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

August 5, 2025

MEMORANDUM

TO: **Council Members**

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

SUBJECT: **Avian Predation on Salmon and Steelhead in the Columbia River Basin- Annual report update on lessons learned, successes, emerging issues, challenges, and potential next steps.**

BACKGROUND:

Presenters: Allen Evans, Scientist with Real Time Research, Inc.
James Lawonn, Oregon Department of Fish and Wildlife, Informal Columbia Basin Avian Predation Workgroup Facilitator/Chair
Dr. Rachael Orben, Assistant Professor, Oregon State University

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 provide a brief history of the avian predation RM&E that Oregon State University, Real Time Research, and U.S. Geological Survey have conducted and will summarize the implementation of three avian predation management plans; assess the efficacy of each plan in achieving management goals and will highlight lessons learned and emerging issues.

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 be reporting on the work of the group, emerging issues, challenges, and some potential next management steps.

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. During the call for recommendations for the 2025 FWL Program amendment the Council received a range of recommendations on predator management. There was a call for basin wide and regional coordination strategies that lead 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.

Background: To address concerns about the impact of avian predation on the survival of smolts, the U.S. Fish and Wildlife Service, the U.S. Army Corps of Engineers (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 objectives of the study Evans will report on were to evaluate the efficacy of management actions to reduce predation on smolts by terns and cormorants and to assess the magnitude of predation by other, unmanaged predator species and colonies, including predation by California gulls, Ring-billed gulls, and American white pelicans.

Specifically, the project goals were to:

(1) locate and estimate the size of tern, cormorant, gull, and pelican colonies that were within foraging range of smolts in the middle Columbia River, lower Snake River, lower Columbia River, and Columbia River estuary.

(2) estimate colony-specific and cumulative (all colonies combined) predation rates on smolts as part of a system-wide evaluation of predation.

(3) evaluate the efficacy of tern and cormorant management plans to reduce predation.

(4) identify emerging predation issues and make recommendations for adaptive management.

Some of the lessons learned that will assist in adaptive management include:

1. Predation/consumption rates on salmonid smolts by piscivorous waterbirds are highly variable, depending on predator species, colony location, colony size, and year and that not all predator species and colonies pose a threat to smolt survival in the CRB.
2. Predation on smolts by Caspian terns on East Sand Island, Crescent Island, and Goose Island have been reduced as result of management actions. Target goals regarding colony sizes and predation rates have been achieved at several, but not all, tern colonies.
3. Management of double-crested cormorants on East Sand Island in the lower estuary has increased the size of cormorant colonies in the upper estuary, where cormorants have higher per capita (per bird) predation impacts on smolts. Adaptive management will be necessary to reduce predation by cormorants in the upper estuary to achieve the goals of the cormorant management plan.

   Predation by California gulls, ring-billed gulls, and American white pelicans on smolts can be substantial, depending on the size and location of the colony. Pelicans are also capable of consuming adult-sized fishes and predation on Sockeye Salmon can exceed 8% of returning adults (upward of 40,000 fish) in some years. Additional research is needed to better understand the factors that influence fish susceptibility to gull and pelican predation and to what degree predation limits fish survival in the CRB.
4. Although management actions have successfully reduced predation at some tern and cormorant colonies, the cumulative or system-wide effects of avian predation/consumption (predation by all predator species and colonies combined) remains a substantial source of smolt mortality in the CRB, particularly for steelhead smolts.

5. Since management of Caspian terns in the estuary started in 2008, the Pacific Flyway population of terns has decreased by more than 70%. Adaptive management may now be necessary to ensure the long-term viability of terns, including providing new and improved nesting opportunities for terns outside of the basin.

Taken together, results suggest that continued system-wide avian predation RM&E, coupled with adaptive management actions, will be necessary to achieve the goals and objective of management plans and to address emerging predation issues and concerns in the future.

A diverse group of state, tribal, and federal 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 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.

Another current update is that the state of Washington recently completed the *Avian Salmon Predation Working Group* (ASPWG)'s *Report* to the state legislature and we may bring them in at a later date to present their findings.

More information:

Avian Predation Synthesis Report

Avian Predation in the Columbia River Basin 2024 Annual Report

Caspian Tern Management Plan

Double Crested Cormorant Management Plan

Inland Avian Predation Management Plan

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: An Update of Research, Monitoring, and Evaluation Studies

Northwest Power and Conservation Council

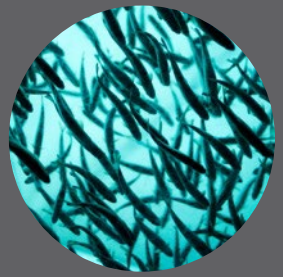
August 12, 2025

OSU Oregon State University

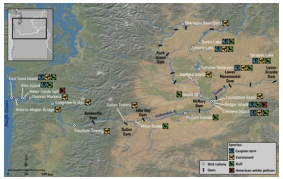
RTR REAL TIME RESEARCH

BACKGROUND





AVIAN PREDATION IN THE COLUMBIA BASIN

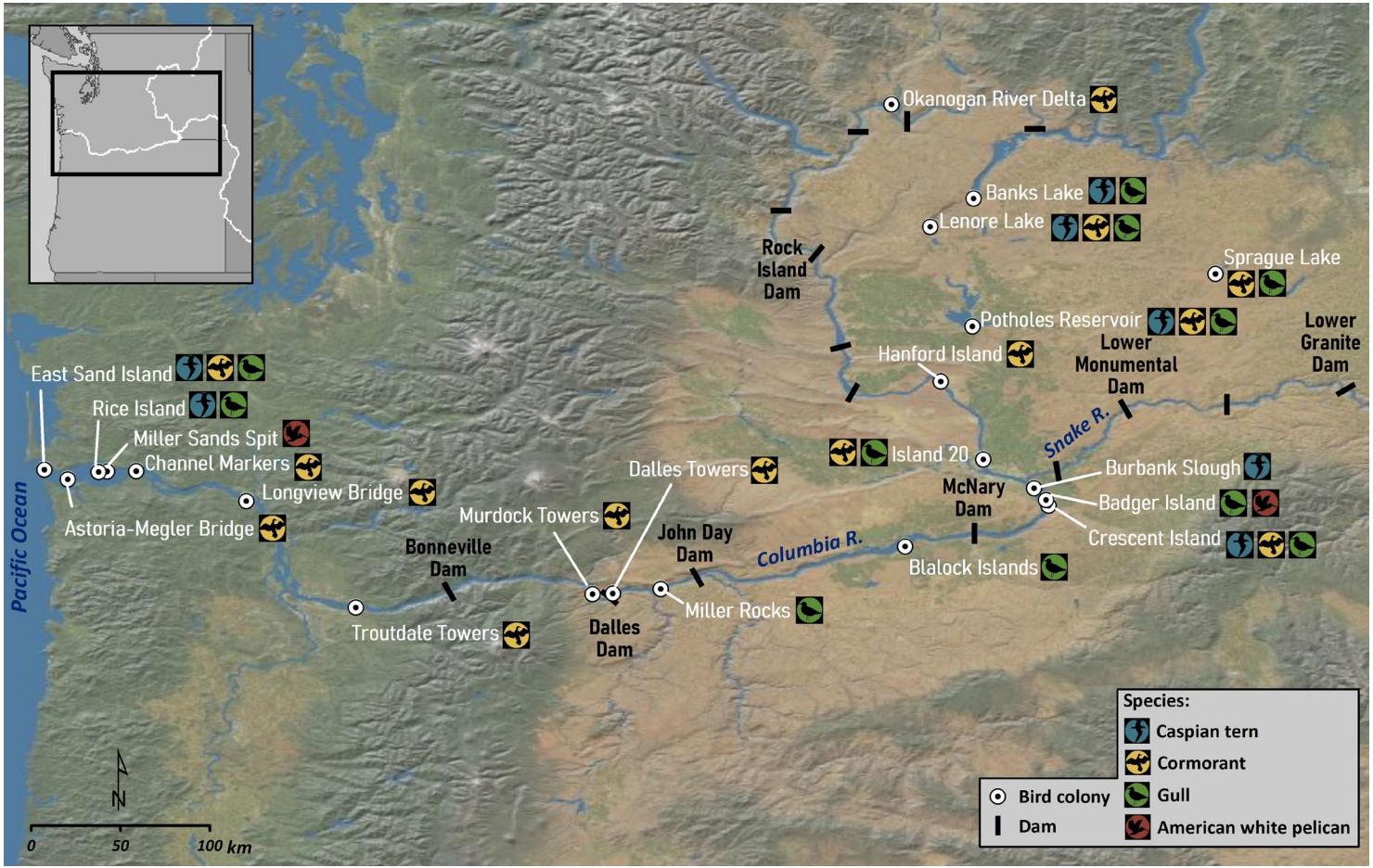


Breeding colonies of fish-eating waterbirds are widespread in the Basin and the nesting season overlaps with the smolt out-migration period.

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

Several other fish-eating waterbird species and colonies exists. Colonies are often smaller in size, and predation concerns more localized.

AVIAN PREDATION IN THE COLUMBIA BASIN



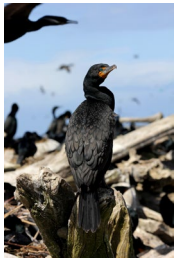
CASPIAN TERN PREDATION IN THE COLUMBIA BASIN

Multiple breeding sites. The largest colony in the world was formerly on East Sand Island in the estuary; a managed colony.

Caspian terns have one of the highest per capita (per bird) impacts on smolt survival.

Caspian terns disproportionally consume steelhead relative to salmon smolts; consumption rates can exceed 20% of available steelhead by some colonies, in some years.

DOUBLE-CRESTED CORMORANT PREDATION IN THE COLUMBIA BASIN



Multiple breeding sites. The largest colony was formerly on East Sand Island; a managed colony site. Largest colony is now on the Astoria-Megler Bridge in the estuary.

Diet composition varies greatly based on colony size and location (freshwater versus marine).

Cormorants consume smolts in proportion to their availability, with impacts more similar amongst salmonid species (salmon and steelhead). Predation can exceed 10% of available smolts at larger-sized colonies, generally less than 5% at smaller colonies.

GULL PREDATION IN THE COLUMBIA BASIN

Multiple gull species and breeding sites. The most abundant species, numerically.

Omnivorous with a diverse diet. Steal fish from other birds and disproportionately forage for fish near dams and other areas where smolts concentrate.

Consumption rates on smolts vary considerably based on colony size and location; with rates ranging from 0% to more than 10% of available smolts.

AMERICAN WHITE PELICAN PREDATION IN THE COLUMBIA BASIN

Small number of breeding sites. Largest colony was on Badger Island in McNary Reservoir but is now on Crescent Island in McNary Reservoir (as of 2025).

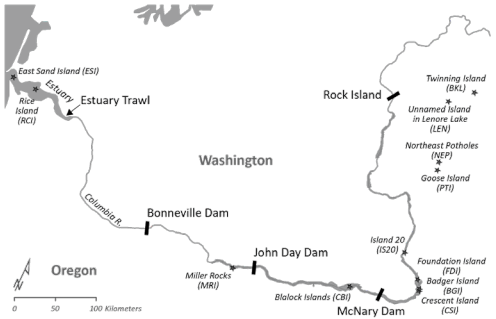
Largest (by wingspan, mass, and gape) piscivorous colonial waterbird in North America. Opportunistic forages that quickly respond to changes in prey availability. Capable of long-distance foraging bouts.

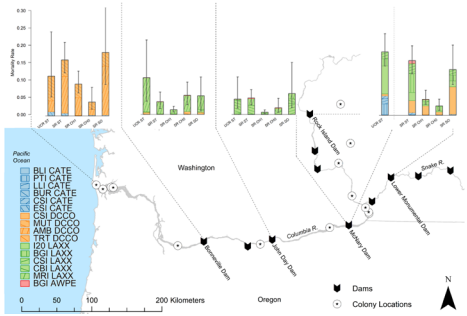
Predation rates low (< 1%) on yearling smolts in the mainstem CR. Predation on subyearling smolts and fish in tributary systems (e.g., Yakima R., Umatilla R.) can be substantial (> 10%) in some years. Pelicans consume adult-sized fishes; predation on Sockeye Salmon upwards of 8% of the run arriving at Bonneville Dam, which equates to more 40,000 fish, in some years.

SYSTEM-WIDE EFFECTS OF AVIAN PREDATION ON SALMONIDS

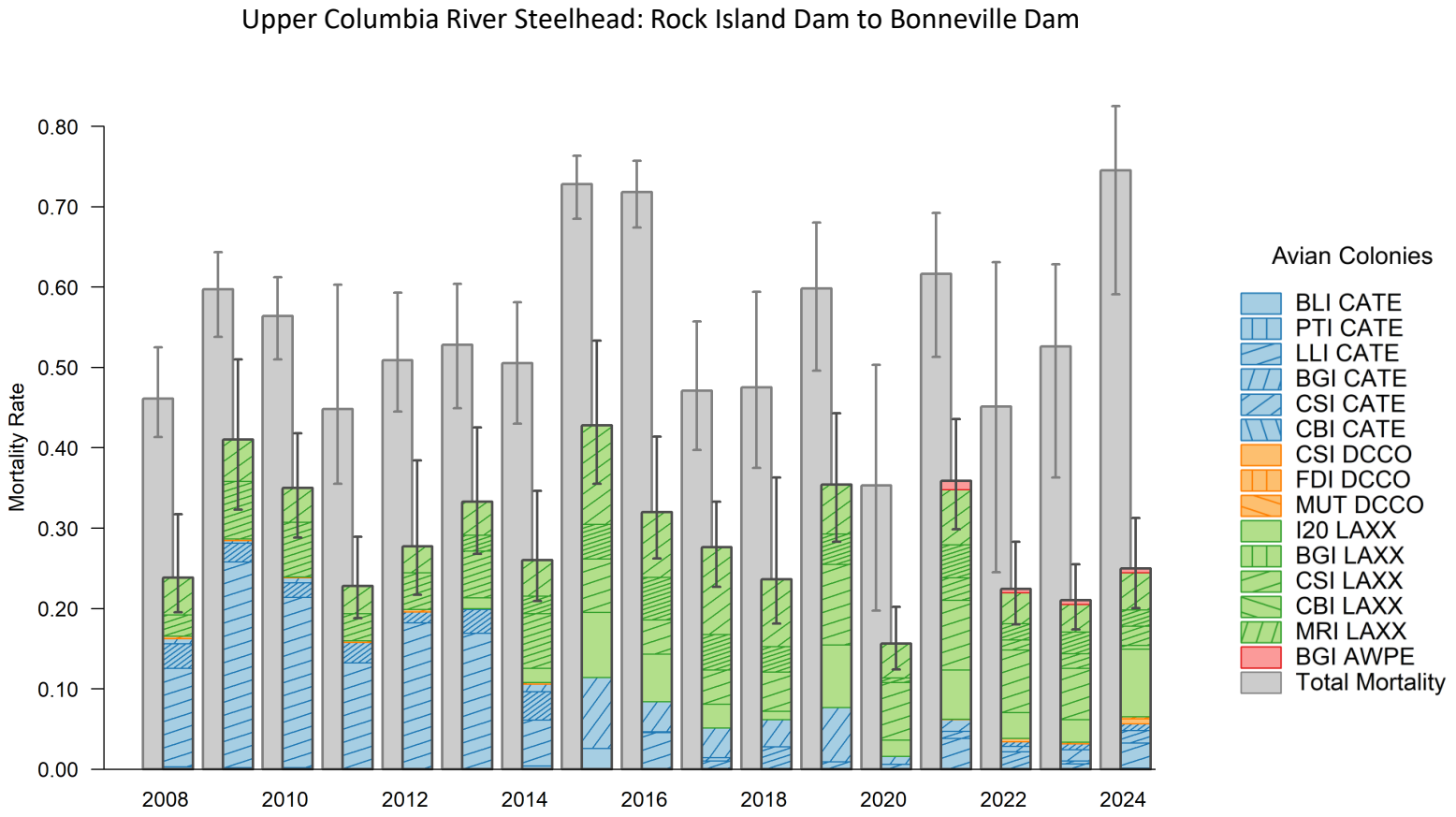
Some salmonid populations are subject to predation by multiple avian predator species and colonies during seaward migration.

Cumulative effects of predation (from all predator species and colonies combined) can be substantial, accounting for more than 50% of all smolt losses during outmigration in some years.

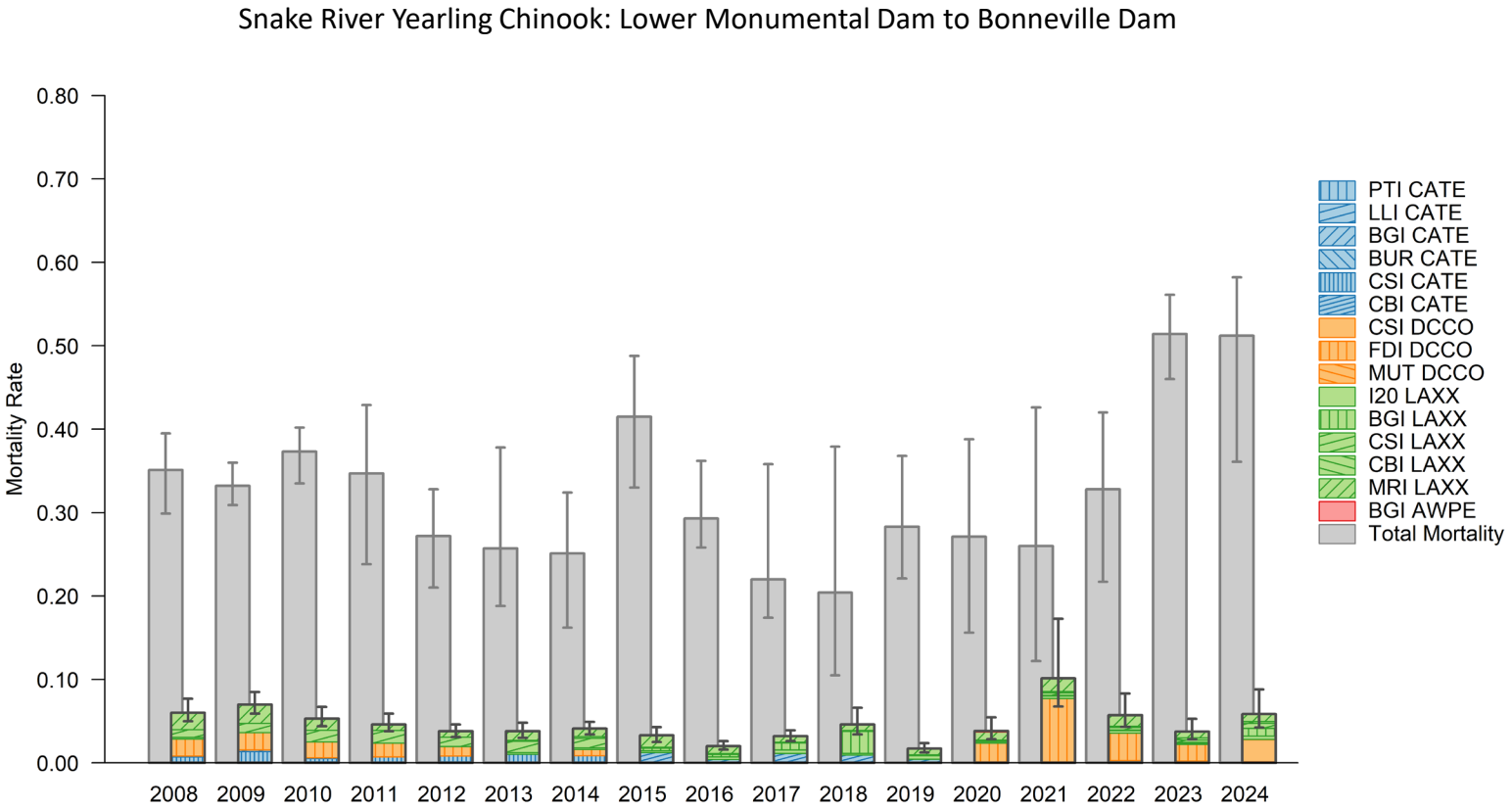




SYSTEM-WIDE EFFECTS OF AVIAN PREDATION ON SALMONIDS



SYSTEM-WIDE EFFECTS OF AVIAN PREDATION ON SALMONIDS



ADDITIVE EFFECTS OF AVIAN PREDATION ON FISH SURVIVAL

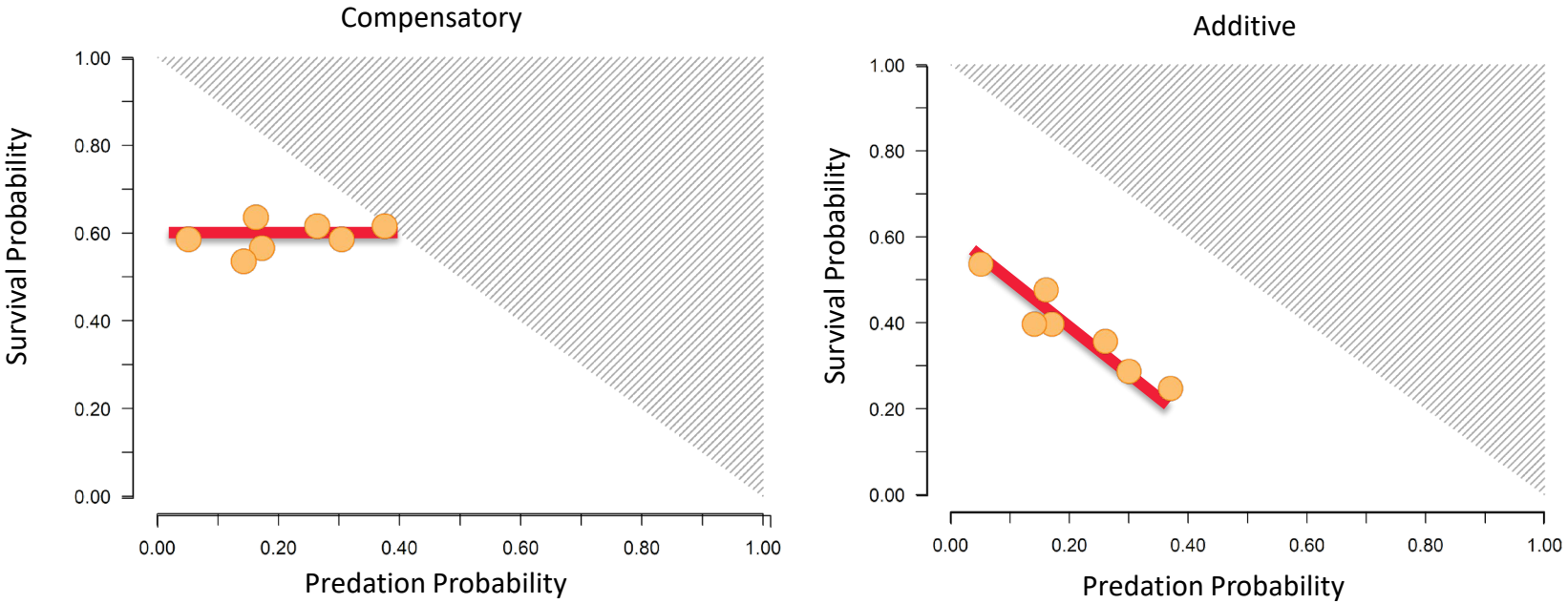
To what degree does avian predation limit fish survival?

Evaluated by determining the strength and magnitude of the relationship between predation and survival. Requires accurate estimates of predation and survival and sophisticated analytical models.

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.

ADDITIVE EFFECTS OF AVIAN PREDATION ON SALMONIDS

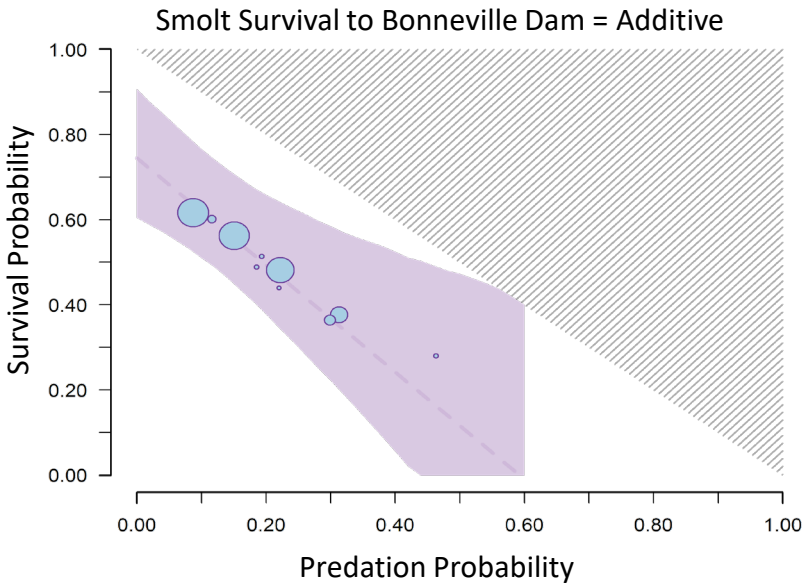
Hypothetical Results

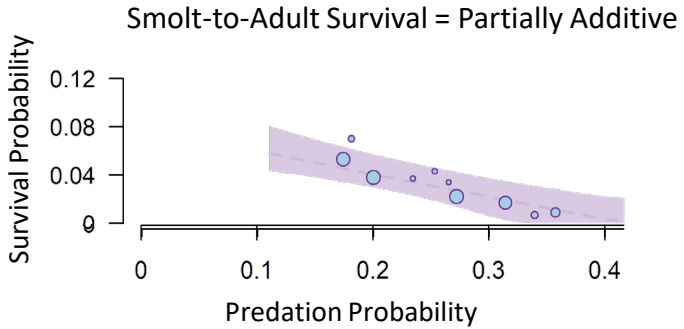


Additive relationship depicted when increases in predation are associated with decreases in survival

ADDITIVE EFFECTS OF AVIAN PREDATION ON SALMONIDS

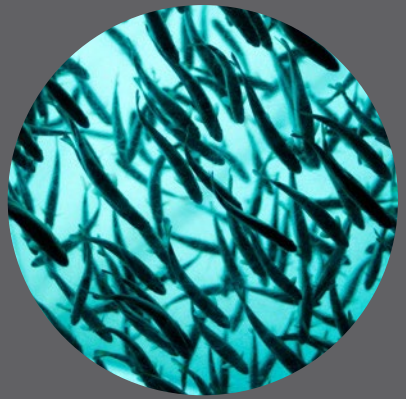
Actual Results: Tern Predation on Steelhead





- 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).

MANAGEMENT PLANS



IMPETUS FOR MANAGEMENT

Caspian terns and double-crested cormorants nesting on East Sand Island (ESI) in the estuary depredated up to 25 million smolts annually, or roughly 15% of the surviving out-migrants prior to management (2000–2007 for terns, 1997–2014 for cormorants).

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

Management of terns and cormorants to reduce their impacts on smolts was called for in regional planning documents.

AVIAN PREDATION MANAGEMENT PLANS

CASPIAN TERNS

East Sand Island, Columbia River Estuary

DOUBLE-CRESTED CORMORANTS

East Sand Island, Columbia River Estuary

CASPIAN TERNS

Goose and Crescent islands, Columbia Plateau Region

GULLS & PELICANS

No federal or state plans; Experimental management of gulls on Miller Rocks Island in the Columbia Plateau region by the Yakama Nation

TERN MANAGEMENT PLAN FOR THE COLUMBIA RIVER ESTUARY

REDUCE SIZE OF ESI COLONY

From about 10,000 to 3,125 breeding pairs using passive & active nest dissuasion

CREATE ALTERNATIVE HABITAT

For tern nesting outside Columbia Basin and attract terns to nest there

CONDUCT MONITORING

To measure action effectiveness and inform adaptive management decisions

ADAPTIVE MANAGEMENT

To prevent terns from nesting outside of main colony on East Sand Island and elsewhere in estuary

CORMORANT MANAGEMENT PLAN FOR THE COLUMBIA RIVER ESTUARY

REDUCE SIZE OF ESI COLONY

From about 15,000 to 5,600 breeding pairs nesting on East Sand Island

CULLING ANG EGG OILING

Culling adults and oiling eggs (Phase I)

REDUCE NESTING HABITAT

By converting nesting habitat to intertidal wetland (Phase II)

CONDUCT MONITORING

To measure action effectiveness and inform adaptive management decisions

TERN MANAGEMENT PLAN FOR THE COLUMBIA PLATEAU

ELIMINATE TERN COLONIES

At Goose and Crescent islands using passive and active nest dissuasion

CREATE ALTERNATIVE TERN HABITAT

For tern nesting outside Columbia Basin and attract terns to nest there

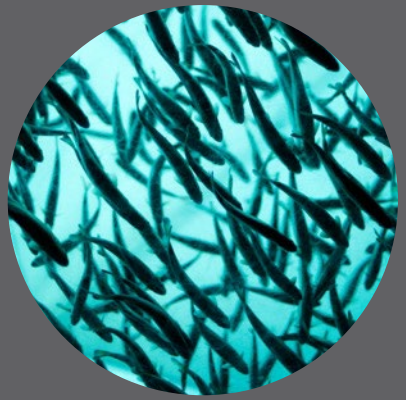
CONDUCT MONITORING

To measure action effectiveness and inform adaptive management decisions

ADAPTIVE MANAGEMENT

If terns relocate to other colonies in the Columbia Plateau, manage as necessary and possible

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 1,524 pairs in 2024 and as low as 524 pairs in 2023 (Emerging Issue)

ALTERNATIVE HABITAT USED

Terns relocated to nesting sites outside of Basin, but sites under-utilized

PREDATION IMPACTS REDUCED

About a 70% reduction in impacts on steelhead smolts since 2020

HIGH FIDELITY TO ESTUARY

Persistent nesting attempts by terns elsewhere in the estuary, impacts largely unknown; 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 East Sand Island occurred following management

DISPERSAL TO UPPER ESTUARY

Astoria-Megler Bridge colony has grown from 300 pairs (2014) to over 5,300 pairs (2024), plus increases at other nesting sites (Lewis and Clark Bridge, Troutdale Towers); predation is now > 10% on multiple ESA-listed salmon and steelhead populations (Emerging Issue)

TERN MANAGEMENT PLAN FOR THE COLUMBIA PLATEAU

COLONY SIZE REDUCED

Little-to-no nesting at Goose Island, colony at Crescent Island initially eliminated but now re-established

DECLINE IN TERN POPULATION

50% decline in the regional breeding population of terns (as of 2024)

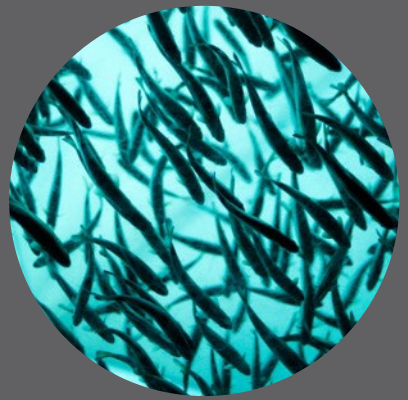
PREDATION IMPACTS REDUCED

Reduction on steelhead predation achieved at some but not all colonies; greatest benefit to UCR steelhead

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 cases

EMERGING ISSUES



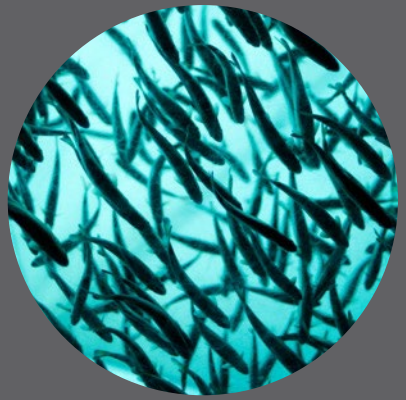
EMERGING ISSUES

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). Colonies were also affected by avian influenza. As of 2024, the Pacific Flyway population has declined by an estimated 71% since 2009.

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.

American white pelican predation: Increasing numbers of pelicans 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.

SUMMARY



CASPIAN TERN PREDATION REDUCED AT MANAGED COLONIES

SMOLT IMPACTS REDUCED

East Sand Island impacts reduced by 70% on steelhead smolts
Goose Island impacts reduced by 80% on UCR steelhead

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 upper estuary should be reduced and the colony at ESI re-established to the size identified in the Plan (about 5,400 – 5,900 pairs).

PREDATION BY GULLS AND PELICAN IS A GROWING CONCERN

CONSUMPTION RATES VARY

Per capita 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

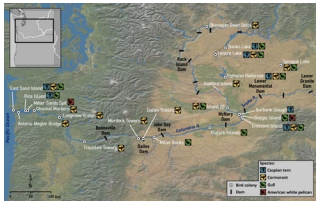
Adult Sockeye Salmon and other larger-sized fishes. Predation on adult Sockeye Salmon substantial in some years

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

LIMITED OR NO MANAGEMENT

No basin-wide management plans for gulls and pelicans

System-wide RM&E



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

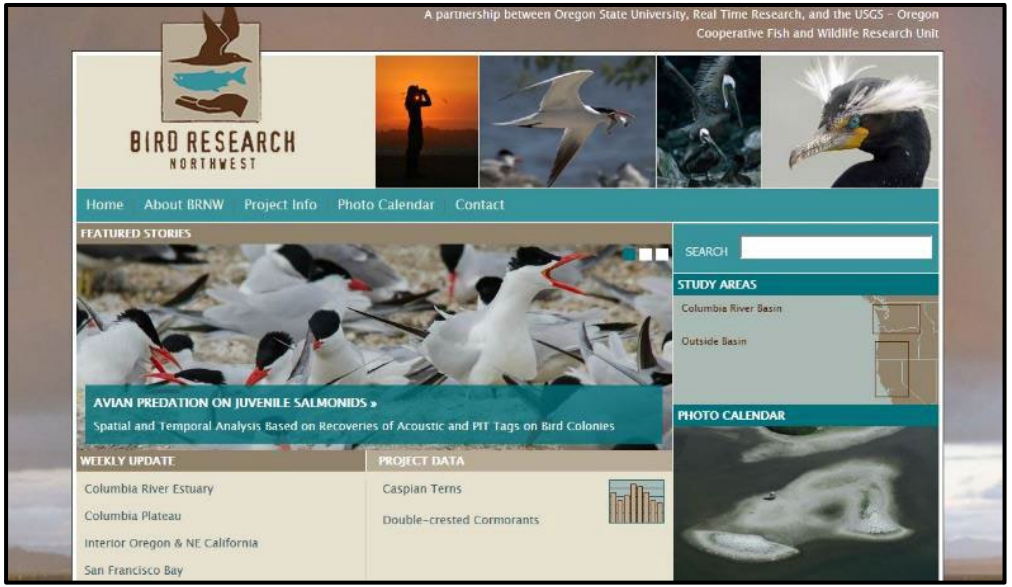
RM&E is used to:

- 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.

MORE INFORMATION

Bird Research Northwest

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



www.birdresearchnw.org

ACKNOWLEDGEMENTS

PRINCIPLE INVESITAGORS

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RTR & OSU STAFF

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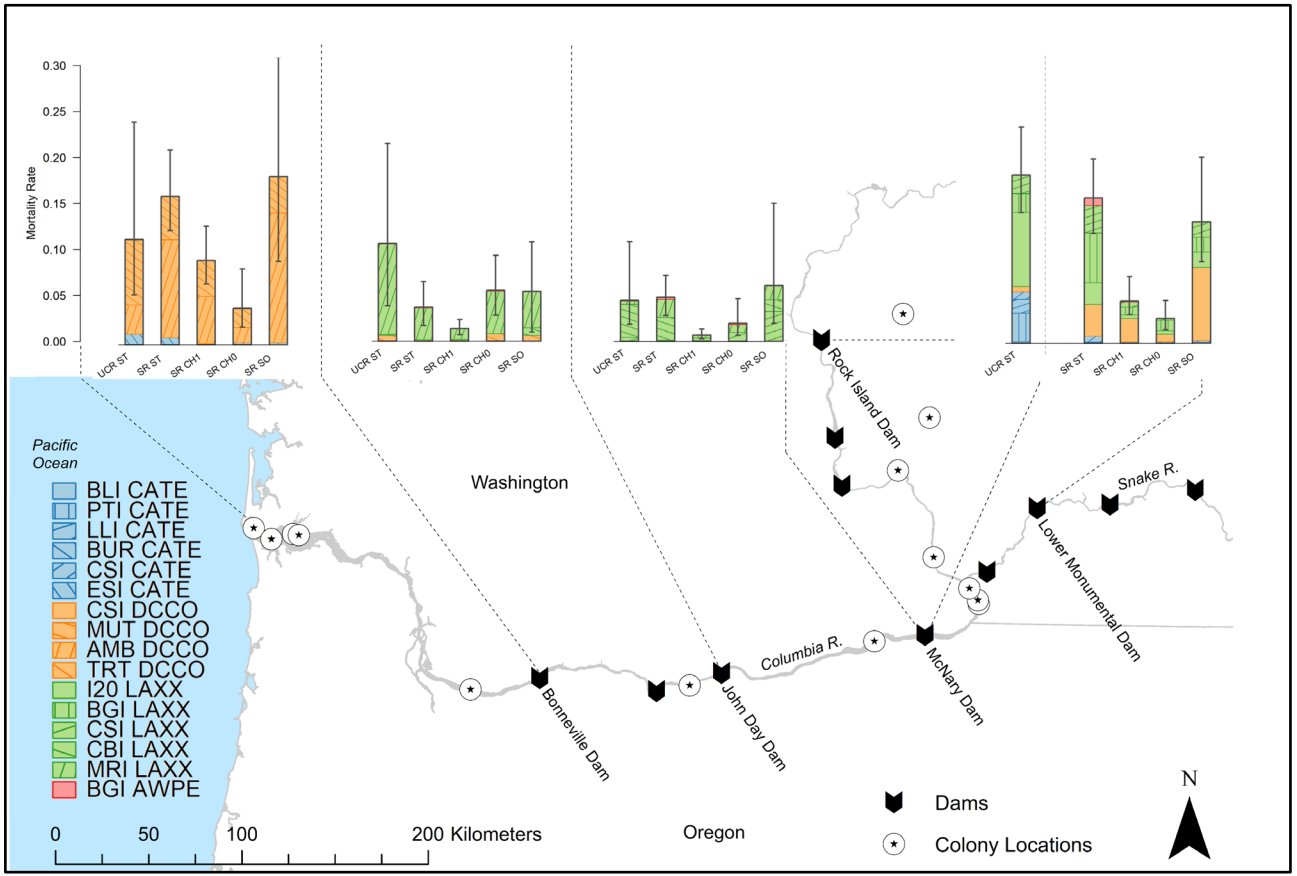
THANK YOU

QUESTIONS?

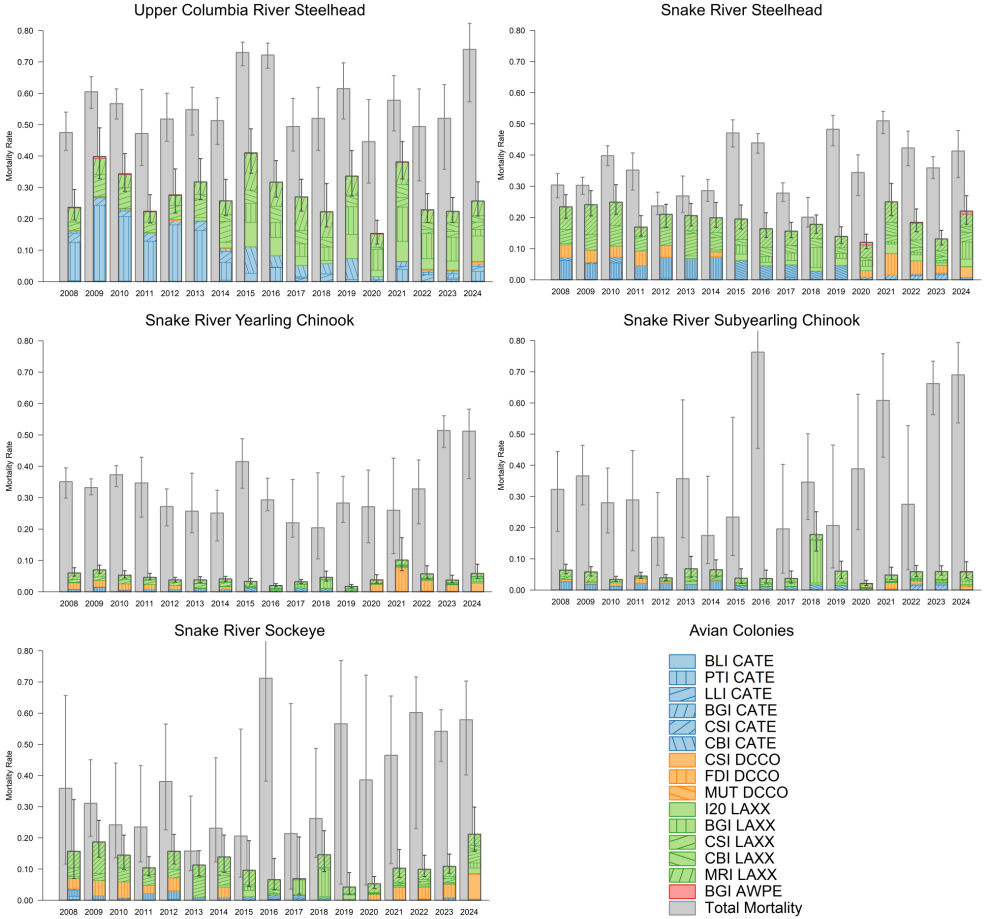
SYSTEM-WIDE EFFECTS OF AVIAN PREDATION ON SALMONIDS

2024 – Reach-specific Avian Predation Estimates



SYSTEM-WIDE EFFECTS OF AVIAN PREDATION ON SALMONIDS

Rock Island or
Lower Monumental
to Bonneville Dam



SYSTEM-WIDE EFFECTS OF AVIAN PREDATION ON SALMONIDS

Rock Island or
Lower Monumental
to Pacific Ocean

INLAND TERN PREDATION RATES AND SURVIVAL

ADAPATIVE MANAGEMENT: TERNS IN POTHOLES RESERVOIR

RM&E DISCOVERS NEW COLONY

A system-wide aerial survey located an incipient tern colony in Potholes Reservoir in May of 2024

ADAPTIVE MANAGEMENT IMPLEMENTED

U.S. Bureau of Reclamation via APHIS passively dissuaded terns from the island within 72 hours

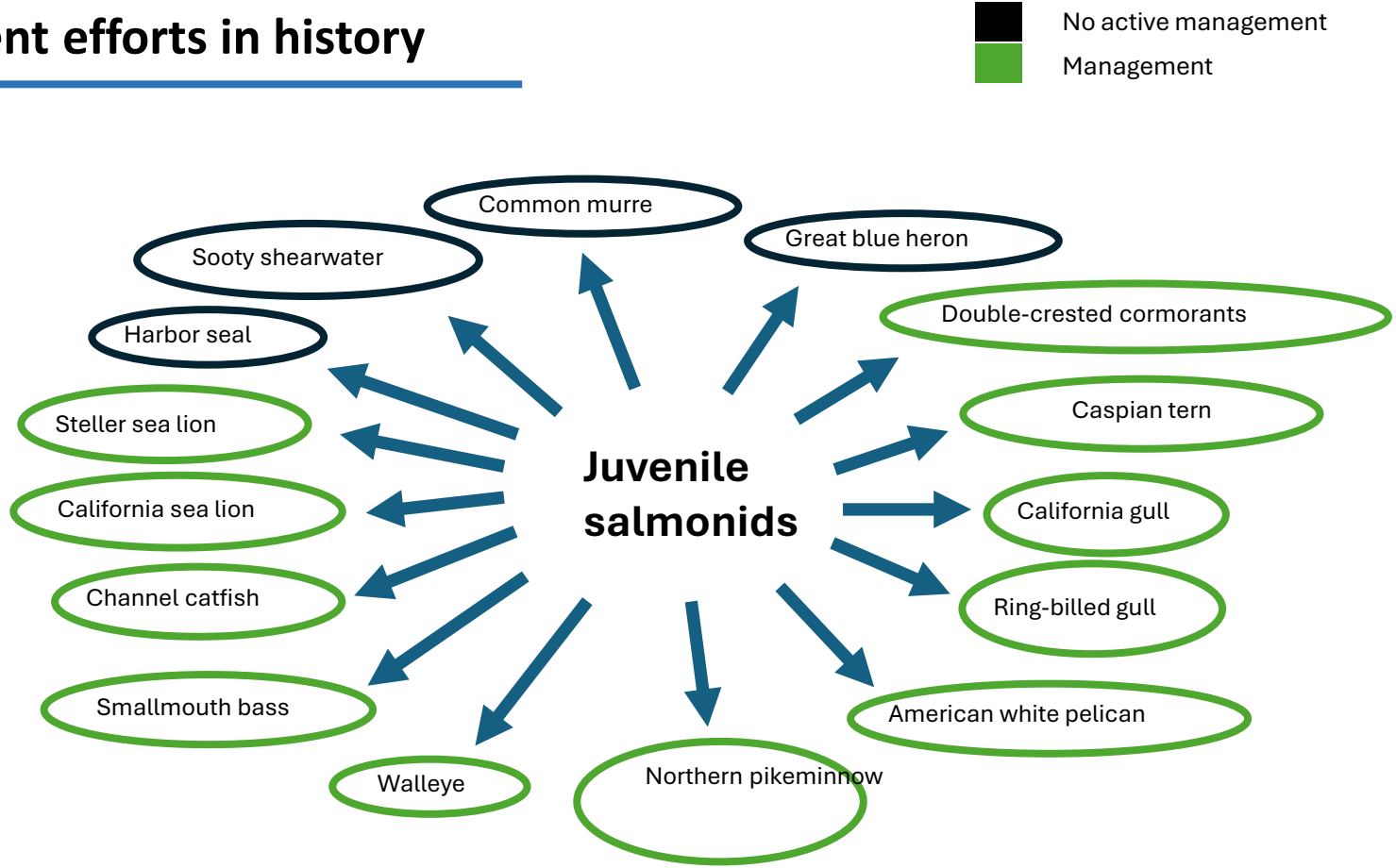
CRESCENT ISLAND IN 2014 VERSUS 2025

Avian Predation in the Columbia River Basin: What Is the Region Doing, and Where Are We Headed?

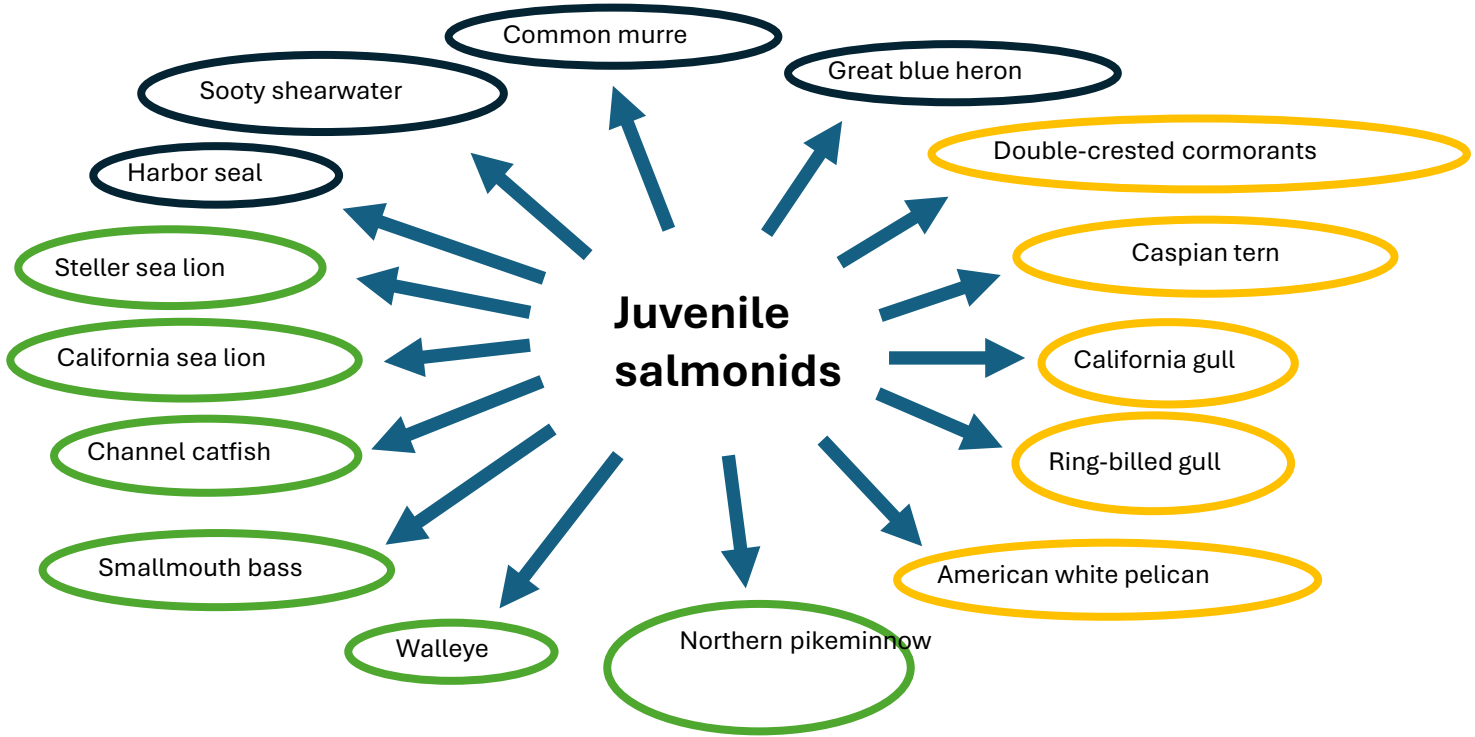
James Lawonn
Avian Biologist/Avian Predation Coordinator
matthew.j.lawonn@odfw.oregon.gov

One of the largest restoration efforts in history

One of largest predator management efforts in history



One of largest predator management efforts in history



Columbia Basin Avian Predation Workgroup

- Facilitate communication among regional fish and wildlife managers
- Focused on development of future management programs
- Monthly meetings

Avian work in 2025

1. American white pelican surveys at foraging areas along the Yakama, Umatilla, Walla Walla, Snake, Hanford Reach, Mid-Columbia (Yakama/CTUIR)
2. Gull management at Miller Sands Spit to reduce social attraction for Caspian terns (USACE/Yakama/CRITFC)
3. Surveys of pelicans, cormorants, gulls and herons along lower Clearwater River and Snake River above LGR (Nez Perce)

Plus at least 31 other avian actions (!)

There is a lot of avian predation work going on in the basin, much of it not covered in BPA-funded annual reports

Priorities/emerging issues

Double-crested 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 biggest challenges

UPDATE: Double-crested cormorant predation in estuary

- ODFW/ODOT preparing (state) legislative package for 2027
- Region drafting double-crested cormorant management strategy for estuary (ODFW, CRITFC, USFWS, NMFS, Corps)
- Application for USFWS permit 2025/2026

Gull management on Miller Rocks

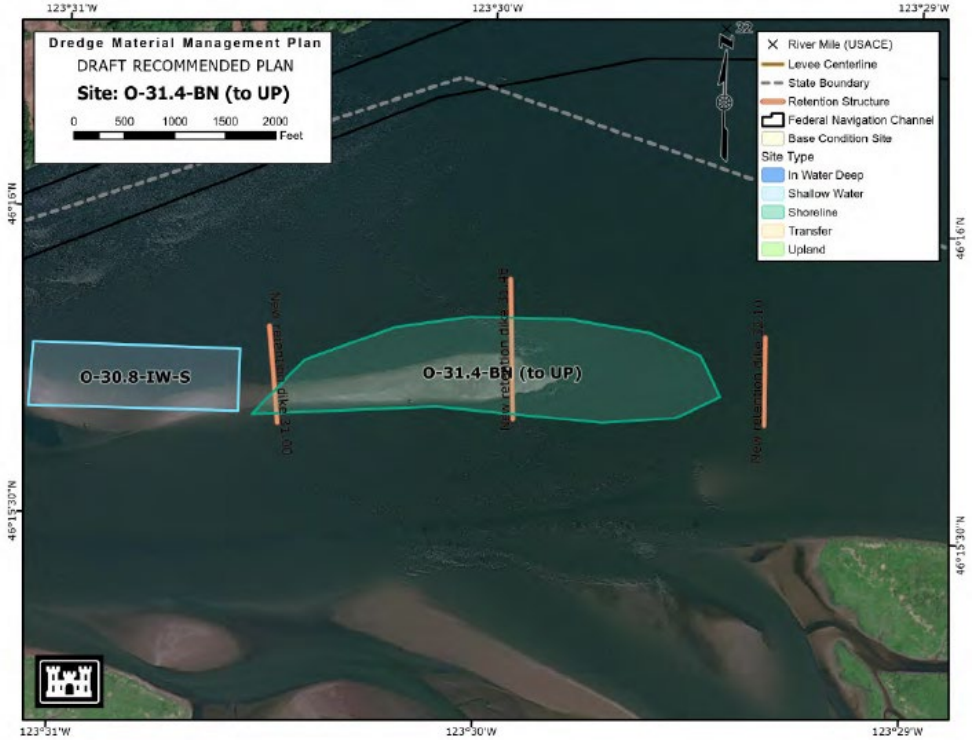
- Predation rates ~3-14% on steelhead
- Management since 2022 by Yakama Nation
- Constrained USFWS-permitted take has been a challenge

American white pelicans at dams and tributaries

- Recent increase at some foraging areas, including fish ladders at 4 dams
- Ongoing studies by Yakama Nation and Umatilla (CTUIR)
- Challenges include federal staff reductions, large spatial scale of conflict, data gaps, and sensitive status of pelicans in Washington

New Corps dredge material island proposed

- Only 10 miles upstream of Rice Island
- 79 acres, 40+ ft tall
- New potential nesting location for terns



Next steps and final thoughts

Management needs urgent

27% Snake River steelhead populations predicted at quasi-extinction threshold by 2029

Hesse and Kinzer 2025

Potential management in 2026

- Begin reducing double-crested cormorant predation in upper estuary (various entities)
- Increased pelican management below dams (Corps)
- Management of Miller Sands Spit pelicans? (Corps)

A word about take

- Scarcity of USFWS-permitted take can constrain management options
- In some cases, non-lethal management takes longer, is more costly, and is much less effective compared with lethal options
- It seems likely the need for lethal tools will increase in the future

Questions?

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