

# Columbia River Estuary Conference – Astoria 2010

*Implementation and Adaptation of the Caspian Tern*

*Management Plan for the Columbia River Estuary:*

*Will it Reduce Mortality of Juvenile Salmonids in the Estuary?*

USGS - Oregon Cooperative Fish & Wildlife Research Unit



Oregon State University

Real Time Research, Inc.



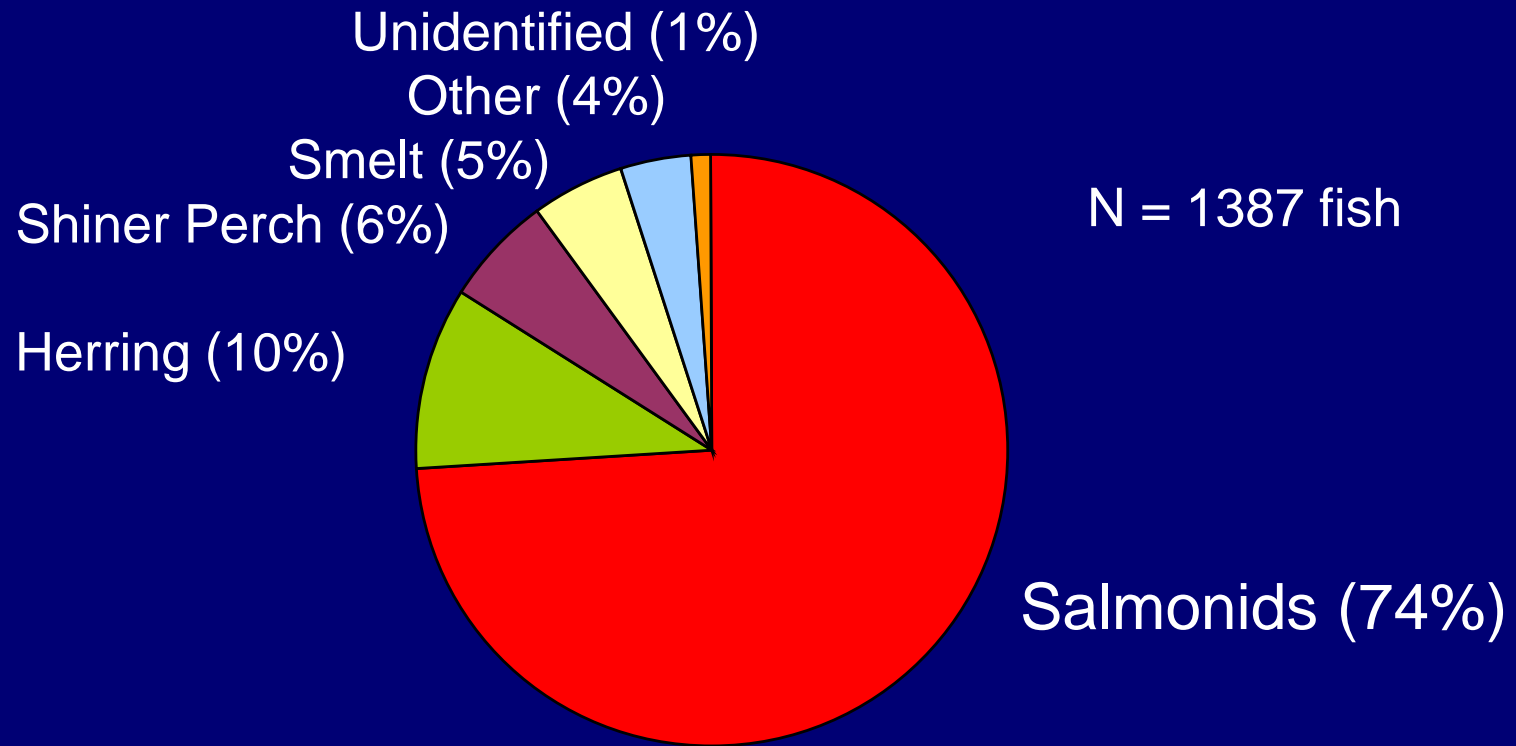
# Rice Island Caspian Tern Colony



Columbia River Estuary



# 1998 Caspian Tern Diet and Smolt Consumption



Estimated Consumption: 12.4 million smolts (95% CI: 9.1 – 15.7 million)



US Army Corps  
of Engineers



# Interagency Caspian Tern Working Group



# Evil Quartet for the Caspian Tern/Salmonid Conflict in the Columbia River Estuary:

- Habitat: dredge spoil islands replace natural sites
- Hydrosystem: concentrates prey, eliminates spring freshet, enhances prey vulnerability
- Hatcheries: provides reliable naïve prey
- Harvest: perception of humans vs.  
fish-eating birds

Objective: Reduce mortality of ESA-listed smolts without lethal control of MBTA-protected waterbirds

Hypotheses:

1. The tern colony can be relocated without loss of tern nesting success
2. Tern diet composition is dependent on local prey availability
3. The impact of tern predation on ESA-listed salmonids will decline with increased availability of alternative prey types



**East Sand Island**

**Rice Island**

**Columbia River Estuary**



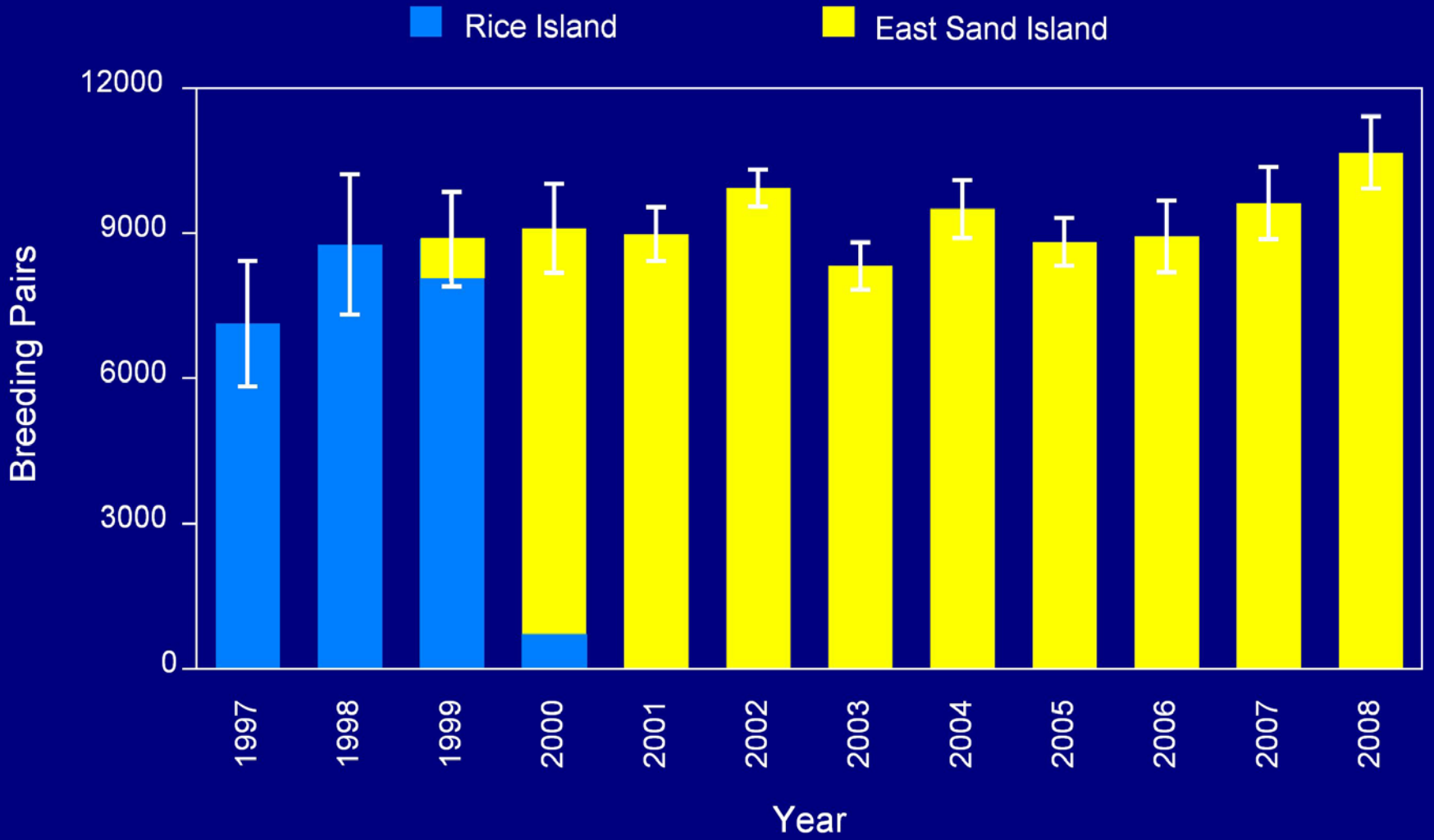
# Habitat Alteration, Social Attraction, and Nest Predator Control to Manage Colony Location

Desired Site:

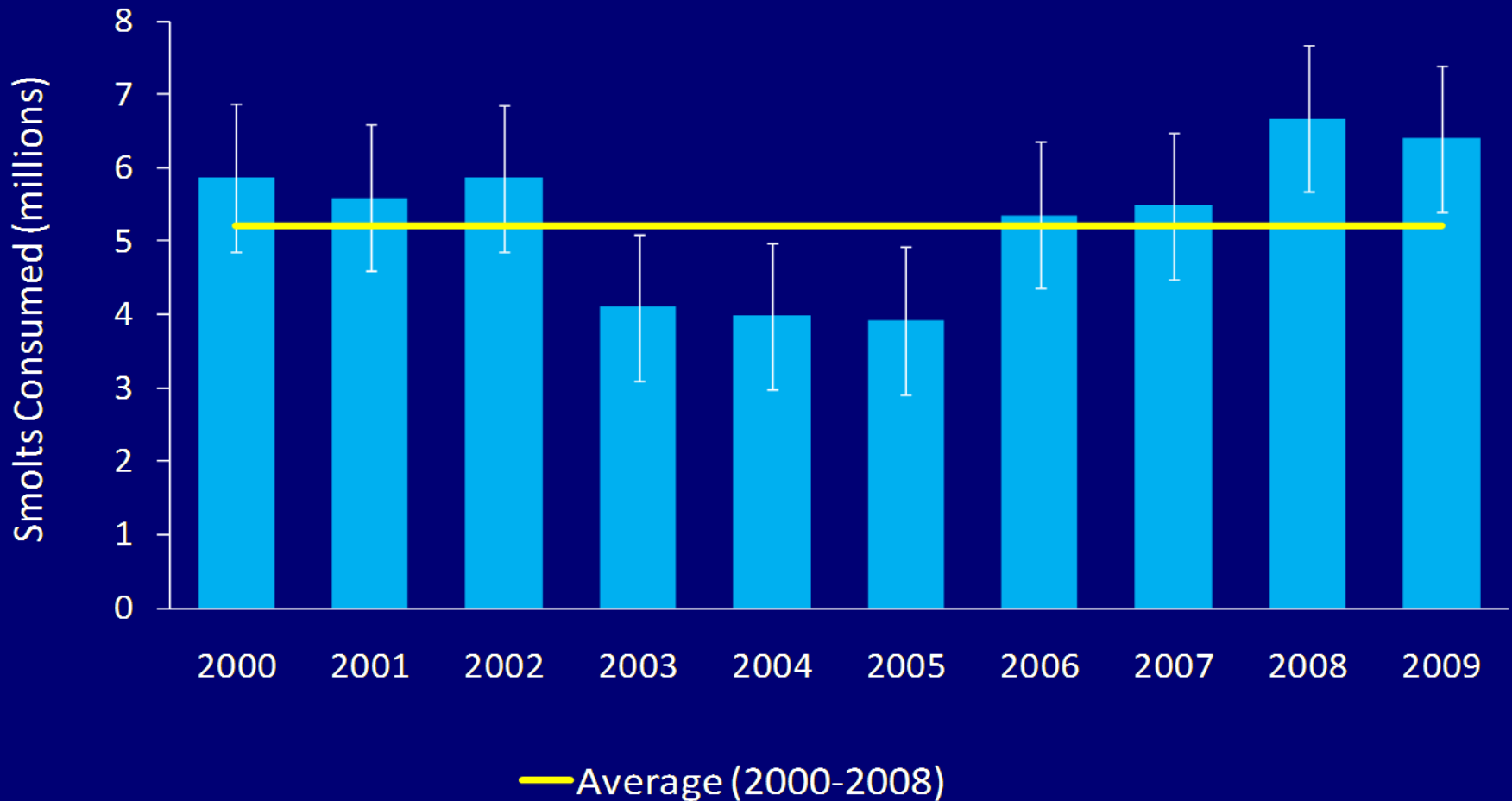
Undesired Site:



# Caspian Tern Colony Size in the Columbia River Estuary

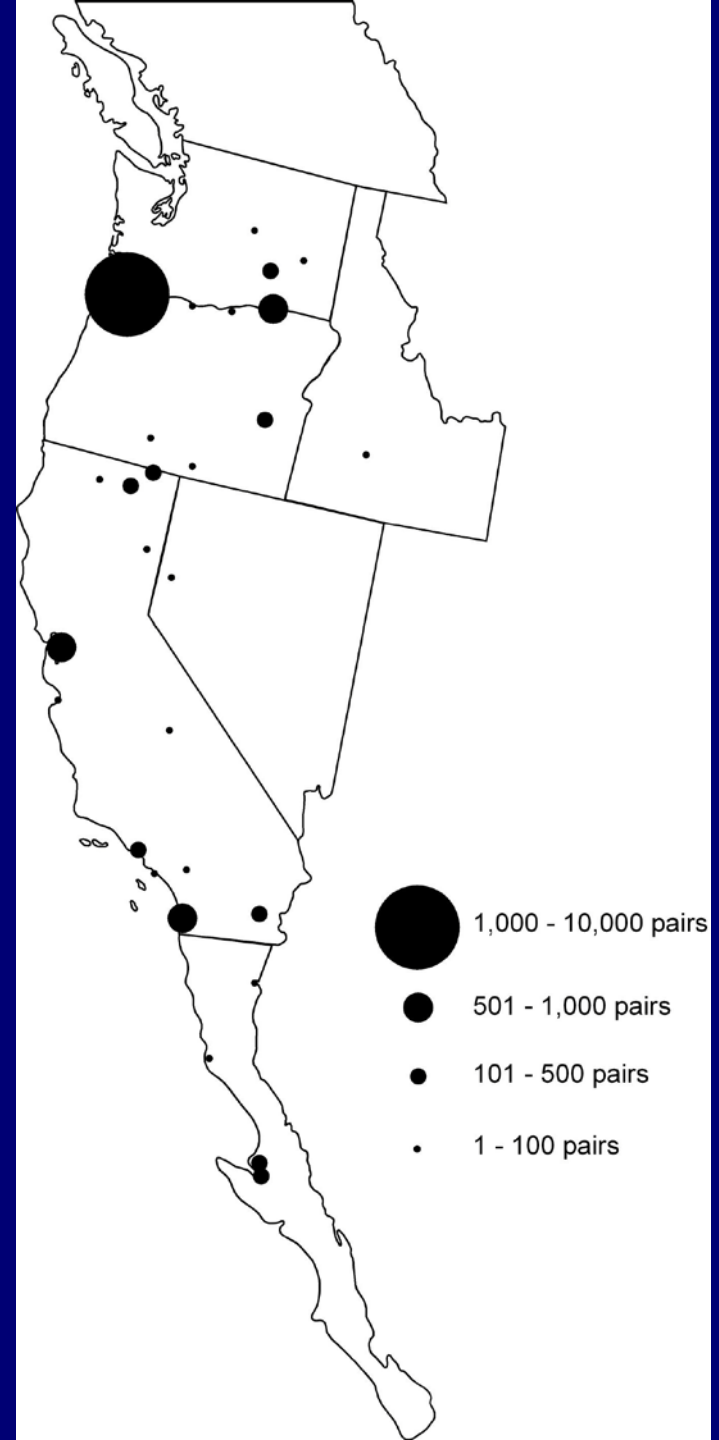


# Caspian Tern Smolt Consumption on East Sand Island



# Caspian Tern Colony Distribution

- East Sand Island is the largest Caspian tern colony in world
- East Sand Island supports 65% of Pacific Coast population of Caspian terns
- First recorded nesting by Caspian terns in the Columbia River Estuary in 1984
- Shift to coastal colony sites due primarily to anthropogenic habitat (dredge spoil islands)

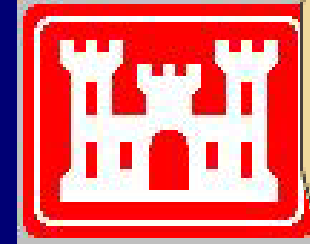


# Objective: Further reduce mortality of ESA-listed smolts without lethal control of MBTA-protected waterbirds

## Hypotheses:

1. Caspian terns limited by available suitable nesting habitat on a regional basis
2. Impact of Caspian tern predation on fish of conservation concern is controllable through management of nesting habitat
3. Conservation of Caspian terns is best served by an extensive network of nesting sites, as opposed to a few large colonies (reduce risks from environmental uncertainty)

# Final EIS: Caspian Tern Management Plan for Columbia River Estuary



- **Develop alternative colony sites (islands)**
- **As alternative colony sites becomes available, reduce habitat on East Sand Island to 1 acre (5 acres available pre-management)**
  - **Prevent tern nesting elsewhere in Columbia Estuary**
- **Expected long-term Caspian tern colony size at East Sand Island about 1/3 current size**
- **Expected smolt losses to terns < 2 million per year**

# Alternative Caspian Tern Colony Sites Specified in the Management Plan

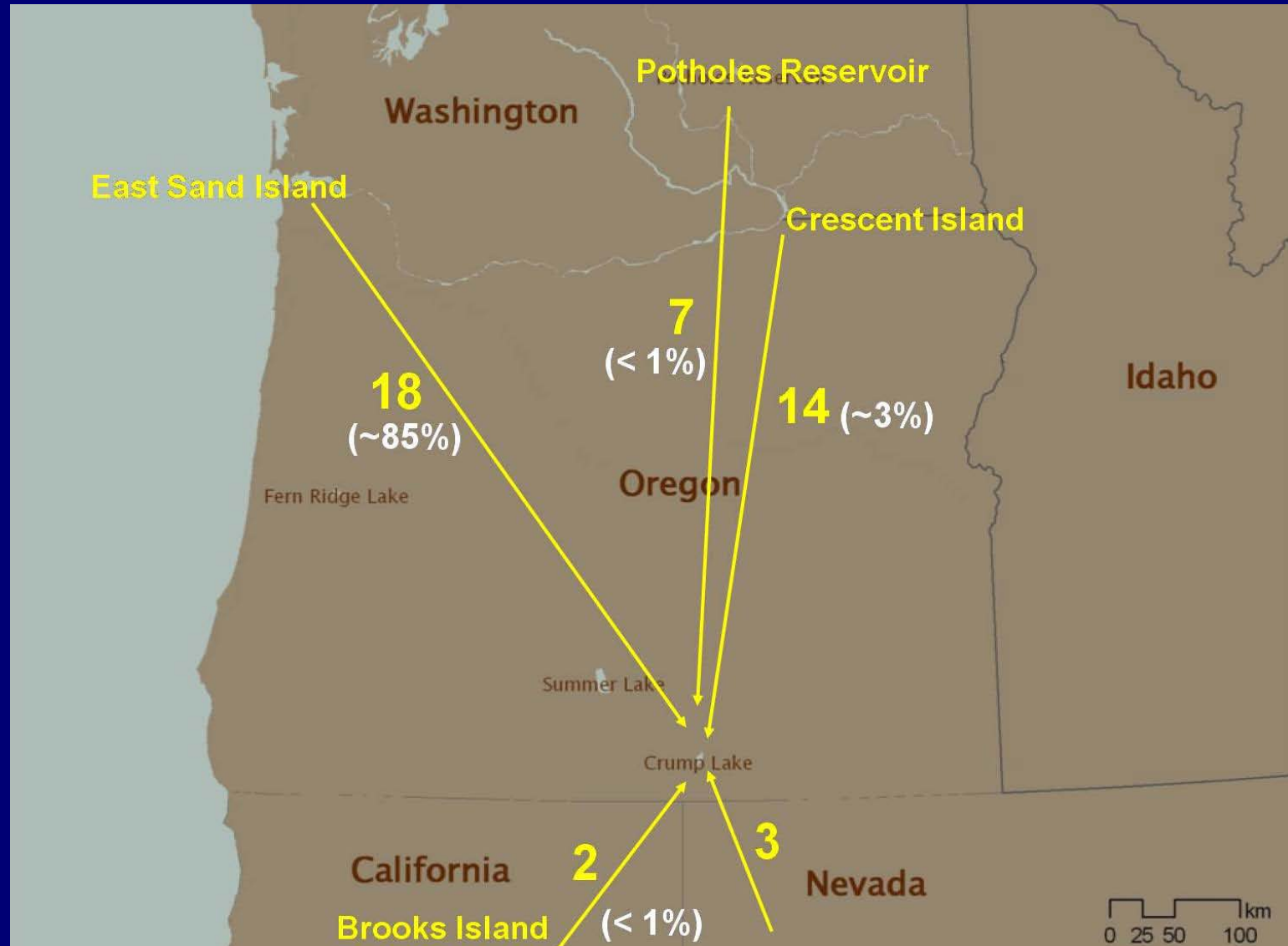


# Crump Lake tern island, Warner Valley, Oregon





# Caspian Tern Band Re-sightings on Crump Lake Tern Island - 2009



## Re-sightings of Banded Caspian Terns

- Birds frequently recruit to colonies other than natal colony
- Adults also change breeding colonies
- Inter-colony movements can exceed 2,000 km



# New Plan for Caspian Tern Nesting Islands

Year	Location	No. of islands	Total acreage
2008	Fern Ridge, OR	1	1
	Crump Lake, OR	1	1
2009	Summer Lake Wildlife Area, OR	2	1
2010	Sheepy Lake, L. Klamath NWR, CA	1	0.8
	Lower Klamath NWR, CA	1	1
	Tule Lake NWR, CA	1	2
	Summer Lake Wildlife Area, OR	1	0.5
2011	Malheur NWR, OR	1	2
	Hayward Shoreline, San Fran. Bay	1	0.5 - 1.0
TOTAL		10	10 – 10.5

# Conclusions

- Annual losses of juvenile salmonids to predation by Caspian terns in the Columbia River estuary about 5% of total run to ocean
- Suitable nesting habitat for Caspian terns and other colonial waterbirds a major limiting factor
- Impact of tern predation on fish stocks of conservation concern can be adaptively managed by controlling where suitable tern nesting habitat is available inside and outside the Estuary
- Caspian terns and other colonial waterbirds can be restored by providing a regional network of islands with suitable nesting habitat as colony sites



# Acknowledgments



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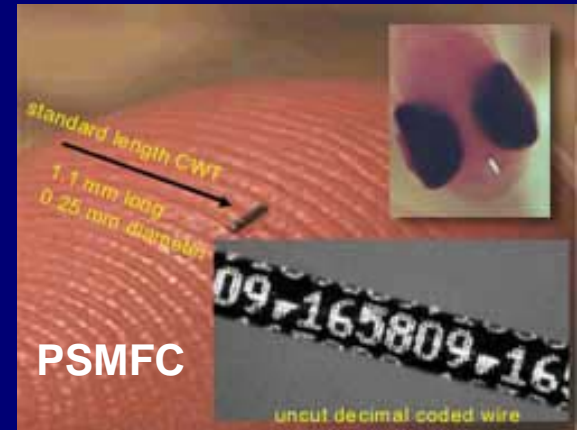


Questions?

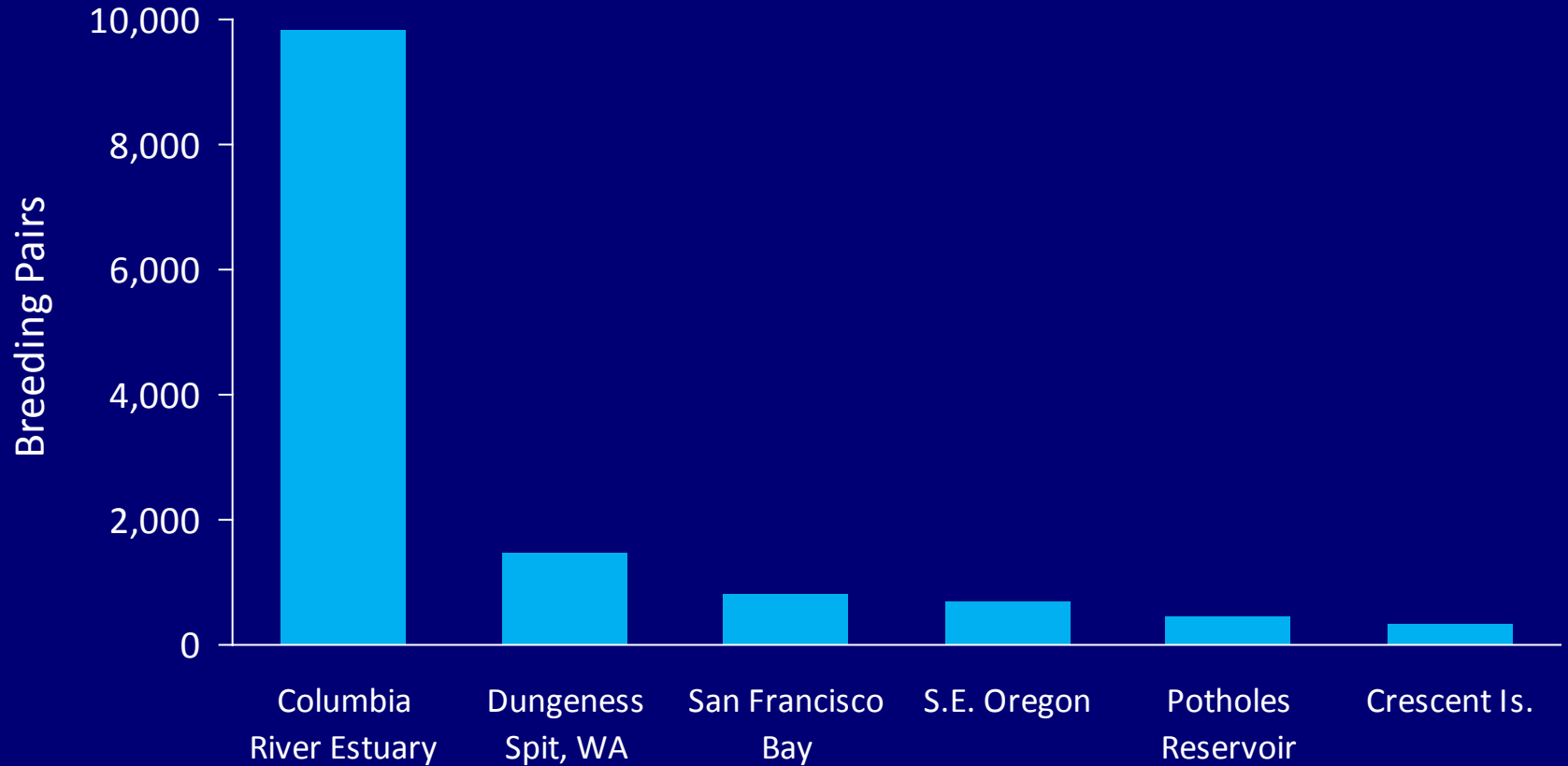
# SF Bay Coded Wire Tag Research Brooks Island Caspian Tern Colony

## Study Results:

- 20% sample of colony substrate yielded 2,079 CWTs
- 98% (n = 2,037) were Central Valley Fall-run Chinook (non-listed)
- 99% (n = 2,073) were released *en masse* from net pens into San Pablo Bay



# Caspian Tern Colony Sizes in 2009



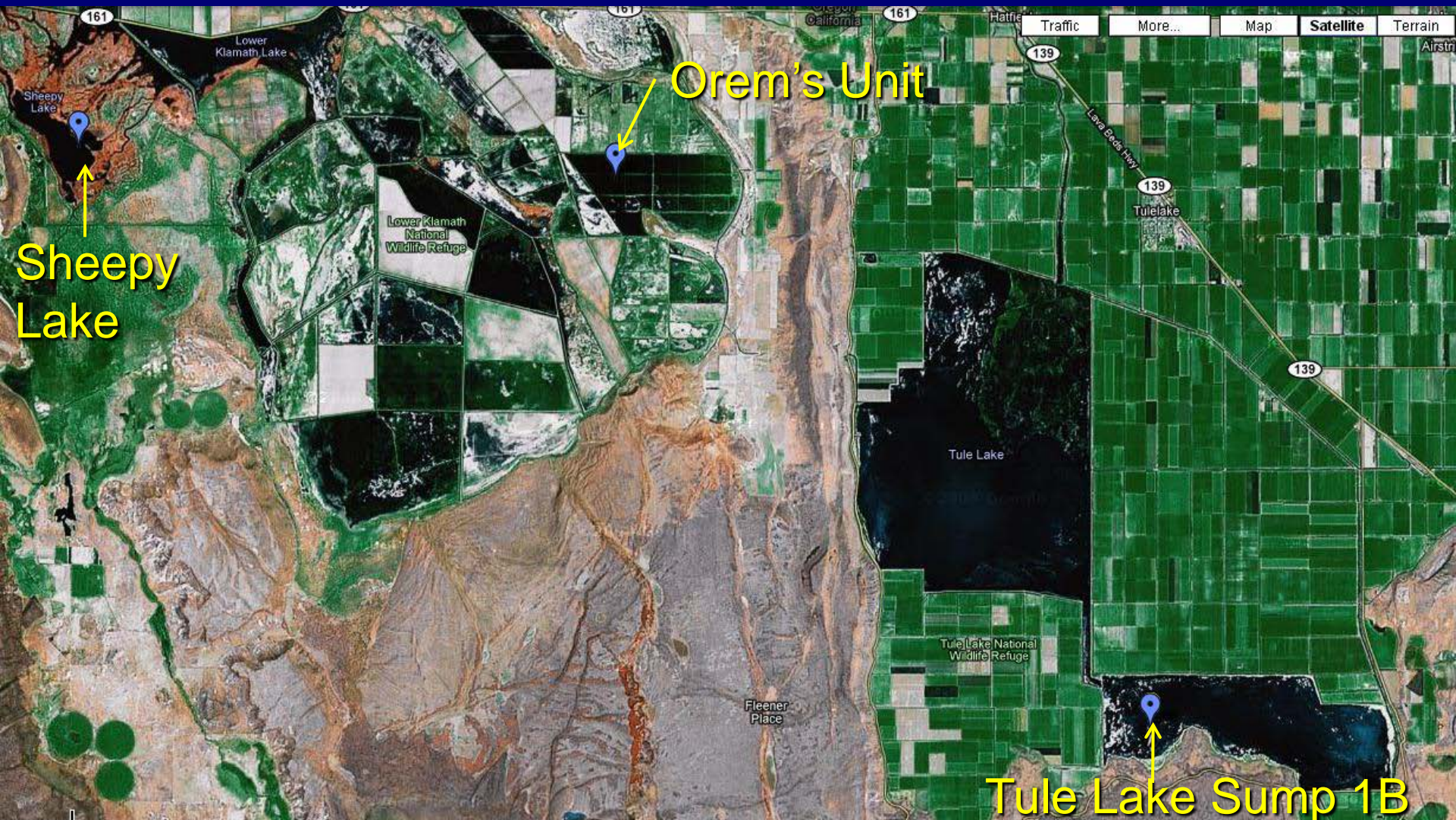


# Smolt PIT Tag Recoveries On-colony

- Portion of consumed PIT tags regurgitated on-colony
- On-colony PIT tag recoveries relative to in-river interrogations yields minimum predation rates
- NOAA Fisheries - Collaborator

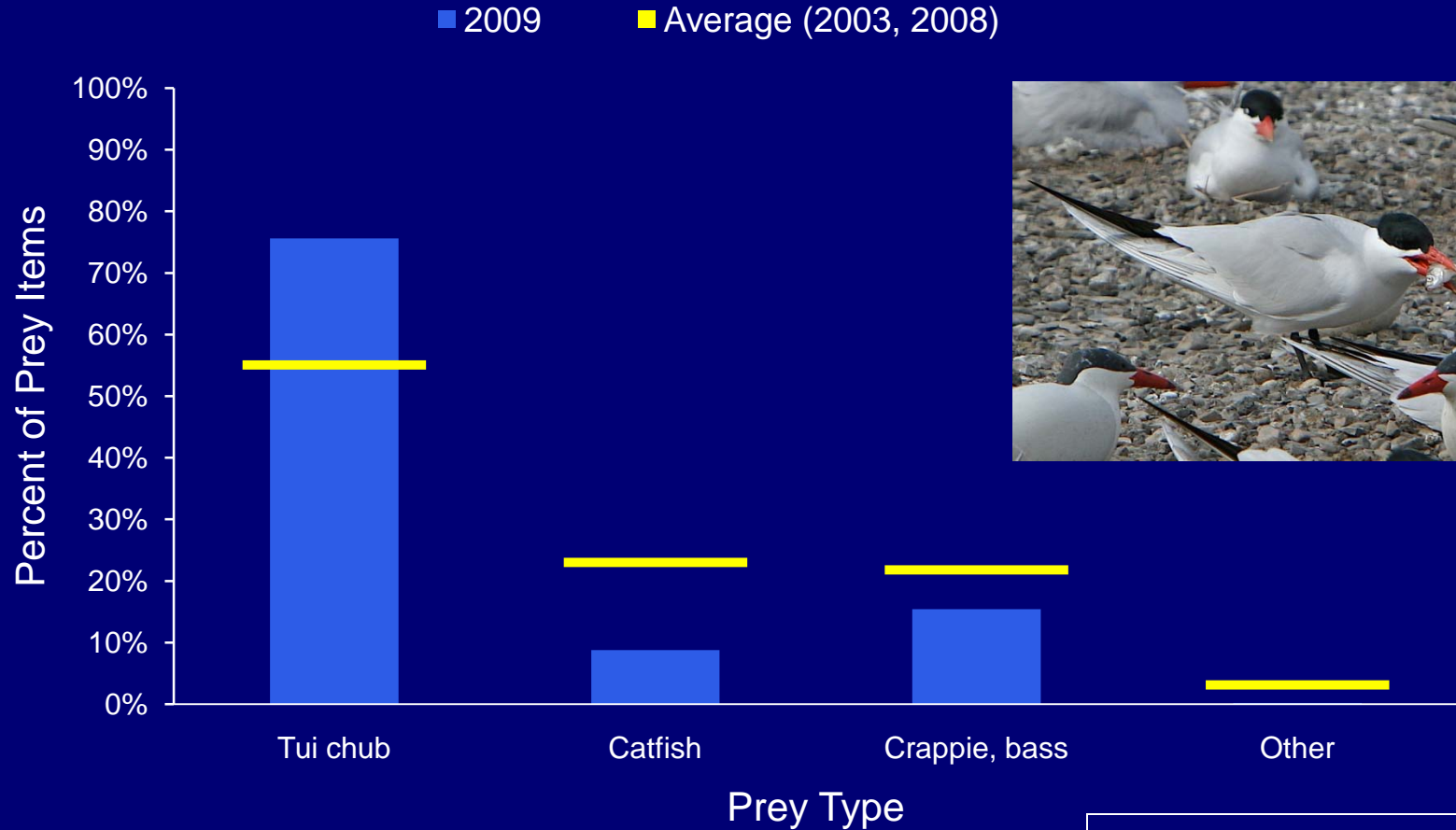


# Caspian Tern Island Sites in the Upper Klamath Basin



Lower Klamath and Tule Lake NWRs

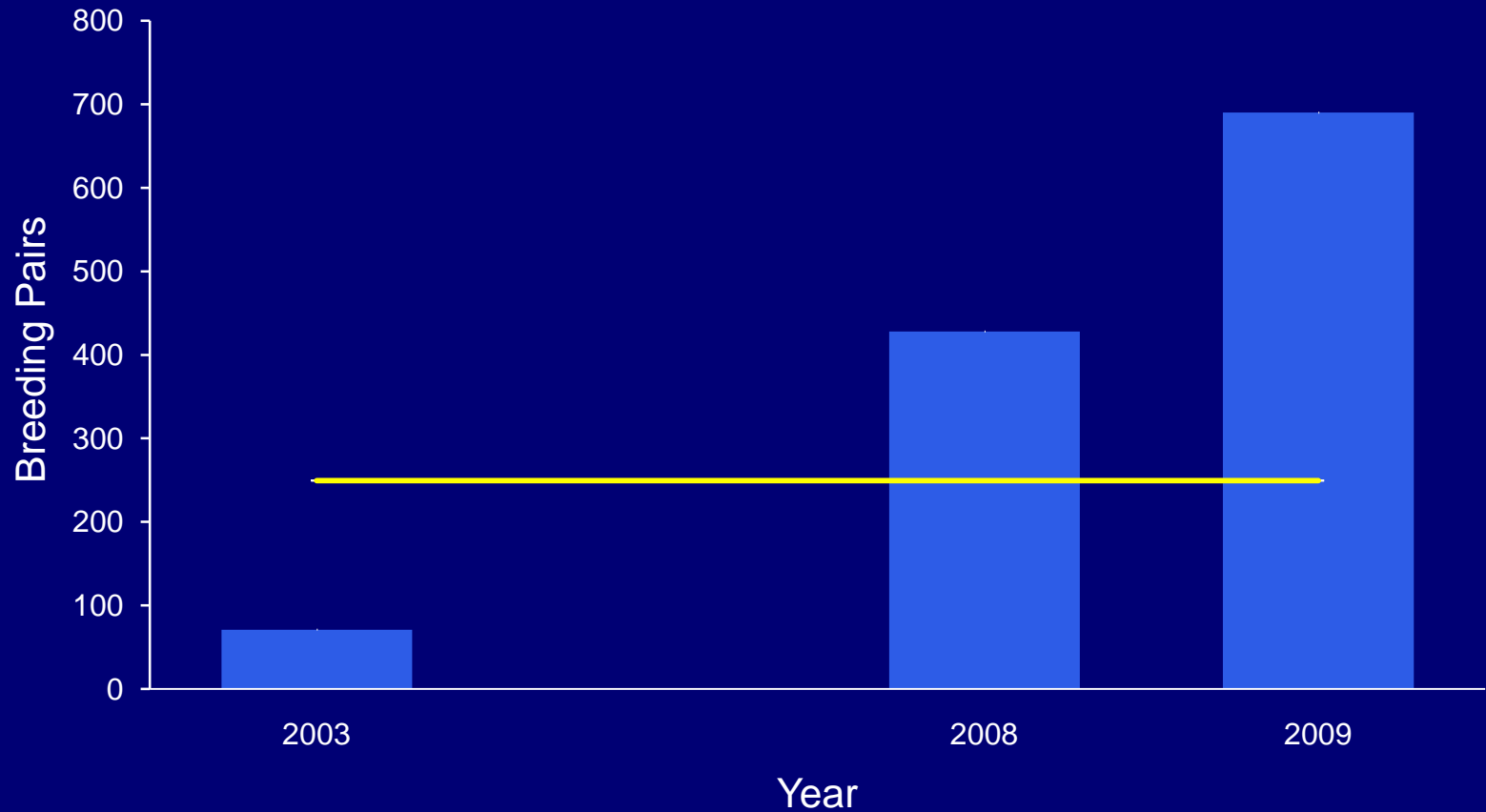
# Diet Composition of Caspian Terns Nesting at Crump Lake - 2009



1 sucker was observed on Crump Lake tern island

# Colony Size at Crump Lake Caspian tern colony, 2009

— Average (2003, 2008)





Malheur Lake



Malheur National Wildlife Refuge



5.95 km

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Image State of Oregon

Streaming 100%

Elev alt 2054 km

Pointer 43°19'46.69" N 118°45'31.15" W

## Warner sucker: ESA-listed as threatened

- 5 suckers seen on Caspian tern colony during 2008 nesting
- 0.17% of tern diet consisted of suckers
- at least 1 sucker was a Warner sucker

