



**NOAA**  
**FISHERIES**

# Columbia Basin Partnership Workshop #1

## Avian Predation

May 4, 2016

# Problem: growing populations of fish-eating birds have increased predation-related mortality of salmon and steelhead



# Columbia River Basin

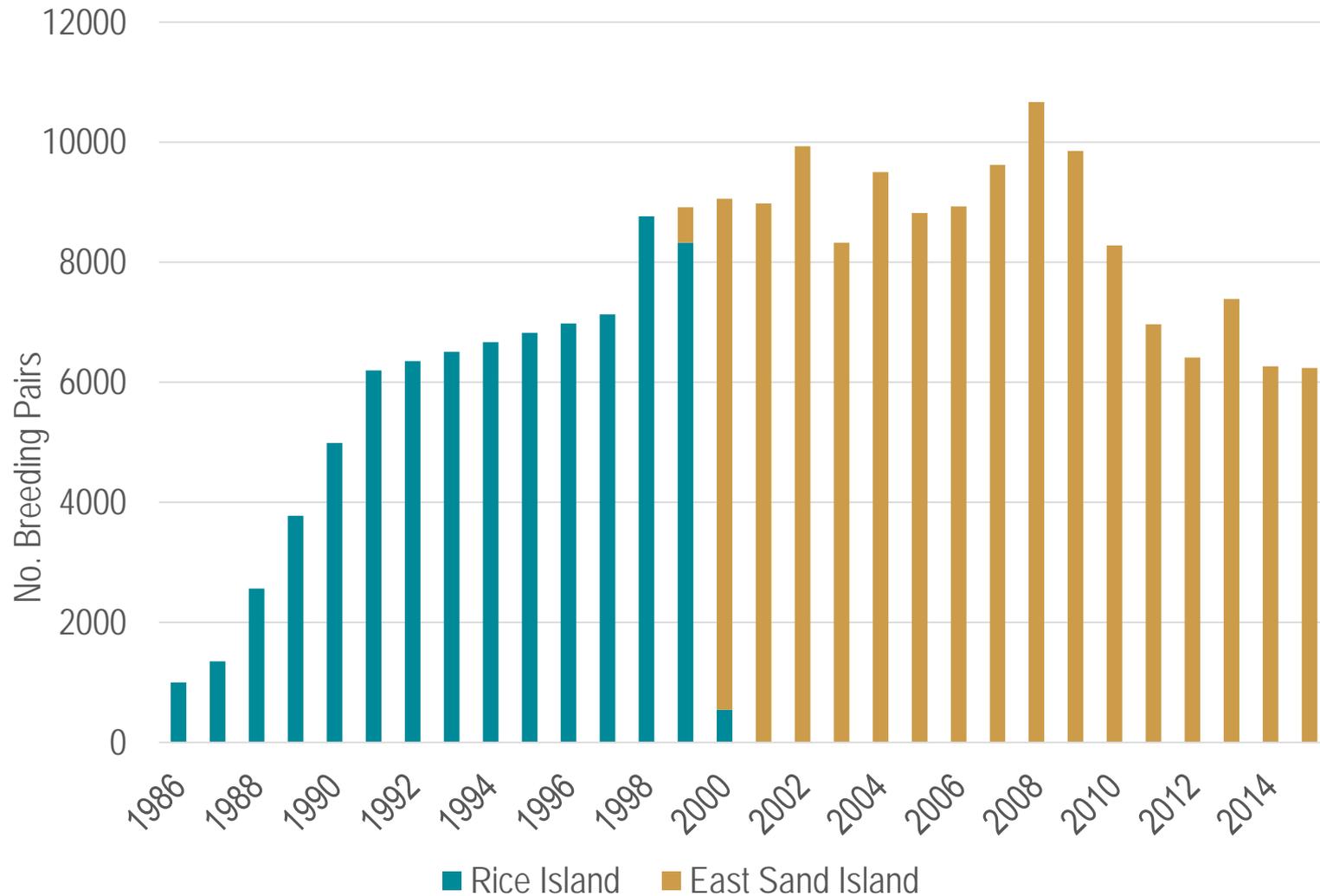
- Corps of Engineers Dams
- Dams owned by Others



# Terns and Cormorants in the Columbia River Estuary

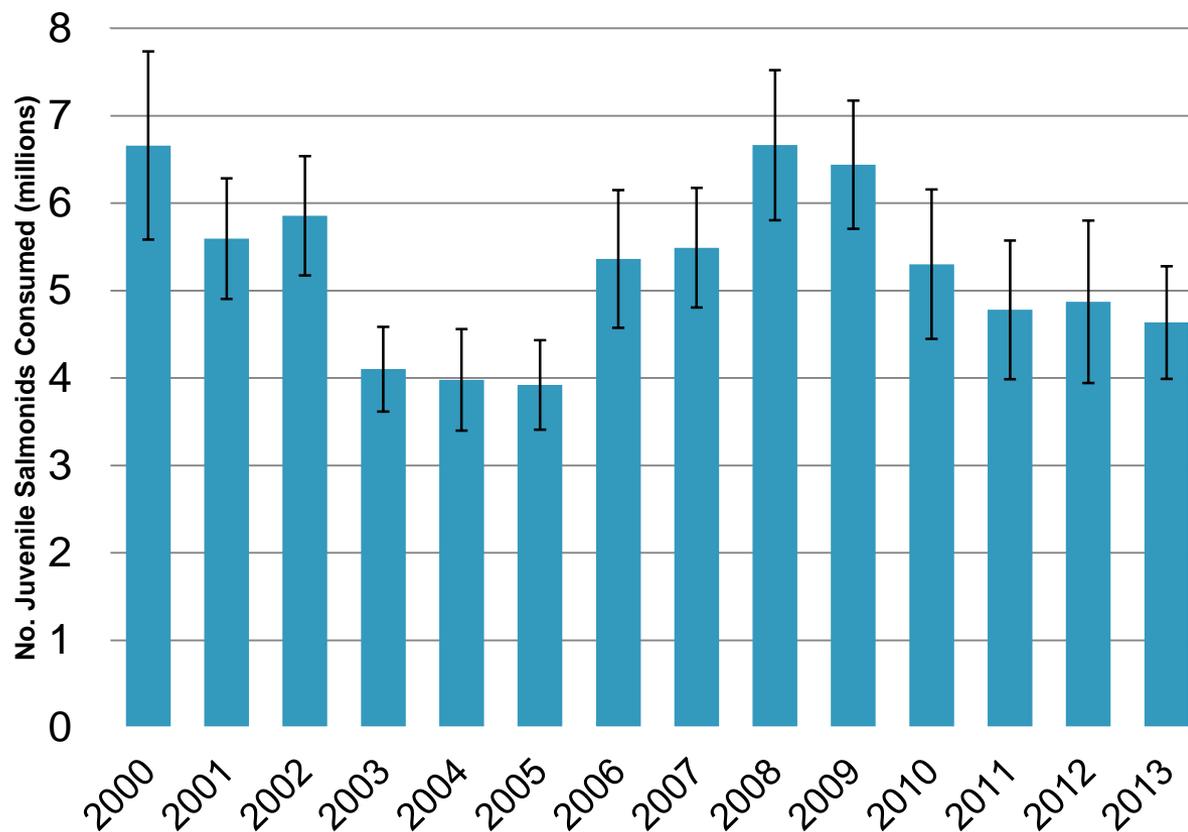


# Tern Colony Size in the Columbia River Estuary



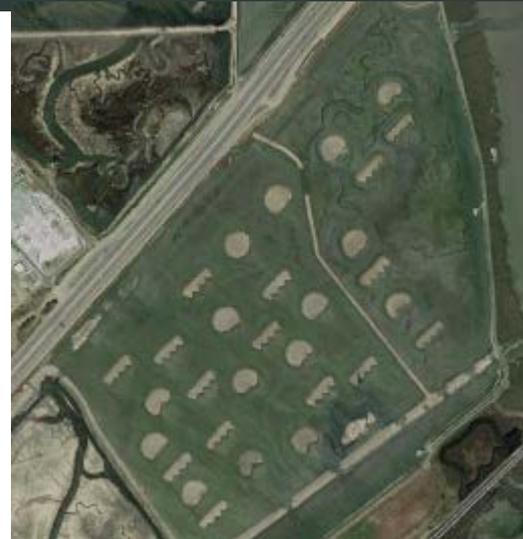
# Annual Predation on Salmonids by East Sand Island Terns

## Smolt Consumption (millions)



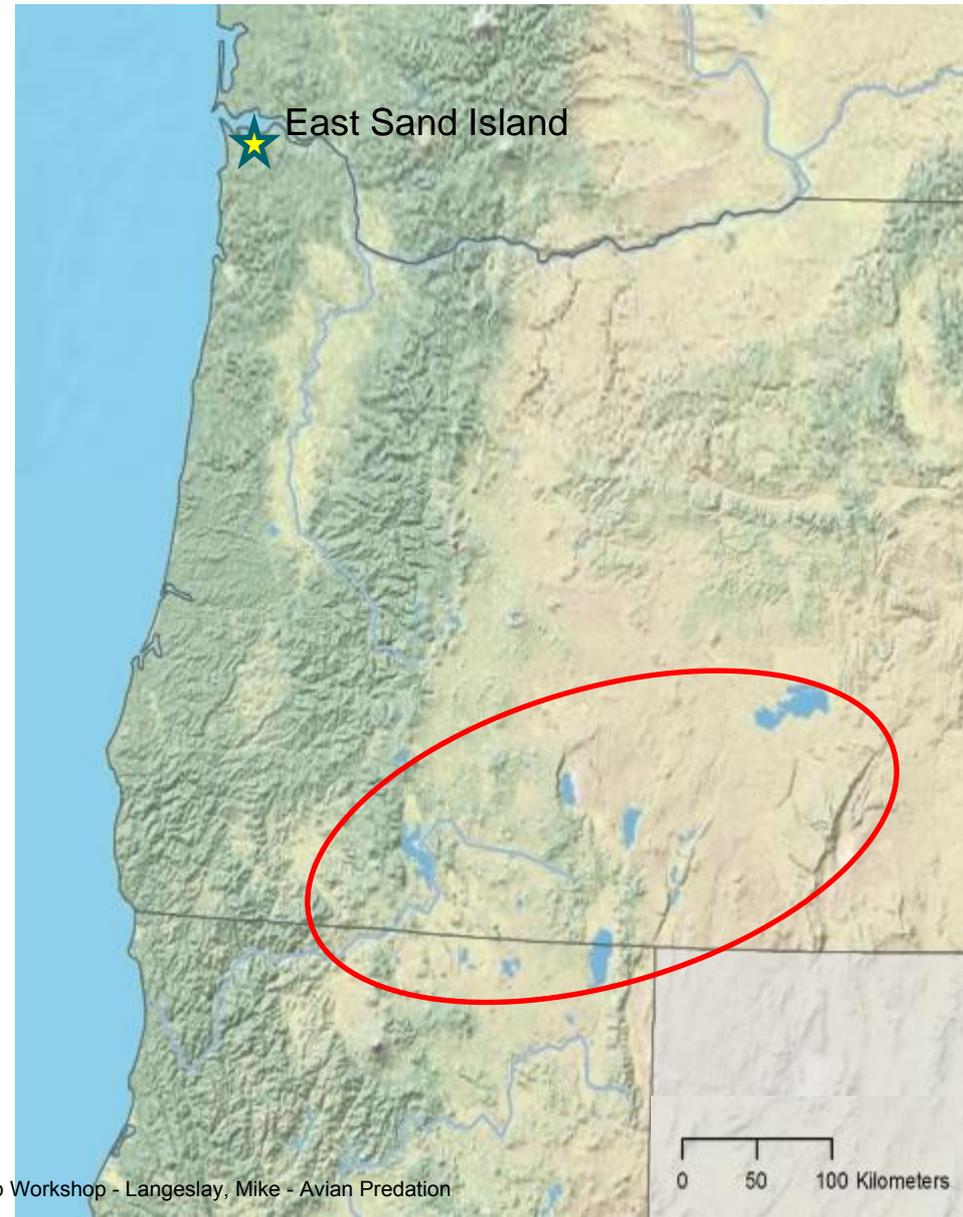
# Management Actions – Estuary Terns

- Construct Nesting Habitat Out of Basin (pull)
- Reduce East Sand Island Nesting Habitat (push)
- Target: ~3000 nesting pairs at East Sand Island



# Out of Basin Islands – the ‘Pull’

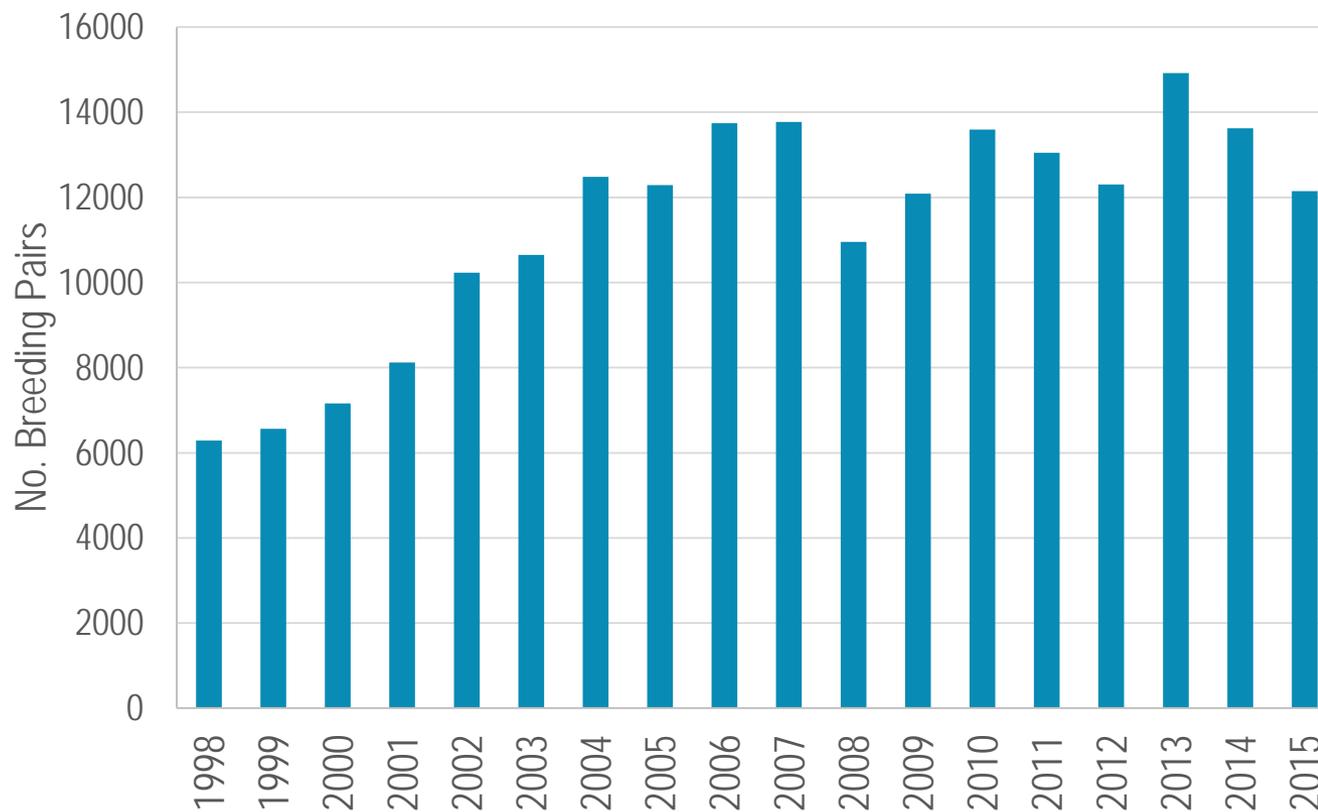
Location	Acres
Malheur NWR, OR	1.0
Lower Klamath NWR, CA	0.8
Crump Lake, OR	1.0
Tule Lake NWR, CA	2.0
Summer Lake, OR (East Link)	0.5
Summer Lake, OR (Gold Dike)	0.5
Lower Klamath NWR, CA (Orems Unit)	1.0
Fern Ridge, OR	1.0
San Francisco Bay, CA	1.9
<b>Total Acres</b>	<b>9.7</b>



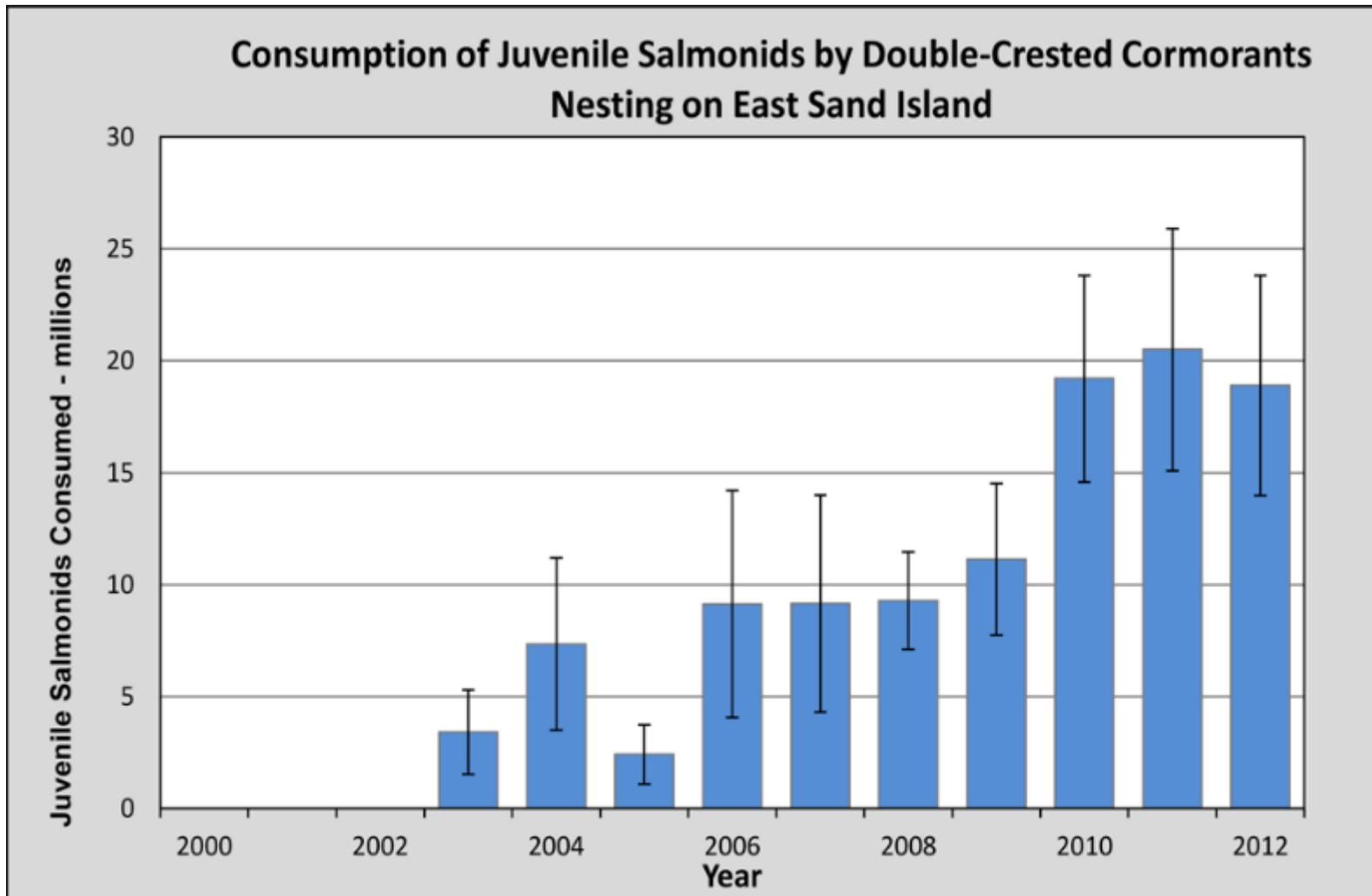
# Average annual predation rates of PIT-tagged salmon and steelhead by East Sand Island Terns: Pre and Post-management



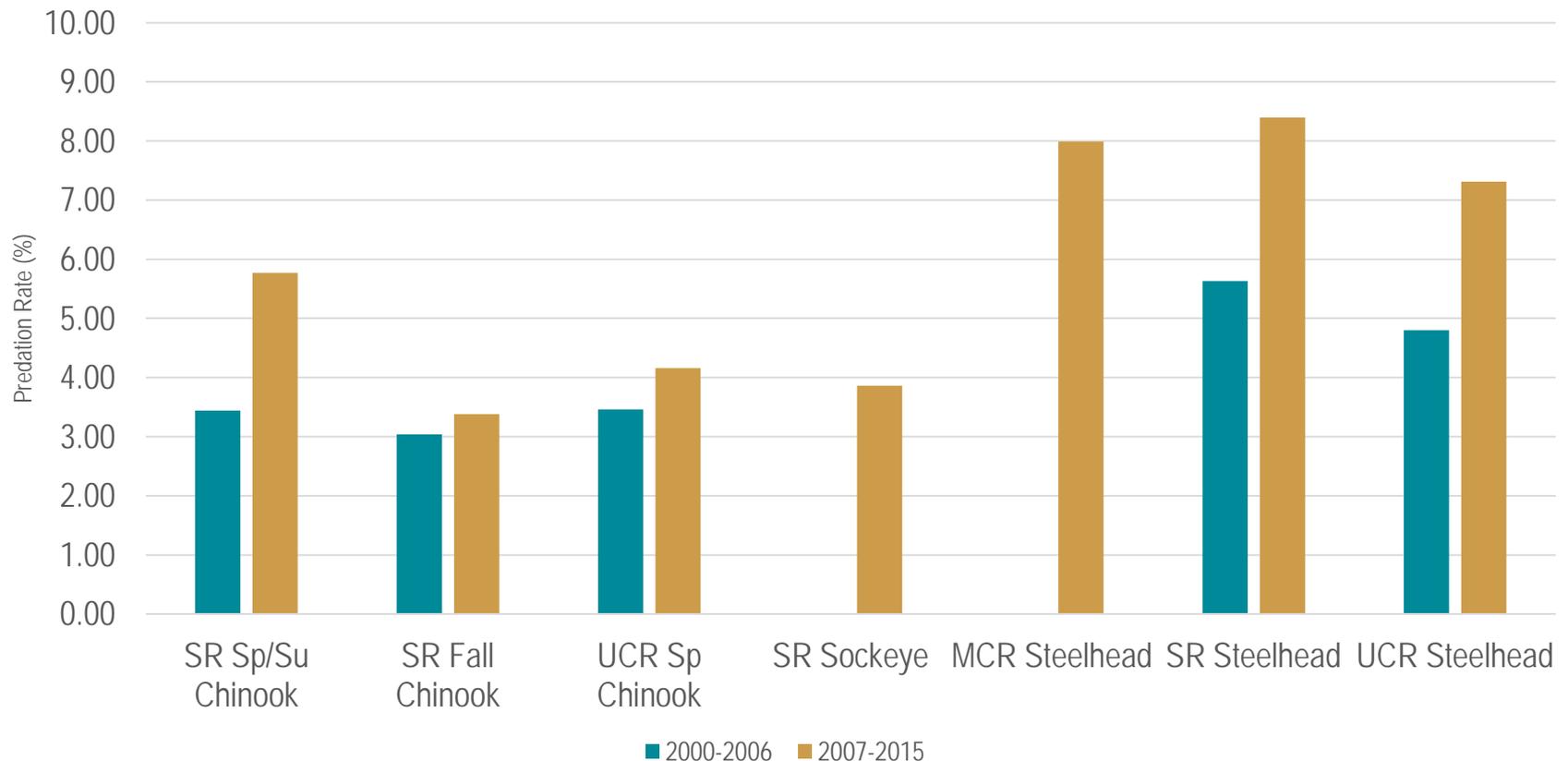
# Cormorant Colony Size on East Sand Island in the Columbia River Estuary



# Predation - East Sand Island Cormorants



# Average annual predation rates of PIT-tagged salmon and steelhead by East Sand Island Double-Crested Cormorants, 2000-06 and 2007-2015



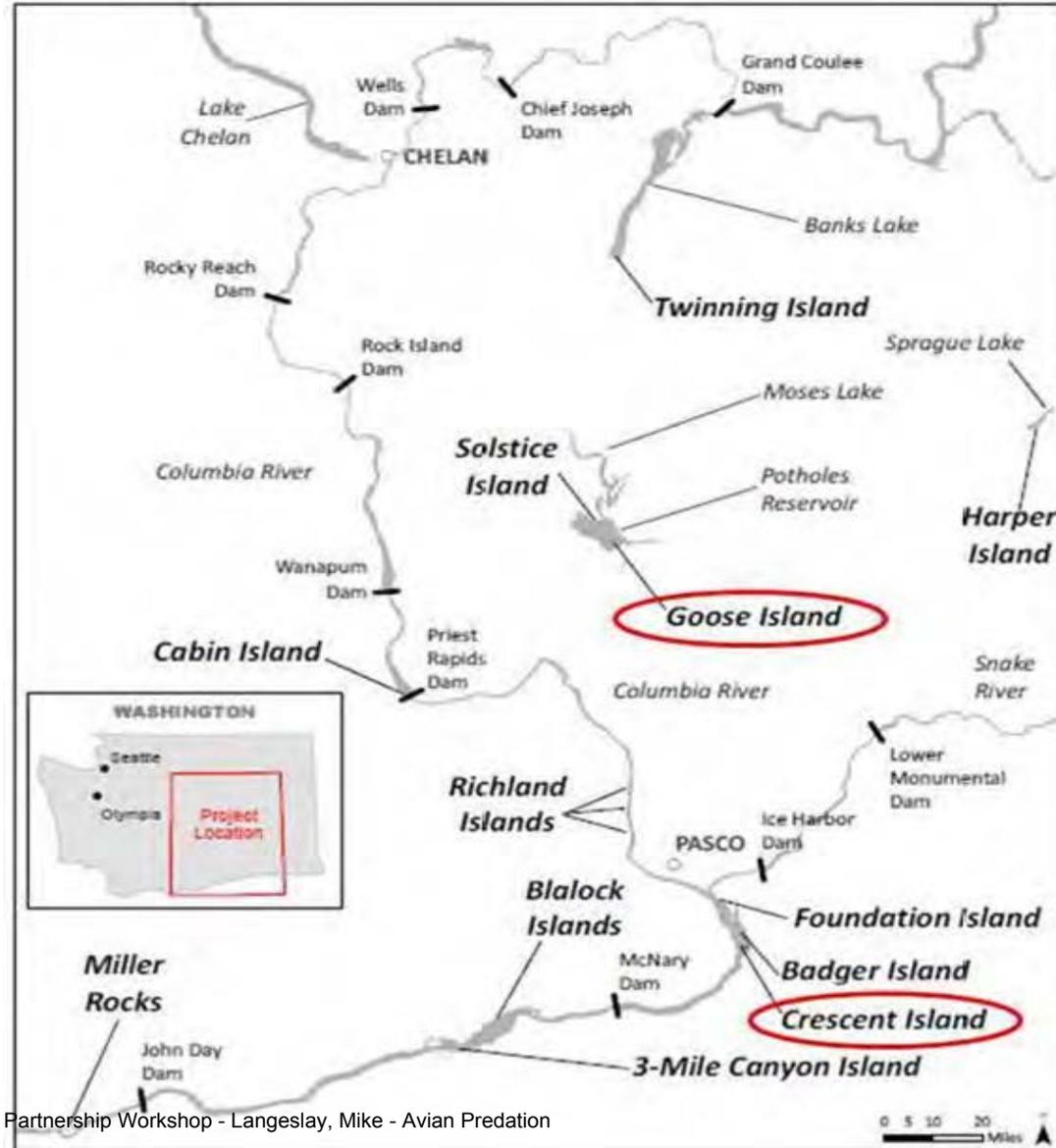
# Management Actions – Estuary Cormorants

- Goal - Reduce Predation on ESA-Listed Salmon and Steelhead
- Methods
  - Lethal Removal of Individual Birds
  - Habitat Modification (inundate western portion of island to preclude nesting)
  - Monitoring and Adaptive Management



# Inland Avian Predation

- Tern Colonies at Goose and Crescent Islands responsible for greatest losses.
- Pre-management
  - 15.7% Predation Rate on Upper Columbia River Steelhead by Goose Is. Colony.
  - 3.9% Predation Rate on Snake River Steelhead by Crescent Is. Colony.



# Management Actions – Inland Avian Predation (Pull/Push)

- Goal – reduce predation losses of juvenile salmonids by Goose and Crescent Island tern colonies.
  - Create attractive out-of-basin nesting habitat (Pull)
  - Dissuade Tern Nesting on Goose (2014) and Crescent Islands (2015) (Push)

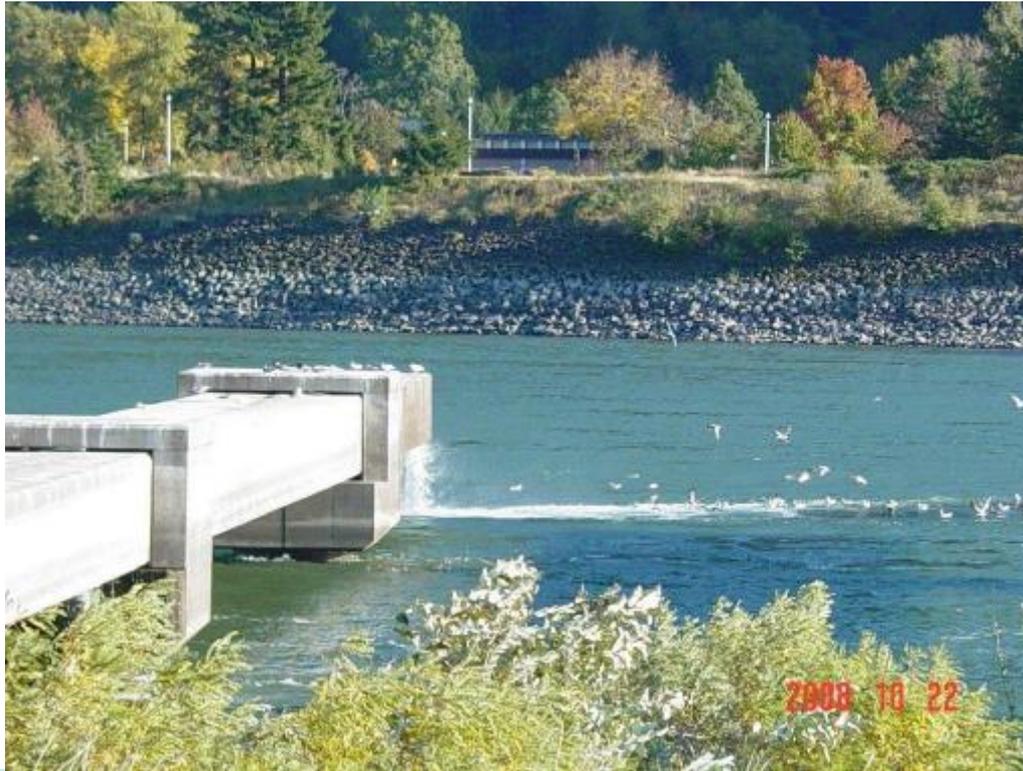


# Inland Avian Predation: Pre vs. Post-Management



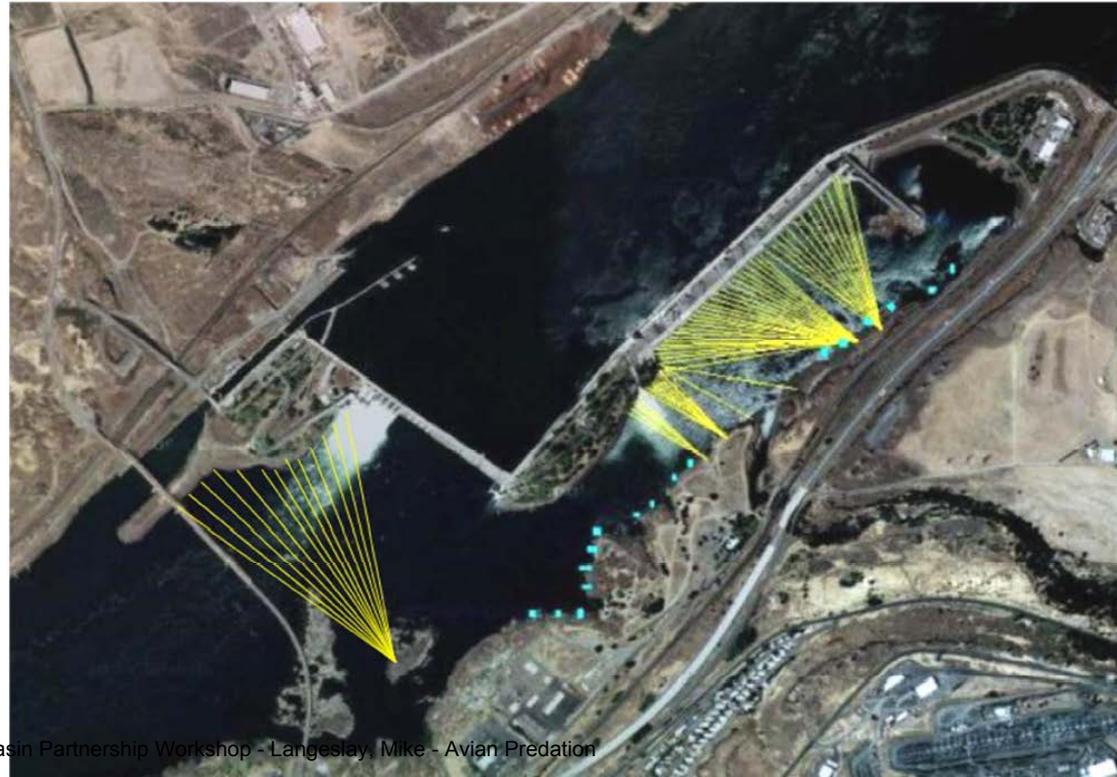
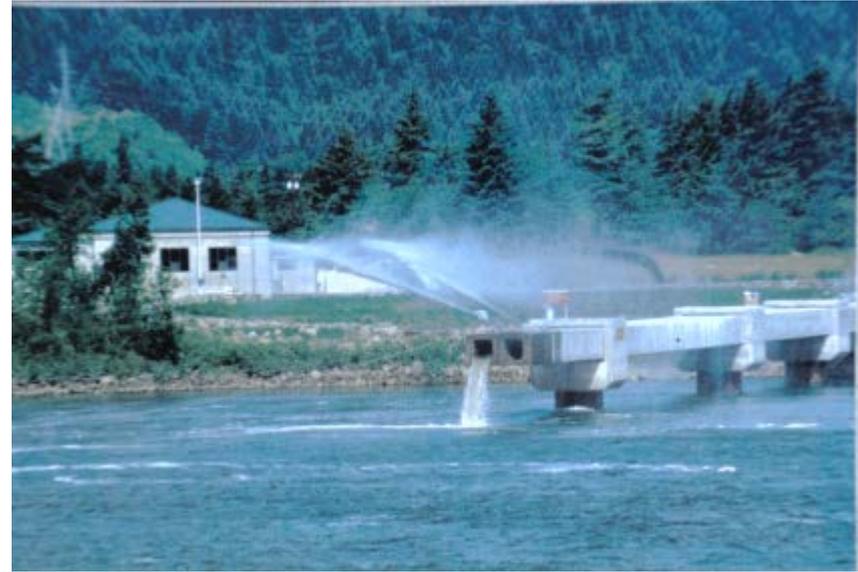
Colony	2007-2013	2014 (Dissuasion at Goose Is. only)	2015 (Dissuasion at Crescent and Goose Is.)
Upper Columbia River Steelhead			
Goose Island	15.7%	2.9%	1.5%
Crescent Island	2.3%	3.4%	<0.1%
Snake River Steelhead			
Crescent Island	3.9%	4.7%	<0.1%

# Avian Predation at Dams



# Avian Predation at Dams

- Wires
- Water Cannons
- Active Hazing
- Monitoring



# Challenges

- Birds are mobile, adaptable, and unpredictable
- Changing environmental conditions
- Conflicts with other bird species
- Competing interests



