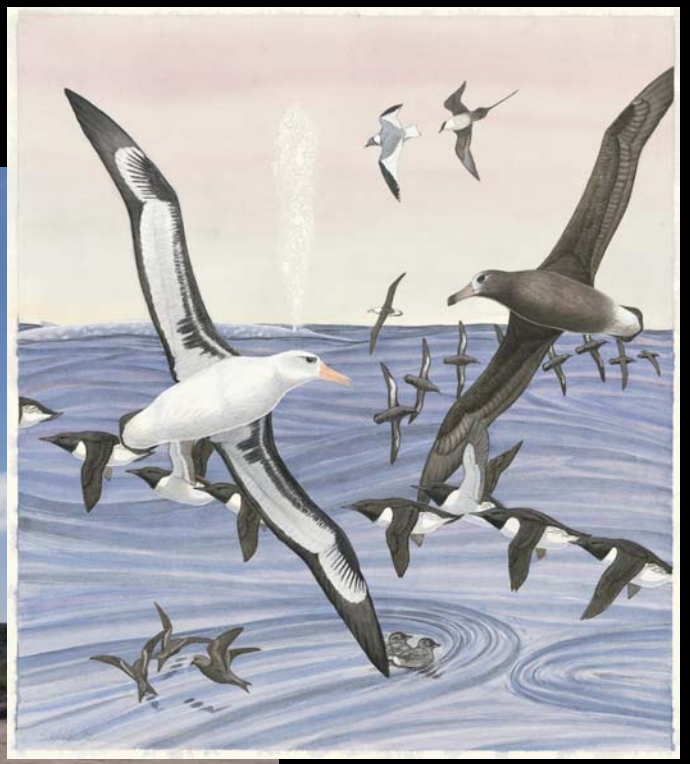
Aerial Seabird Studies



Josh Adams USGS-WERC, Moss Landing Marine Labs, CA

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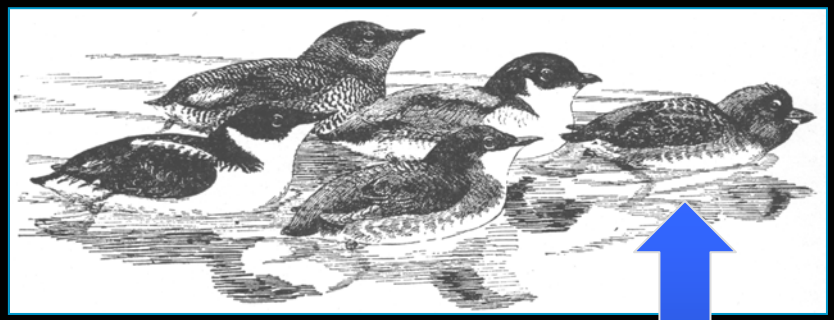
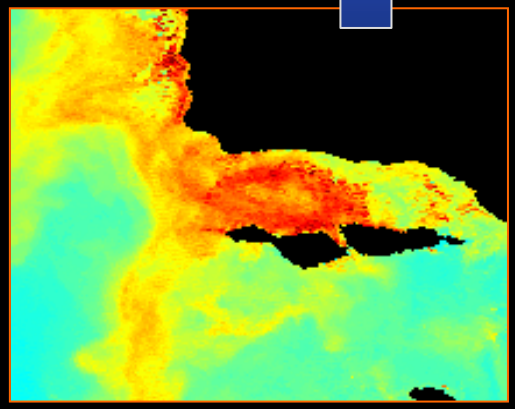
Southern California Bight Biophysical coupling

Seabirds and Marine Mammals



Zooplankton



Primary productivity

- Independent measure of prey availability & species composition
- Quick system response
  (e.g. Blue whale movements, auklet diet & reproduction)

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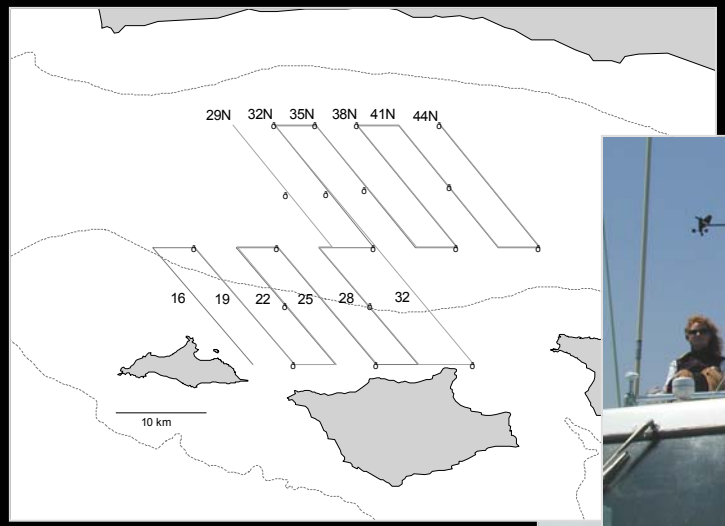
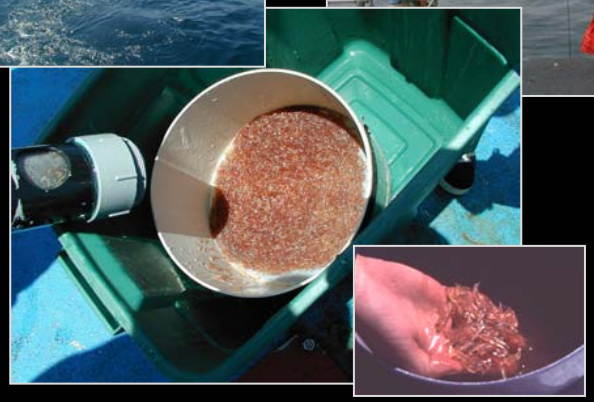
Two approaches to measure the distribution and habitats of seabirds at sea

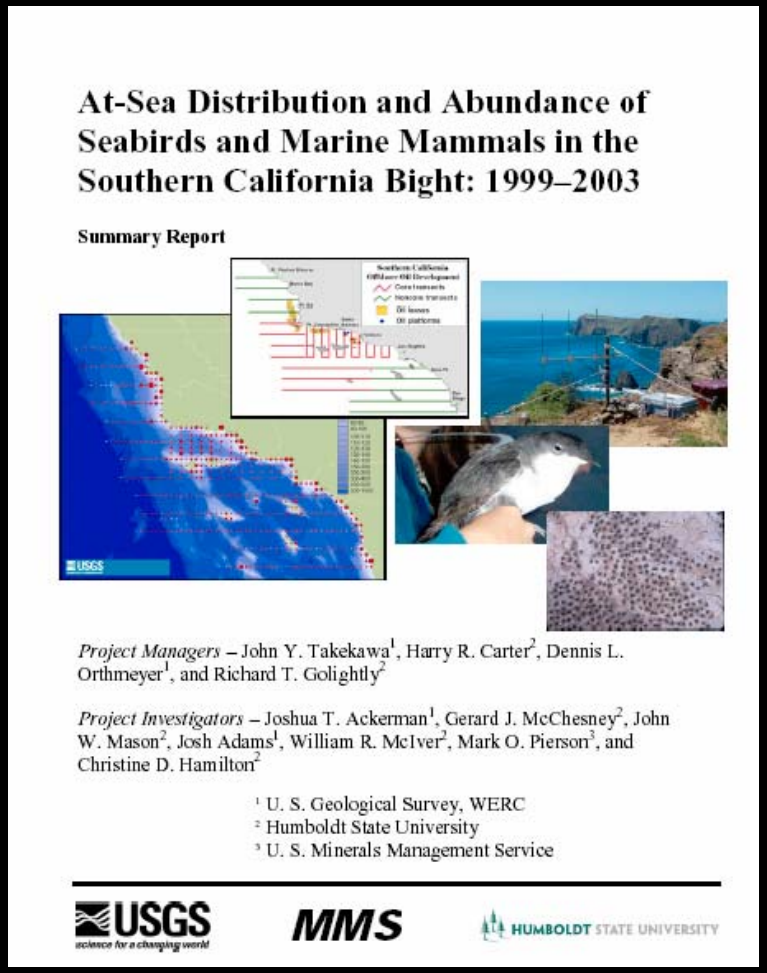
1. Vessel-based surveys

- static snap-shot of distribution
- spatially restricted surveys
- populations often unknown
- allows convenient measures of habitat and prey distributions





Seabirds and Marine Mammals in the Southern California Bight



At-Sea Distribution and Abundance of Seabirds and Marine Mammals in the Southern California Bight: 1999–2003

Summary Report

Project Managers – John Y. Takekawa[1], Harry R. Carter[2], Dennis L. Orthmeyer[1], and Richard T. Golightly[2]

Project Investigators – Joshua T. Ackerman[1], Gerard J. McChesney[2], John W. Mason[2], Josh Adams[1], William R. McIver[2], Mark O. Pierson[3], and Christine D. Hamilton[2]

[1] U. S. Geological Survey, WERC
[2] Humboldt State University
[3] U. S. Minerals Management Service

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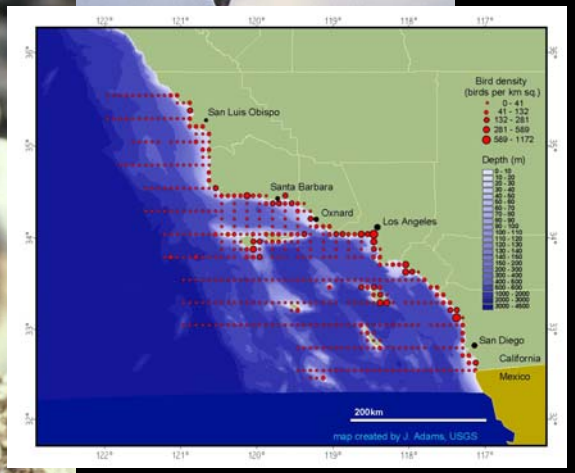
Primary objectives

- spatial and temporal patterns in at-sea distribution
- collect current biological data to assess potential threats/impacts
- assess changes in densities at sea 1975 - 2002

Seabirds in the Southern California Bight

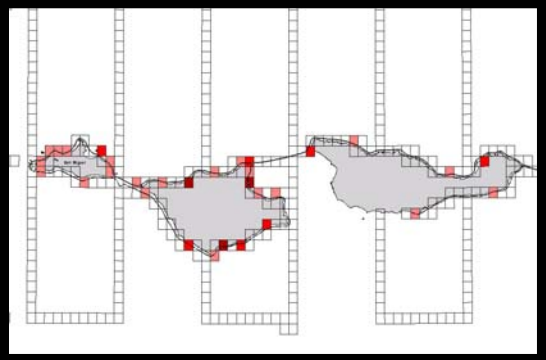


Results for seabirds

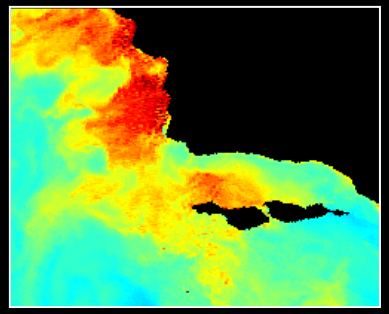
- 54,600 km transect effort (14,400 km coastal)
- 54 species (12 families) 135,545 counted ~850,000 individuals
- greatest densities along coastlines (island and mainland) – January
- 14-42% decrease in abundance for all seabirds (over 20 yrs)

Integrate existing data to model habitat associations

1. Gridded seabird densities



2. Ocean habitat variables



3. 2-step GAM

- presence – absence
- density conditional on presence

Swartzman 1992, Stoner et al. 2000

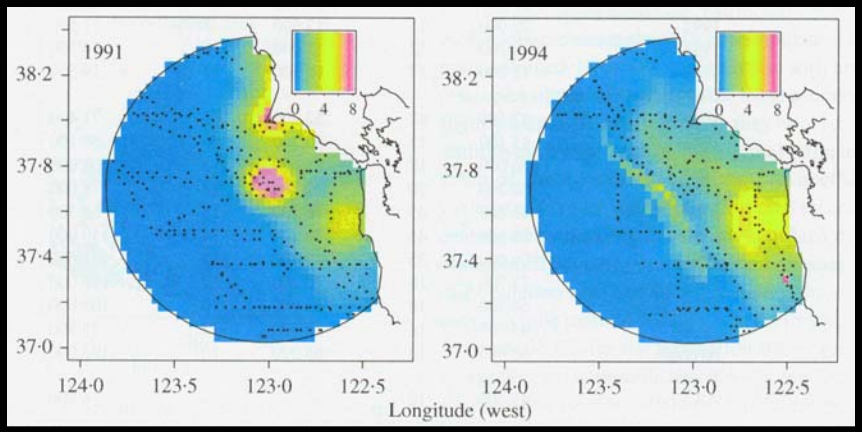
End products:

- ✓ mapped species distributions
- ✓ refined population estimates

5. Model validation

4. Map predicted distributions

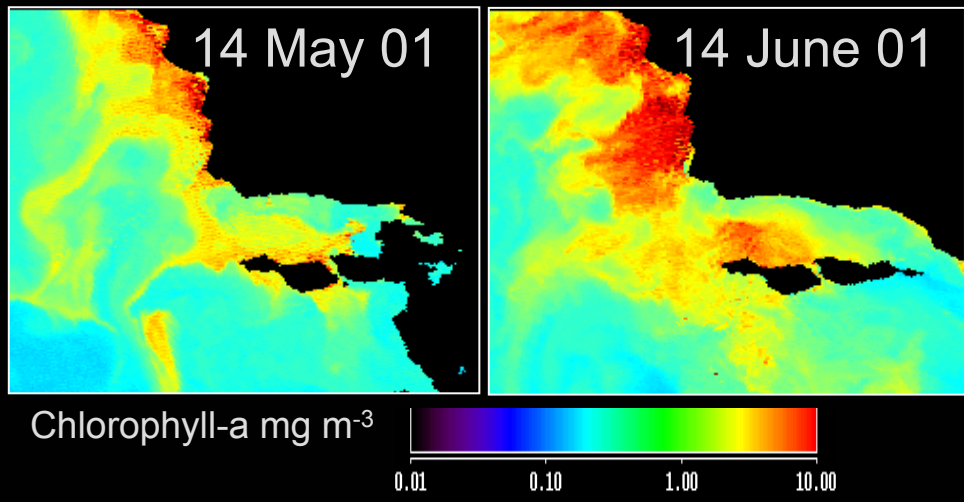
Clarke et al. 2003



Two approaches to measure the distribution and habitats of seabirds at sea

2. Telemetry

- extended temporally
- allows for unrestricted movements
- distribution of known individuals or populations
- must rely on remote sensing to quantify habitat associations

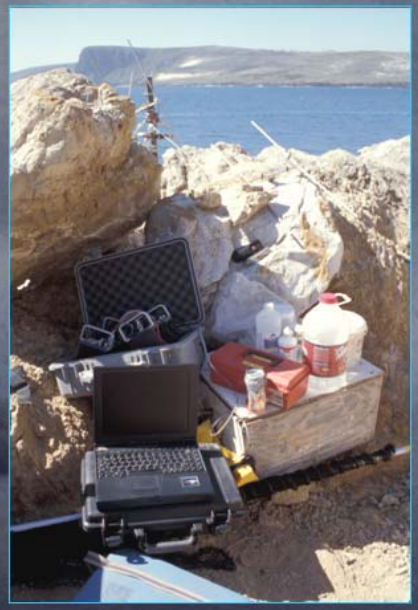


Cassin's Auklet foraging ecology & breeding biology

- abundant resident seabird
- ~12,000 nesting in Channel Islands NP
- "sentinel" species for shelf marine ecosystem
- CINP initiated LT monitoring in 1984
- targeted for restoration

USGS-HSU-MMS-MLML Seabird Studies 1999-2001
USGS-MLML-OWCN 2005-07

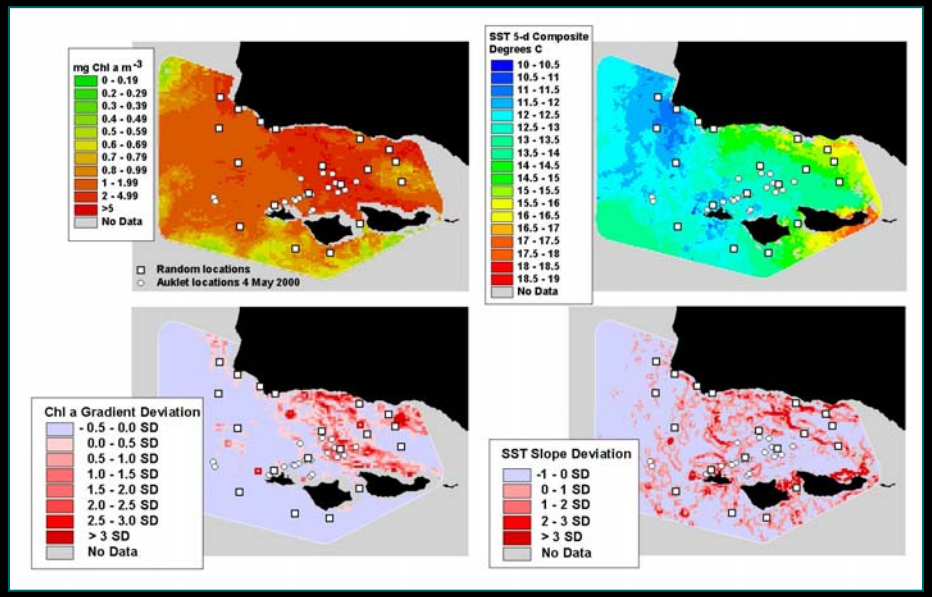
Seabird Radio-telemetry

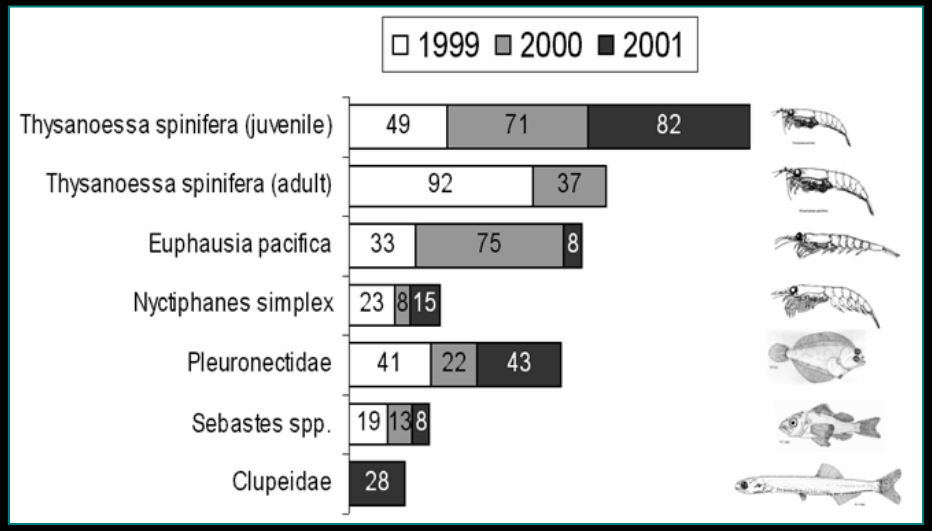


- Colony-based telemetry system
  - Continuous monitoring for attendance
- At-sea aerial telemetry surveys
  - Flights March – July 1999 – 2003
  - Aircraft support from DFG, USN
  - Locations by encircling – recorded with GPS

Gilmer et al. 1981

Cassin's Auklet foraging ecology & breeding biology





Within their available foraging area, auklets tend to occur:

- coolest waters
- chlorophyll-rich areas
- chlorophyll fronts
- no effect of thermal fronts

Adams 2004 *Master's Thesis, MLML*
Adams et al. 2004 *Condor*
Adams et al. 2004 *Canadian Journal of Zoology*
Ackerman, Adams et al. 2004 *Wildlife Bulletin*
Adams et al. *In prep*
Adams et al. *In prep*

Ashy Storm-Petrel foraging ecology

- 2-year effort, 3 islands
- standardized CPUE (183 net hrs)
- banded 972 individuals
- genetics & sexing
- radio-marked 71 individuals at 3 islands

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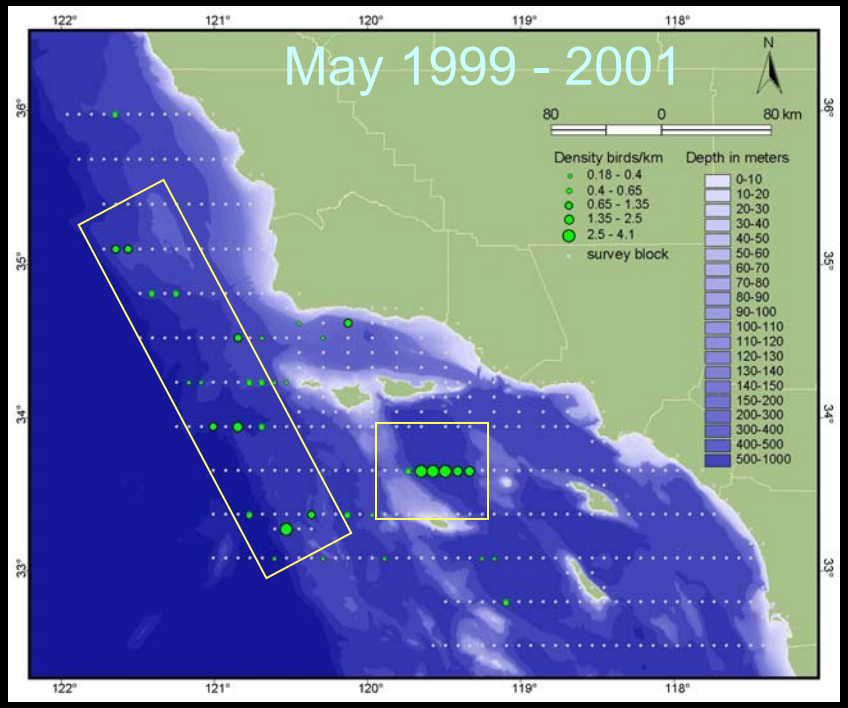
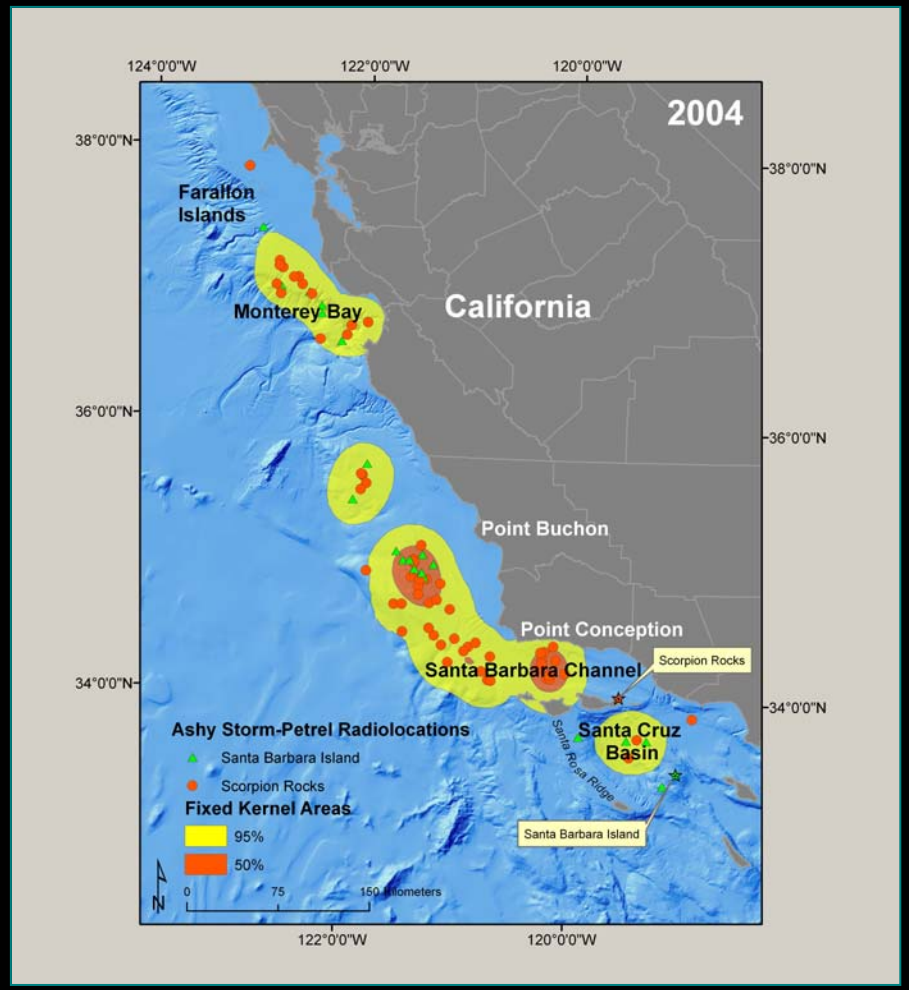
Ashy Storm-Petrel foraging ecology

At-sea aerial ***transect surveys***



At-sea aerial ***telemetry***



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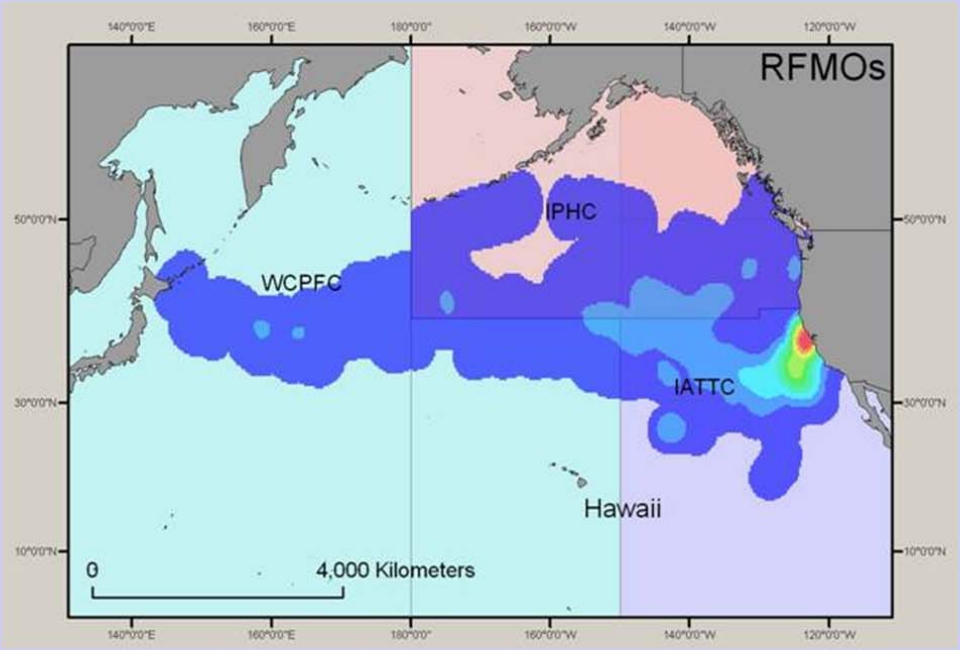
USGS Park Oriented Biological Support Program 2004-05

Albatross Overlap with Regional Fishery Management Organizations (RFMOs)



WCPFC: Western & Central Pacific Fisheries Commission
IPHC: International Pacific Halibut Commission
IATTC: Inter-American Tropical Tuna Commission

Data provided by: BirdLife Procellariiformes Tracking Database (F. Taylor & C. Small, 2005)