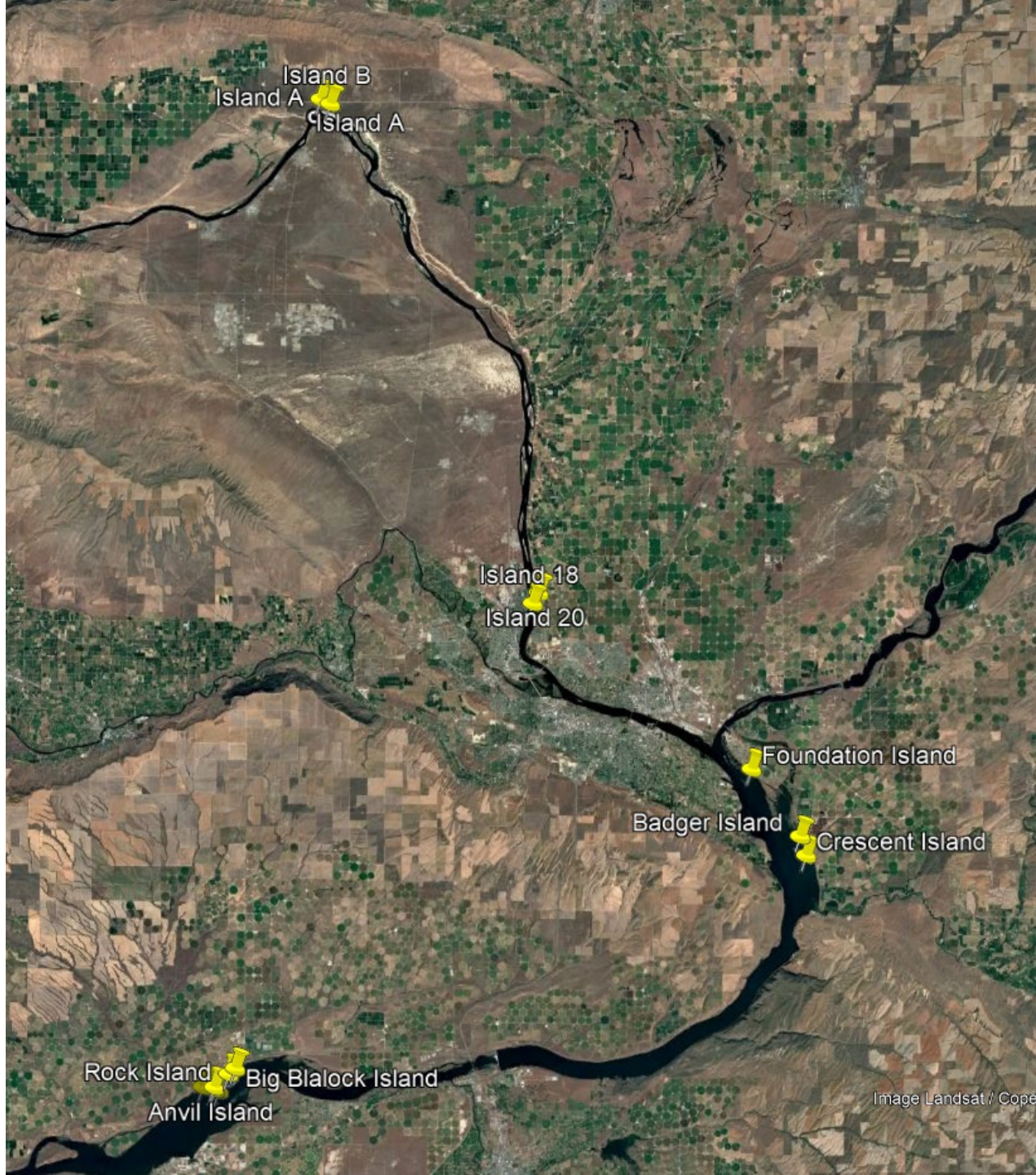
Avian management needs on federal lands

- Mostly “artificial” habitats: islands and structures
- High predation rates on ESA-listed fish
- Administered by USFWS, Corps, BPA, Coast Guard



Columbia Plateau

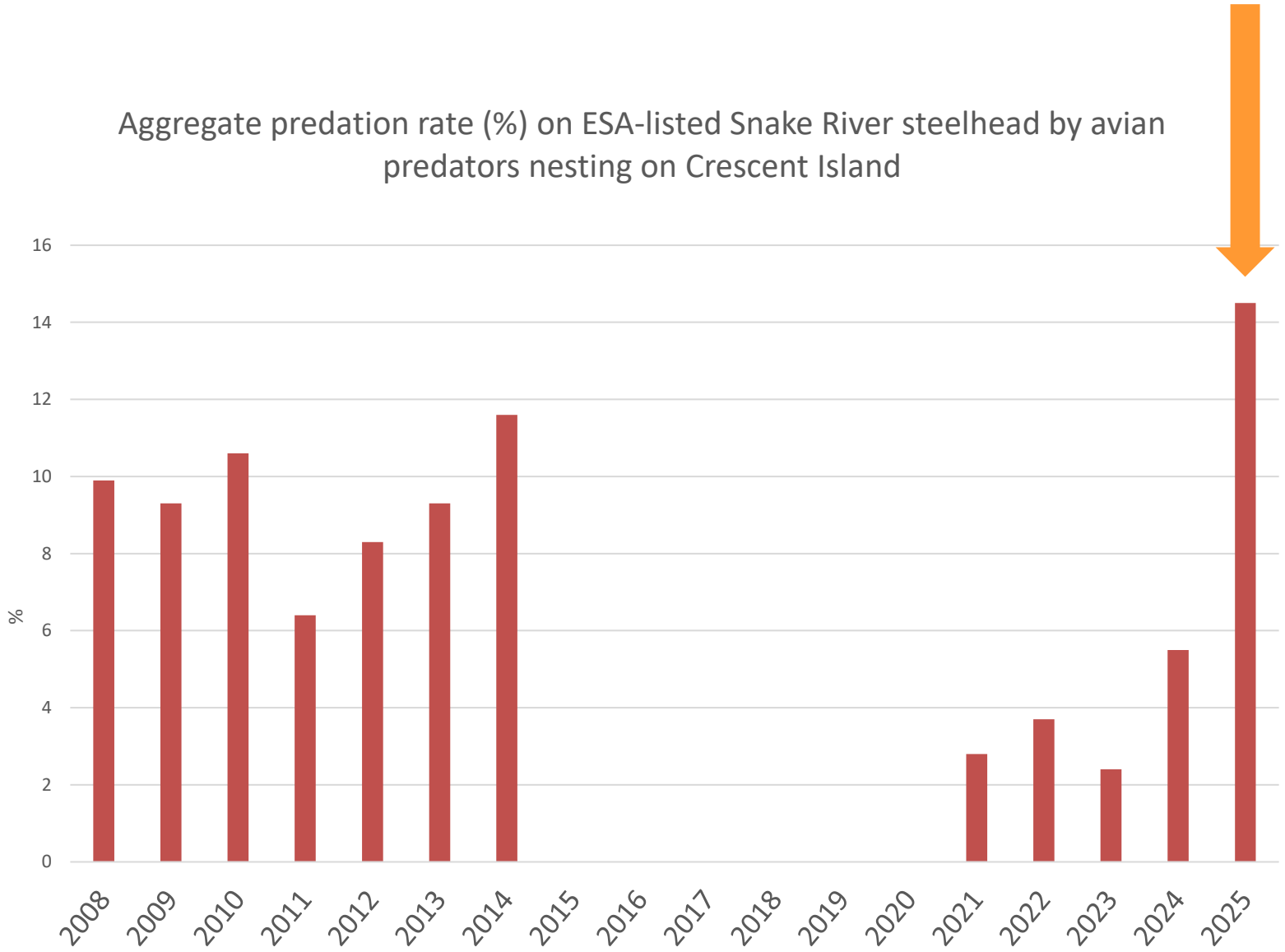
- Avian predation on the Columbia Plateau is driven largely by colonies on federal lands
- Current management targets terns, but has not adapted to increased consumption by gulls
- Avian predation rates still high after 12 years of management: ~25-30% of available steelhead



Crescent Island

- Dredge material island (Corps and McNary National Wildlife Refuge)
- Terns (and gulls) dissuaded in 2015 as part of Inland Avian Predation Management Plan
- Terns and gulls returned in 2020 and were soon joined by cormorants and pelicans

Evans et al. 2025



Data from Evans et al. 2026

Workgroup discussion points

- USFWS mandate to protect birds on Refuge lands—including “native invaders”—can conflict with survival of ESA-listed fish
- Do National Wildlife Refuge management plans sufficiently account for predation on ESA-listed fish?
- Alignment of conservation efforts across federal agencies will be crucial for future management

Legislation update

- H.R. 8195 - Responsible Cormorant Management and Control Act of 2026
- “the [Secretary of the Interior]…shall identify appropriate management actions that can be taken within units of the National Wildlife Refuge System to meet management objectives of States, Indian Tribes, the Regional Flyway Councils and such units”

Difficult truths

- Intensive management may need to occur across much of the predator suite to be effective (i.e. to prevent compensation via prey-switching)
- There may be an unavoidable trade-off between fish survival goals and regional bird abundance
- Improvements to avian management may require tough and controversial choices (e.g. lethal take)

Questions?

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