Science, Service, Stewardship

Is NOAA for the Birds?

An Overview of NMFS's National Seabird Program

Kim Rivera
National Seabird Coordinator
NOAA Fisheries Service
Alaska Region
April 21, 2010

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NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

NOAA

U.S. DEPARTMENT OF COMMERCE

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Safety Seagull Homepage - Windows Internet Explorer

http://www.safetyseagull.noaa.gov/

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NOAA Fisheries Alaska | Safety Seagull Homepage | Page Tools

SAFETY SEAGULL'S SAFETY TIPS

Welcome to the NOAA's Safety Seagull Website!

As everyone within NOAA already knows, Safety Seagull has many hours of atmospheric flight experience as well as an extensive knowledge of our coastal and oceanic environment. For years, Safety Seagull has been observing NOAA researchers and mariners, so assuming the role of watching over NOAA to ensure we conduct ourselves in a safe and environmentally friendly manner is a natural fit for Safety Seagull.

Safety Seagull has already made several helpful suggestions to make NOAA a safer and more environmentally friendly place to work, which we will share with you shortly. In order to launch this campaign I will send out weekly emails (for the next six weeks) to get you familiar with the mission set forth to our friend Safety Seagull .These emails will contain messages provided by our Safety and Environmental Compliance Office, and delivered by Safety Seagull. I encourage

Done Internet 100%

start 2 Microsoft Office P... 2 Microsoft Office P... 2 Mozilla Thunderbird Safety Seagull Home... Links 12:03 PM

Seabird . . .

- ✓ Birds living in and making their living from the marine environment …
- ✓ Birds whose normal habitat and food source is the sea, whether they be coastal, offshore, or pelagic

Life History	Seabird	Songbird
Age 1st breeding	2-9 years	1-2 years
Clutch size	1-5	4-8
Incubation period	20-69 days	12-18 days
Nestling/fledgling pd	30-280 days	20-35 days
Maximum life span	12-60 years	5-15 years

Seabirds …

- ✓Long lived
- ✓ Deferred sexual maturity
- ✓Low productivity
- ✓High adult survival rate
- ✓Small clutches
- ✓Relatively large size
- ✓High mate fidelity
- ✓High site fidelity
- ✓Most monogamous, mate for life

From Biology of Marine Birds, 2002, ed by EA Schreiber and Joanna Burger

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Road Map

1. What is the National Seabird Program?
   - Why does NMFS work on seabirds?
   - What is the current Program?
2. Seabird Workshop in Sept 2009
   - Workshop Outcomes
3. Program's Future Direction & Needs
   - Stable Base and Support
   - Resource and Funding Needs
4. Birds & Other NOAA Line Offices

BYCATCH
ECOSYSTEM

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ISSUE: Entanglement, direct interaction with fishing gear

- ✓ Longline gear -- become accidentally hooked or entangled on groundline as it is deployed
- ✓ Trawl gear – collide with cables or third wire or entangled in trawl mesh
- ✓ Gillnet –become entangled ‘passively’

Seabirds are important ecosystem indicators

National Plan of Action on Seabirds (NPOA) Actions for Regions with Longline Fisheries

I. Seabird Bycatch Assessment

II. Data Collection and Improved Reporting

III. Prescription of Mitigation Measures

IV. Research and Development of Mitigation Measures and Techniques

V. Outreach, Education, and Training About Seabird Bycatch

VI. Reporting

VII. Collaboration between NMFS and FWS on Seabird Issues

….includes international efforts

Executive Order 13186: Responsibilities of Federal Agencies to Protect Migratory Birds

- ✓ **If action has measureable negative impact…**
- ✓ **Then develop MOU with US Fish & Wildlife Service**

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Request from AA --2001

1. Designate seabird contact at every region, science center, hq office
2. National program coordinator appointed
3. Implementation of NPOA & EO 13186 requires maintenance of national perspective through coordinated regional activities

What is the National Seabird Program? ….people!

Coordinator	Kim Rivera
ST	Steve Swartz
	Eric Breuer
	Samantha Brooke
	Mridula Srinivasan
IA	Nicole LeBoeuf
SF	Lee Benaka
PR	Therese Conant
	Philip Hoffman
HC	Jeff Shenot
HMS	Karyl Brewster-Geisz
GCF	Stacey Nathanson
	Connie Sathre
GCIL	Peter Oppenheimer
AKR	Kim Rivera
	Kristin Mabry
AFSC	Shannon Fitzgerald
	Doug DeMaster
PIR	Al Katekaru
	Lewis VanFossen
PIFSC	Mike Seki
	Chris Boggs
NWR	Kevin Duffy
NWFSC	Elizabeth Clarke
	Tom Good
SWR	Lyle Enriquez
SWFSC	Lisa Ballance
NER	Ryan Silva
NEFSC	Richard Merrick
	Gina Shield
	Gordon Waring
	Debi Palka
	Melissa Warden
SER	Jennifer Lee
SEFSC	Joan Browder
	John Carlson

NOAA Fisheries Service & Seabirds…
Our Responsibilities

- ✓ Magnuson-Stevens Fishery Conservation & Management Act (seabirds in recent reauthorization, Section 316)
- ✓ Endangered Species Act
- ✓ National Environmental Policy Act
- ✓ U.S. National Plan of Action on Seabird Bycatch in Longline Fisheries
- ✓ FAO's Best Practice Technical Guidelines
- ✓ NMFS's Strategic Plan….& for Fisheries Research
- ✓ NOAA Fisheries National Bycatch Strategy & Report
- ✓ Executive Order 13186: Responsibilities of Federal Agencies to Protect Migratory Birds
- ✓ USFWS Birds of Conservation Concern

NOAA Fisheries Service & Seabirds…
Our Responsibilities

- ✓ **Magnuson-Stevens Fishery Conservation & Management Act**
- ✓ Bycatch definition…
- ✓ Section 316, Bycatch Reduction Engineering Program (BREP) & Coordination on Seabird Interactions
  - ✓ FMPs may include incentive systems
  - ✓ gear with demonstrated low seabird bycatch
  - ✓ outreach to industry
  - ✓ actions at international fishery organizations
- ✓ Section 303b12, FMPs may include measures to conserve non-target species
- ✓ **NOAA Fisheries National Bycatch Strategy**

Our Partners…

- ✓ US Fish & Wildlife Service (USFWS)
- ✓ US Geological Survey (USGS)
- ✓ Minerals Management Service (MMS)
- ✓ NOAA's National Marine Sanctuary Program (NMSP)
- ✓ Department of State (DOS)
- ✓ Sea Grant
- ✓ Universities (e.g. UW, UCSC, Duke, CSU)
- ✓ Pacific States Marine Fisheries Commission
- ✓ Pacific Seabird Group
- ✓ Atlantic Marine Bird Cooperative
- ✓ North Pacific Research Board
- ✓ Agreement on the Conservation for Albatrosses and Petrels
- ✓ NGOs (American Bird Conservancy, BirdLife International, National Audubon Society, World Wildlife Fund)
- ✓ Fishing Industry (e.g. Alaska and Hawaii associations)

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Examples of NMFS Seabird Projects & Activities

April 21, 2010

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Types of Projects & Activities

- Seabird bycatch estimation analysis
- Mitigation gear development
- Free mitigation gear—fishermen incentives
- Enhanced seabird identification training for observer programs
- Necropsy program for bycaught seabirds
- Seabirds in the Ecosystem--Data collection on seabird distribution, abundance, and behavior on NOAA platforms
- Outreach (conferences, ID guides, workshops)
- International

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SHORT-TAILED ALBATROSS

THREATS AT COLONY

Toroshima Island, Japan

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SHORT-TAILED ALBATROSS

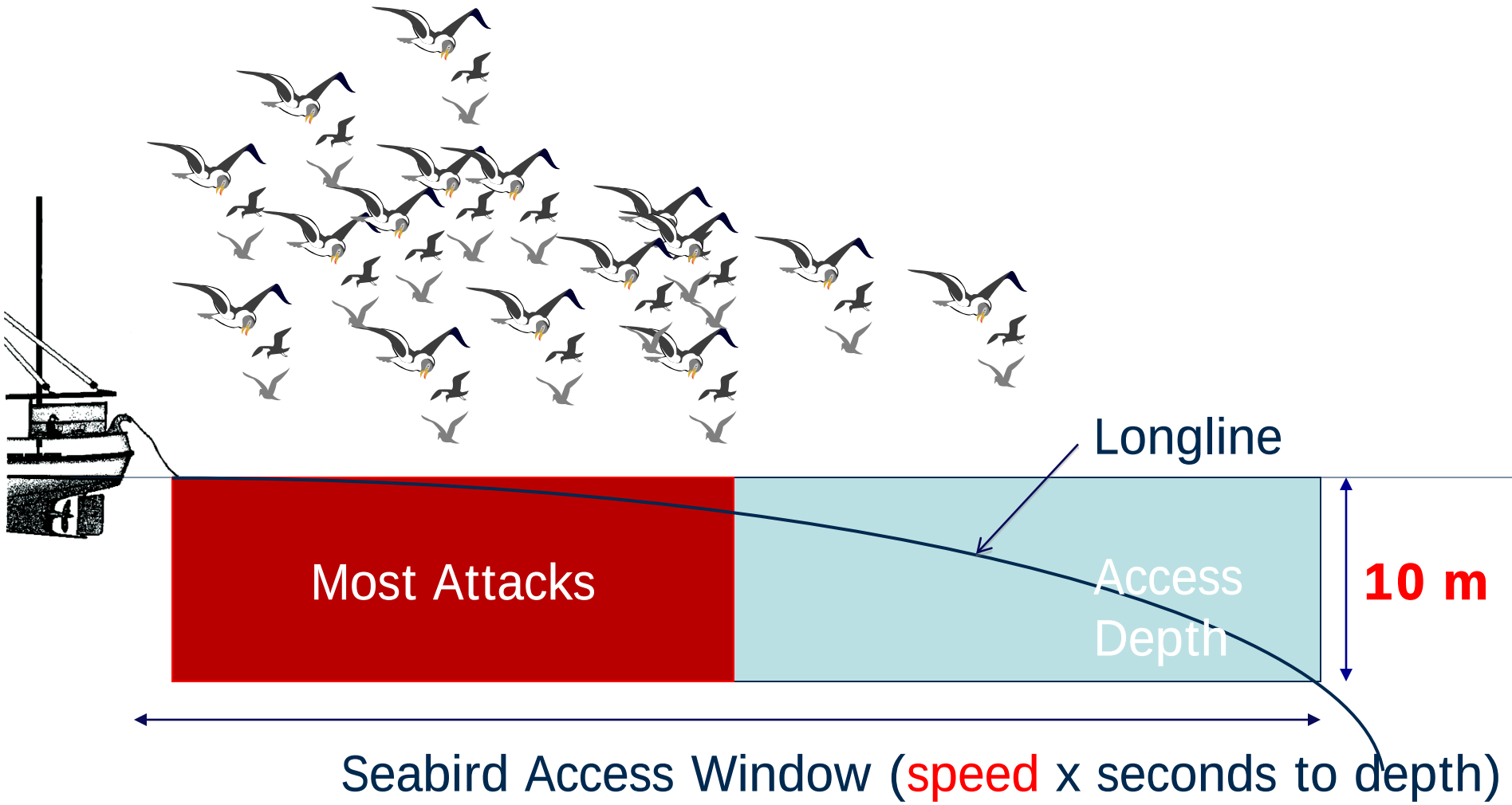
TRANSLOCATION

Mukojima Island, Japan

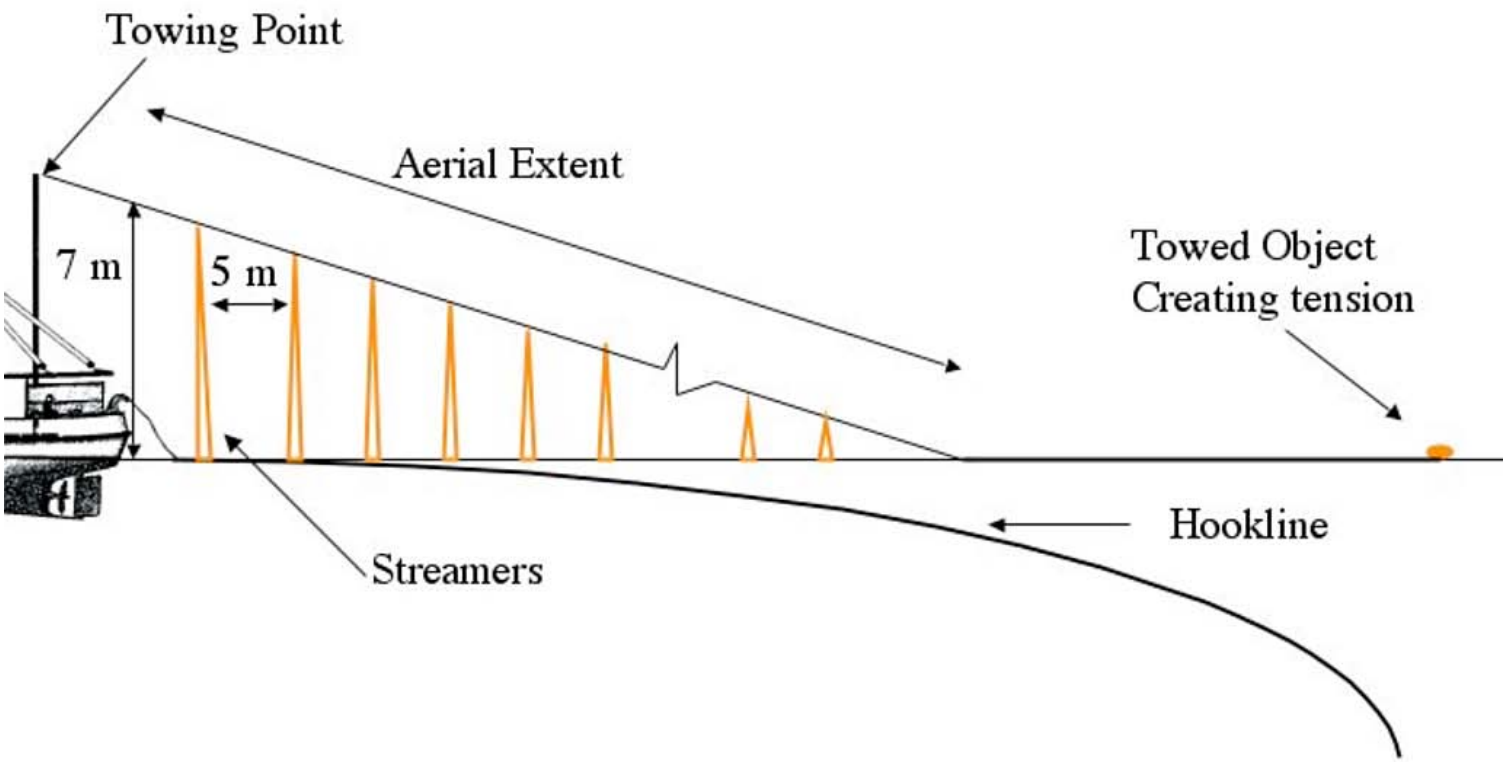
Developing Solutions to Seabird Mortality in Alaskan Fisheries: Accomplishments and Continued Research

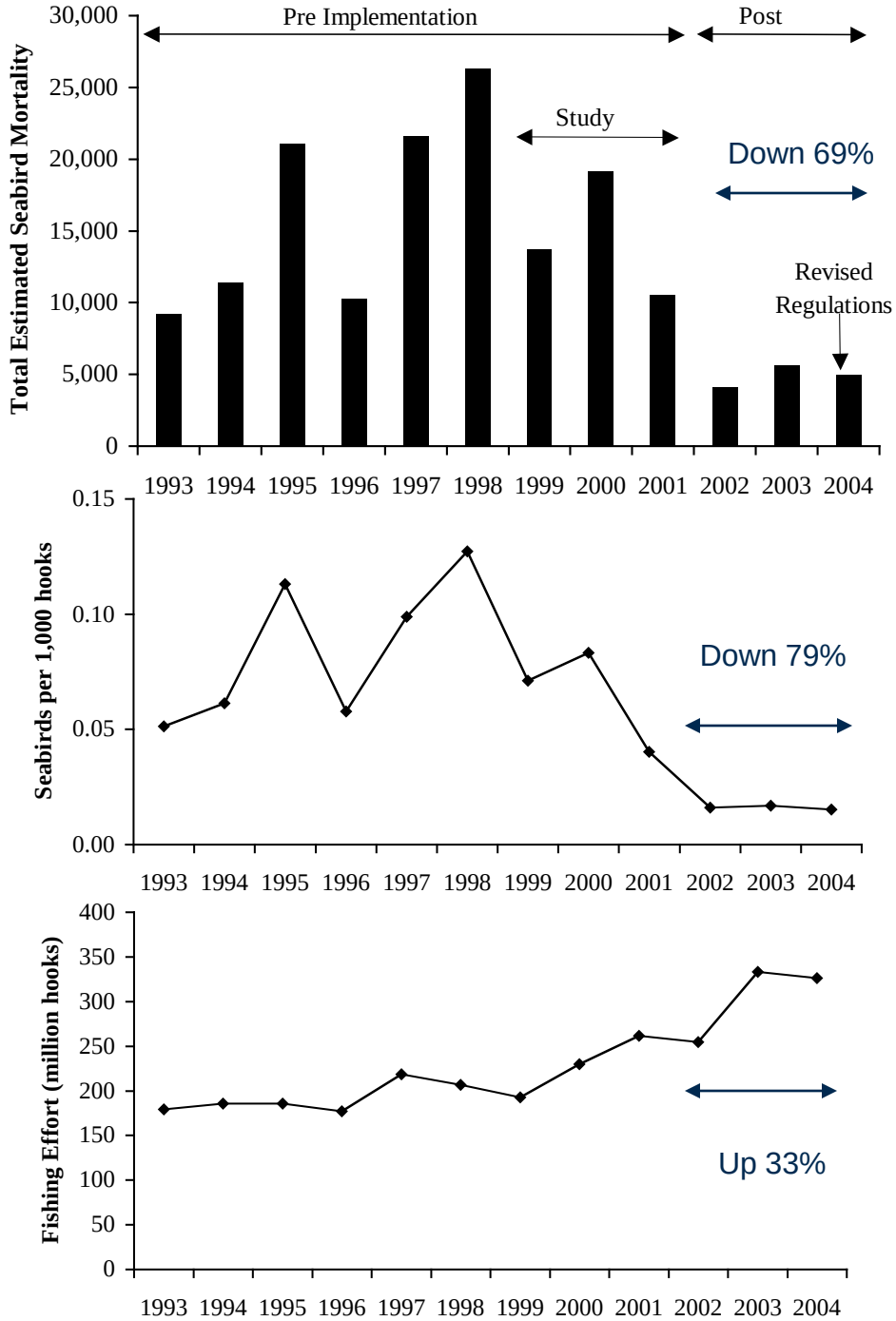
Ed Melvin
Washington Sea Grant Program
School of Aquatic and Fishery Sciences
University of Washington

Seabird Bycatch Mitigation 101:
Shrink and Defend



Demersal Tori Line (streamer line)



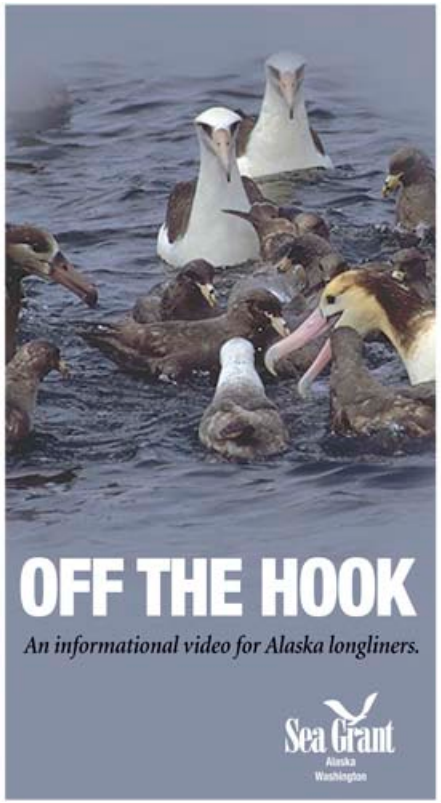


Since paired streamer lines with performance standards were implemented by the Alaska fleet beginning In 2002, total seabird mortality and seabird bycatch rate are down by 69% and 79%, respectively, while fishing effort has increased

Data from NMFS, prepared by Washington Sea Grant

Outreach

Video/Flyer (3 Languages)



Free Streamer lines

Research as Outreach

Ad-hoc Committee Process

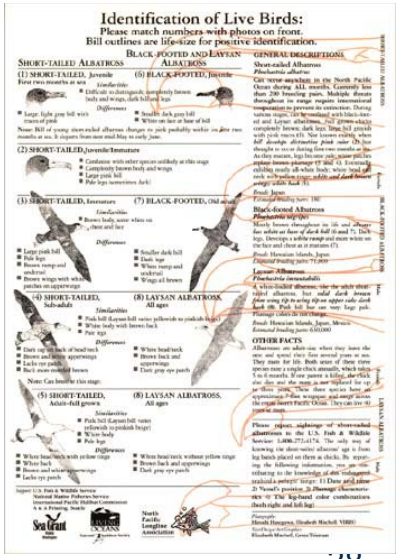
Council Process

Small Boat Fleet

Industry Peer Pressure

Industry Flyers - Thorn Smith

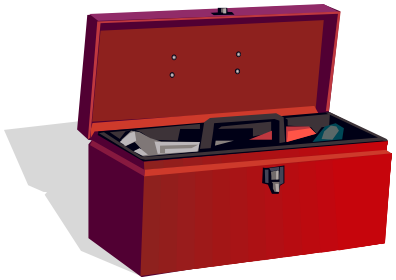
Media



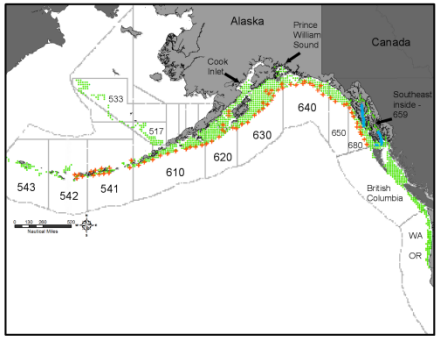
Longline Study

QuickTime™ and a
Photo CD Decompressor
are needed to use this picture

Small boats



Continued Collaborative Research

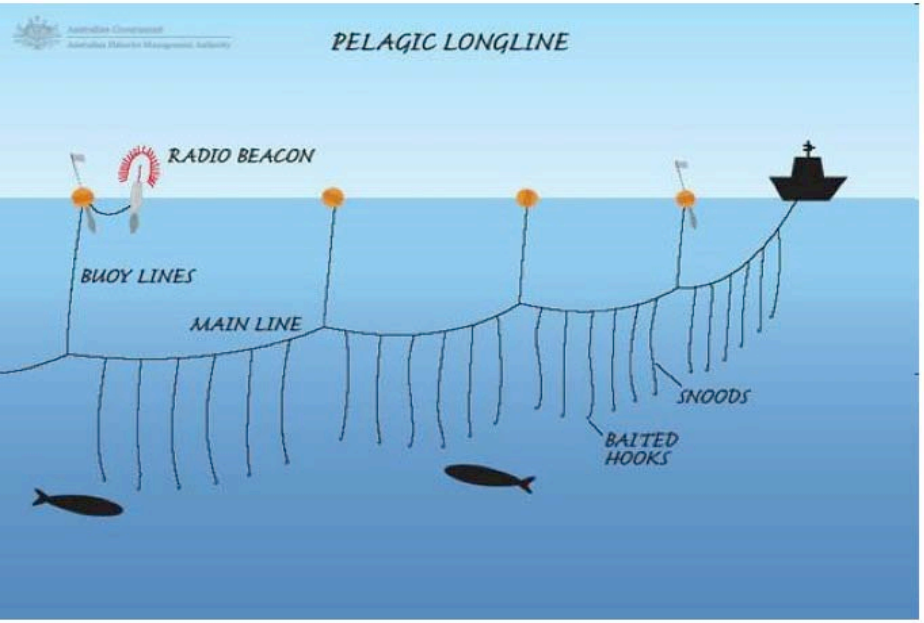


Seabird Surveys

Trawl Mitigation

IW Longlines

Pelagic Longline Fisheries: Operational Challenges



- Surface floats
- Branchlines (snoods)
  - Long ~ 35 m
  - un-weighted
- Fast setting speeds (~10 knts)
- Fewer hooks vs demersal
- Catch rare events
- Few observed fisheries

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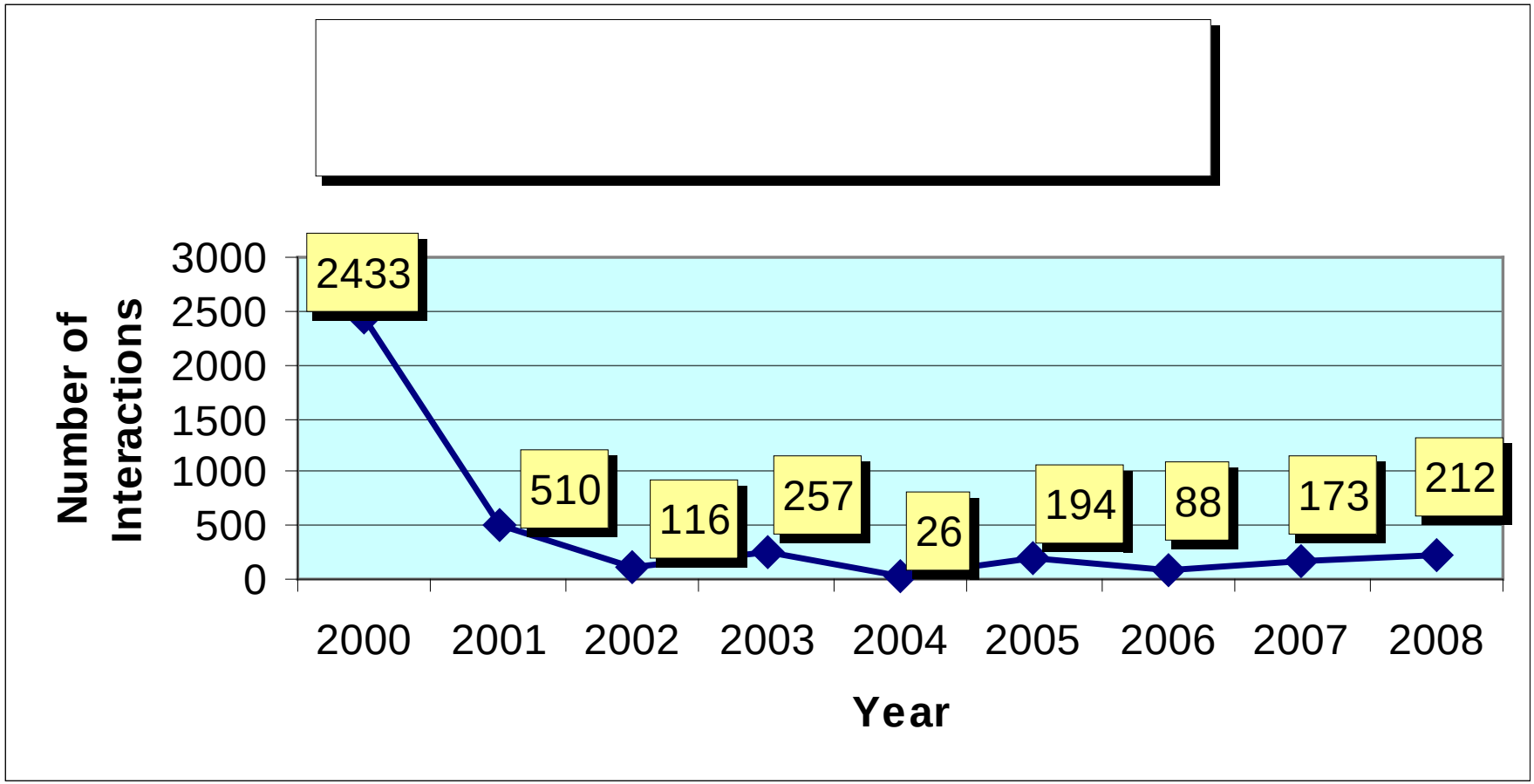

Figure 16 Total estimated albatrosses (LAAL and BFAL) incidentally taken by Hawaii longline vessels 2000-2008 (Source NMFS, Pacific Island Regional Office)

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Seabird Bycatch Activities in the Southeast Fisheries Science Center

Seabird Bycatch of the U.S. Pelagic Longline Fishery in the Western North Atlantic

Joan A. Browder, David S. Lee, Andreas Winter and Yan Jiao, Gladys Liehr & Thomas Jackson

April 21, 2010

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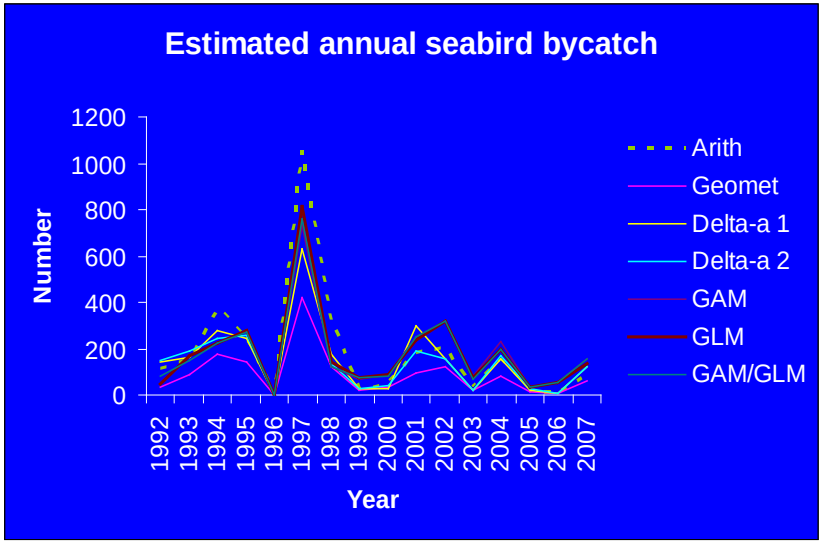
SEFSC

Atlantic pelagic longline fishery

Estimated annual bycatch, by six methods.

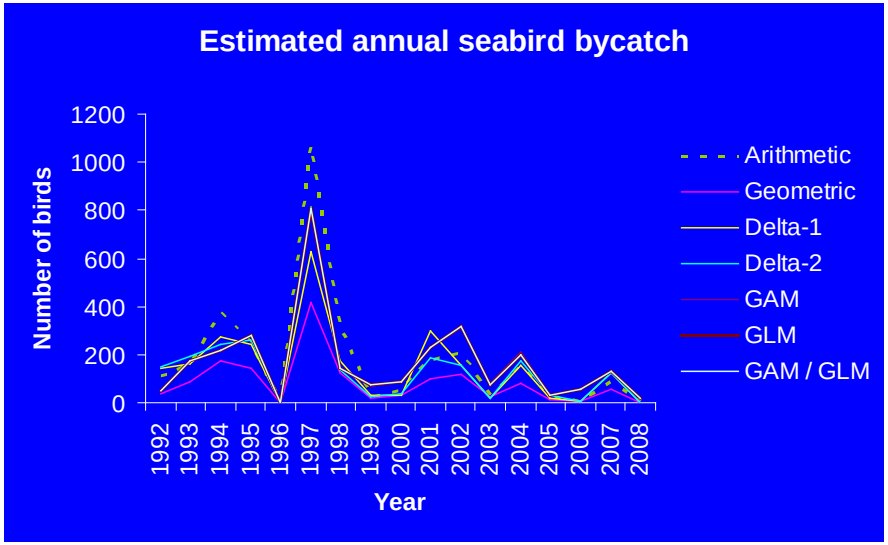


Estimated annual bycatch, by six methods.

Estimates were calculated from the entire POP data base and 1992-2007 (left) and 1992-2008 (bottom) estimates differed slightly because of the added year.

Similar time series patterns and values by the six methods. Identical annual values by GLM and GAM/GLM from the 1992-2008 dataset (right)

Aberrant GAM estimates for 1993 and 1995 were removed so that the scale would show variation in the other estimates.



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The oceanic area where most of the seabird bycatch occurs encompasses an area of high seabird diversity along the continental shelf break off the North Carolina Outer Banks

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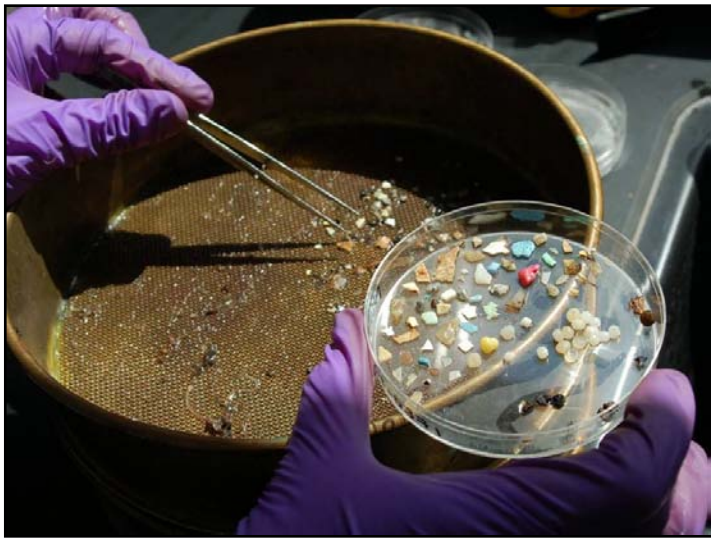
The importance of the continental shelf break off the North Carolina Outer Banks

This area has been nominated as a Globally Important Bird Area (IBA).

NEFSC's Loon bycatch analysis

Year	Total est. common loon NE	CI	Total est. common loon MidAtl	CI	Total est. red-throated loon	CI
1996	44	(16, 123)	331	(203, 540)	483	(331, 704)
1997	49	(27, 88)	774	(499, 1201)	4,059	(1719, 9 585)
1998	98	(39, 243)	1 294	(848, 1975)	649	(321, 1311)
1999	107	(31, 370)	919	(566, 1491)	932	(653, 1329)
2000	95	(24, 372)	770	(494, 1200)	426	(239, 759)
2001	32	(15, 72)	161	(93, 278)	203	(105, 394)
2002	158	(52, 476)	203	(114, 363)	1,042	(498, 2183)
2003	47	(18, 122)	357	(199, 640)	370	(225, 610)
2004	194	(45, 829)	274	(177, 424)	536	(236, 1216)
2005	20	(9, 46)	268	(173, 416)	356	(247, 513)
2006	10	(4, 22)	107	(66, 172)	135	(73, 252)
2007	37	(14, 98)	262	(156, 439)	1,567	(963, 2550)
ave annual	74	(26, 213)	477	(294, 773)	897	(486, 1654)
total	891	(347, 2286)	5720	(4438, 7372)	10 758	(7438, 15561)

NOTICE



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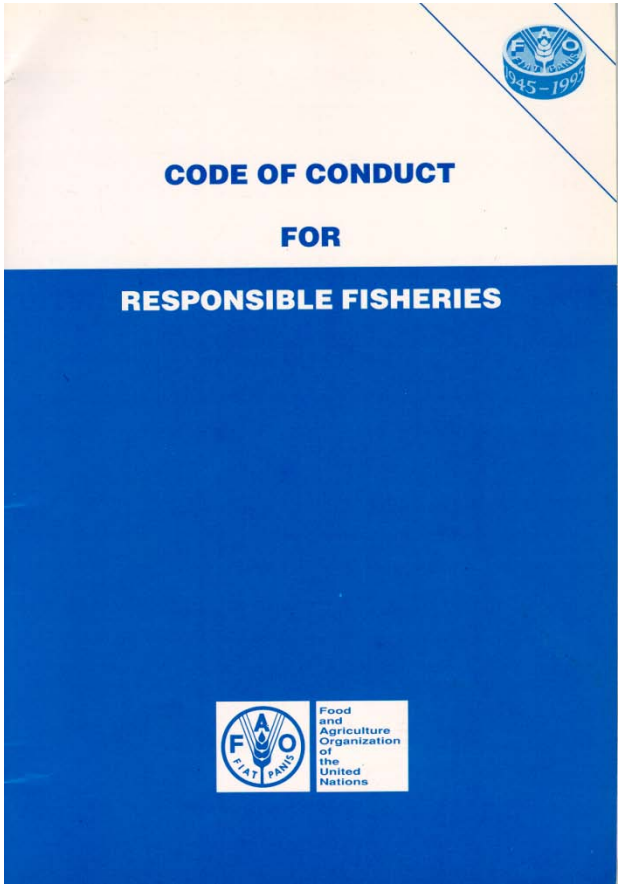
International

Global Issue



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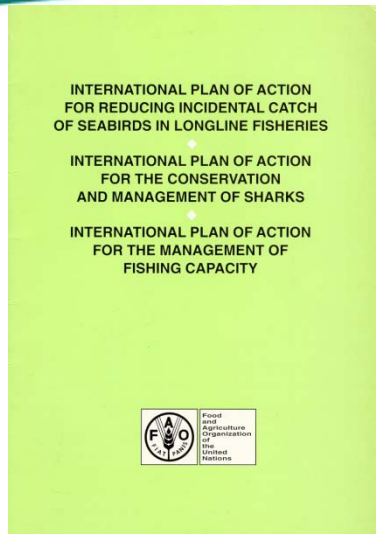
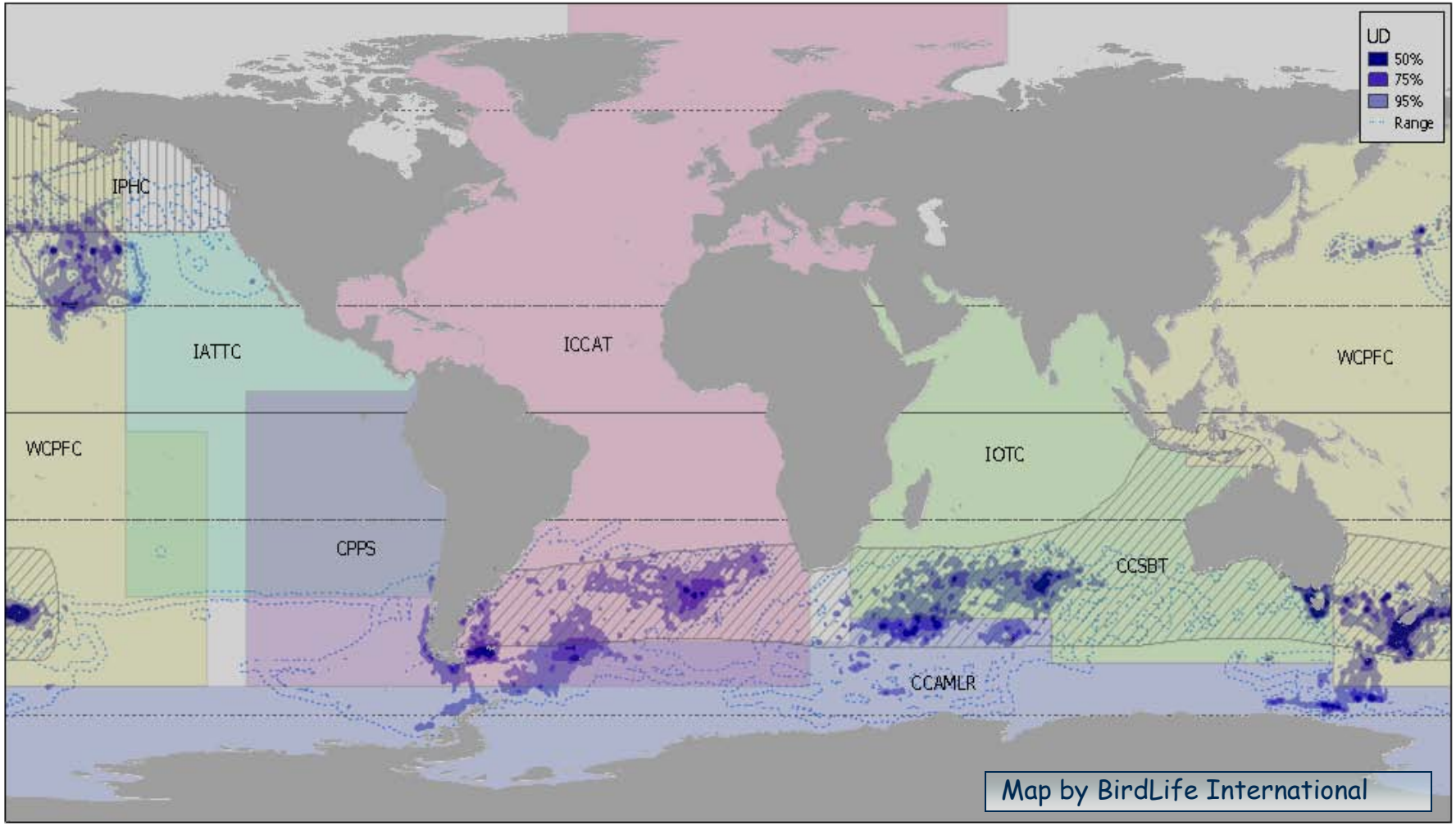
Why an IPOA-Seabirds?



- ✓ LOTS of birds killed annually---estimated 300,000 (1/3 albatrosses)
- ✓ Declines of some albatross populations linked to longline fishing
- ✓ Some populations threatened with extinction

International Fisheries Management



Parties to ACAP

Agreement on the Conservation of Albatrosses and Petrels

- Argentina
- Australia *
- Brazil
- Chile
- China
- Ecuador *
- France*
- Japan
- Indonesia
- Korea
- Namibia
- New Zealand *
- Norway
- Peru*
- Poland
- Russia
- South Africa *
- Spain*
- Ukraine
- USA
- United Kingdom *
- Uruguay

* : ratified

Optimizing Tori Lines For Pelagic Longline Fisheries

Ed Melvin
Washington Sea Grant
University of Washington

Sea Grant Washington

the David & Lucile Packard FOUNDATION

Specters in the Sound:

marine bird mortality from derelict fishing gear in Puget Sound and the Northwest Straits

Thomas P. Good, Jeffrey A. June,

Michael A. Etnier and Ginny Broadhurst

Applied Osteology

Marine debris

Ingestion

Entanglement

Derelict fishing gear

- 640,000 tons added annually
- 10% of world total of marine debris
- Chronic, low-level seabird mortality (?)

NORTHWEST STRAITS
marine conservation initiative

Home | What's New | Foundation | MRCs | Commission | Archives | Site Map

- About the Commission
  - "Straits" or "Straights"
- Regional projects
  - Derelict Fishing Gear
  - Derelict Gear Project Accomplishments
  - Locating, Removing and Disposing of Derelict Gear
  - Transboundary Derelict Gear Workshop
  - Creosote Debris Removal

Derelict Fishing Gear Removal

The Issue: Decades of a thriving commercial and recreational fishery in Puget Sound has left tons of old fishing gear behind. The Northwest Straits Initiative works to survey and remove lost fishing gear. We have found thousands of old crab pots littering the seafloor and hundreds of nets caught in rocky outcroppings and draped along waterways and we know that there are many more. Bad weather, mechanical failures and human error have caused fishermen to lose or abandon their fishing gear. Most of what we find is gillnets and crab pots (commercial and sport). Both can continue to fish long after the original owners have gone. The result is wasted seafood and needless damage to our marine resources.

Potential mortality of 870 recovered gillnets

Documented mortality
(absolute minimum)
x
drop-out rate
(from NRC/NWSC study)
x
turnover rate
(from NRC/NWSC study)
x
“soak time”
(reported – retrieved)

~ 12,000 birds

(T. P. Good, quick-and-dirty analysis)

Summary/Conclusions

Multiple net parameters involved

Thousands of birds likely killed

Mortality matches local declines

—Scoters, loons, grebes

Different than bycatch

San Juans hotspot

NOAA

Restoration Center

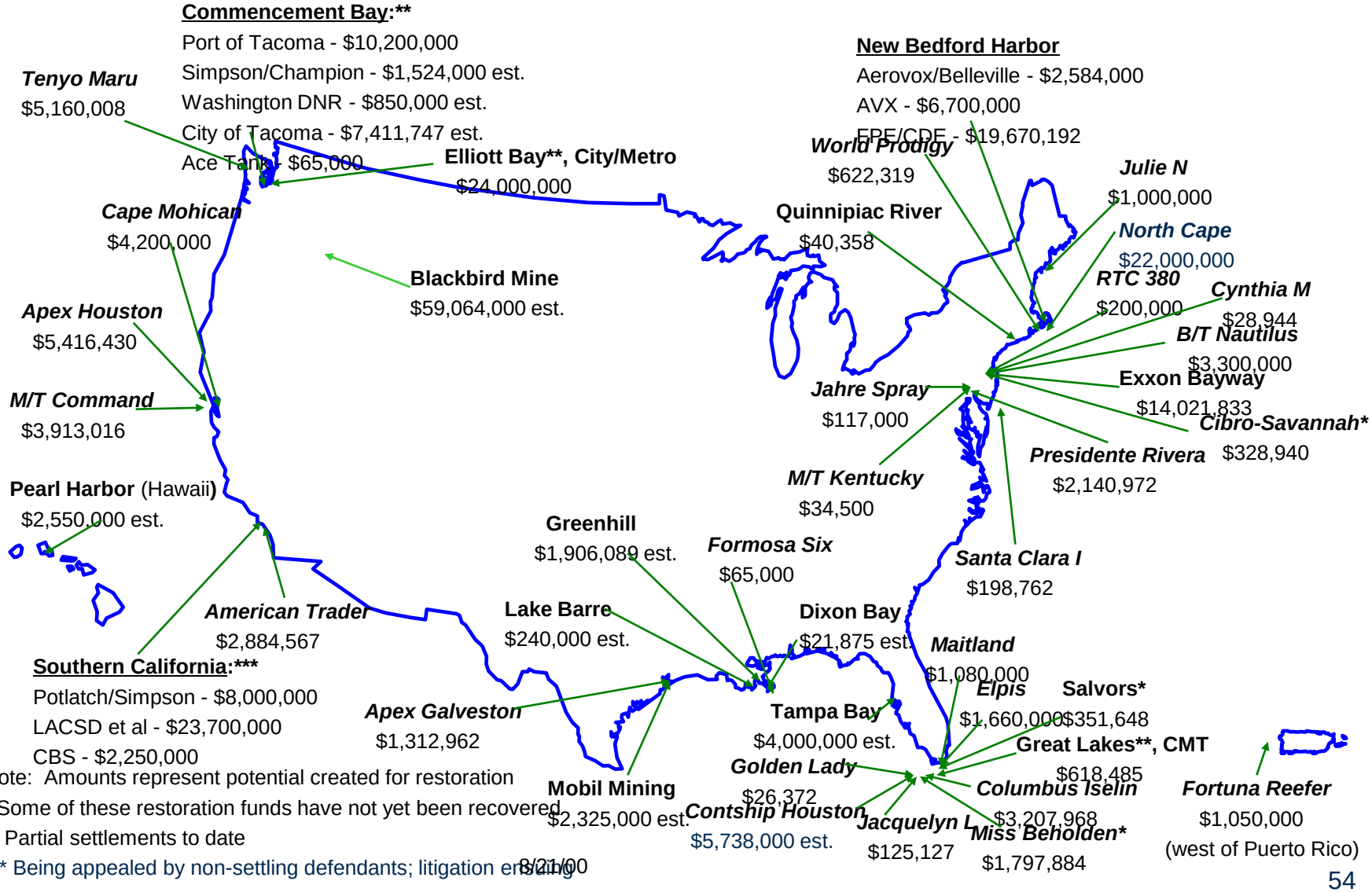
National Marine Fisheries Service

Damage Assessment, Remediation & Restoration Program (DARRP)

Natural Resource Trustees

- **DOC - NOAA: National Ocean Service, General Counsel, NOAA Fisheries**
- **Other Federal Trustees:**
  - **DOI (FWS, BLM)**
  - **USDA (Forest Service)**
  - **DOE**
  - **DOD**
- **State Agencies**
- **Local Government**
- **Tribes**

NOAA's DARRP has generated over $340 million for restoring coastal resources.



Note: Amounts represent potential created for restoration

* Some of these restoration funds have not yet been recovered

** Partial settlements to date

*** Being appealed by non-settling defendants; litigation ensuing

8/21/00

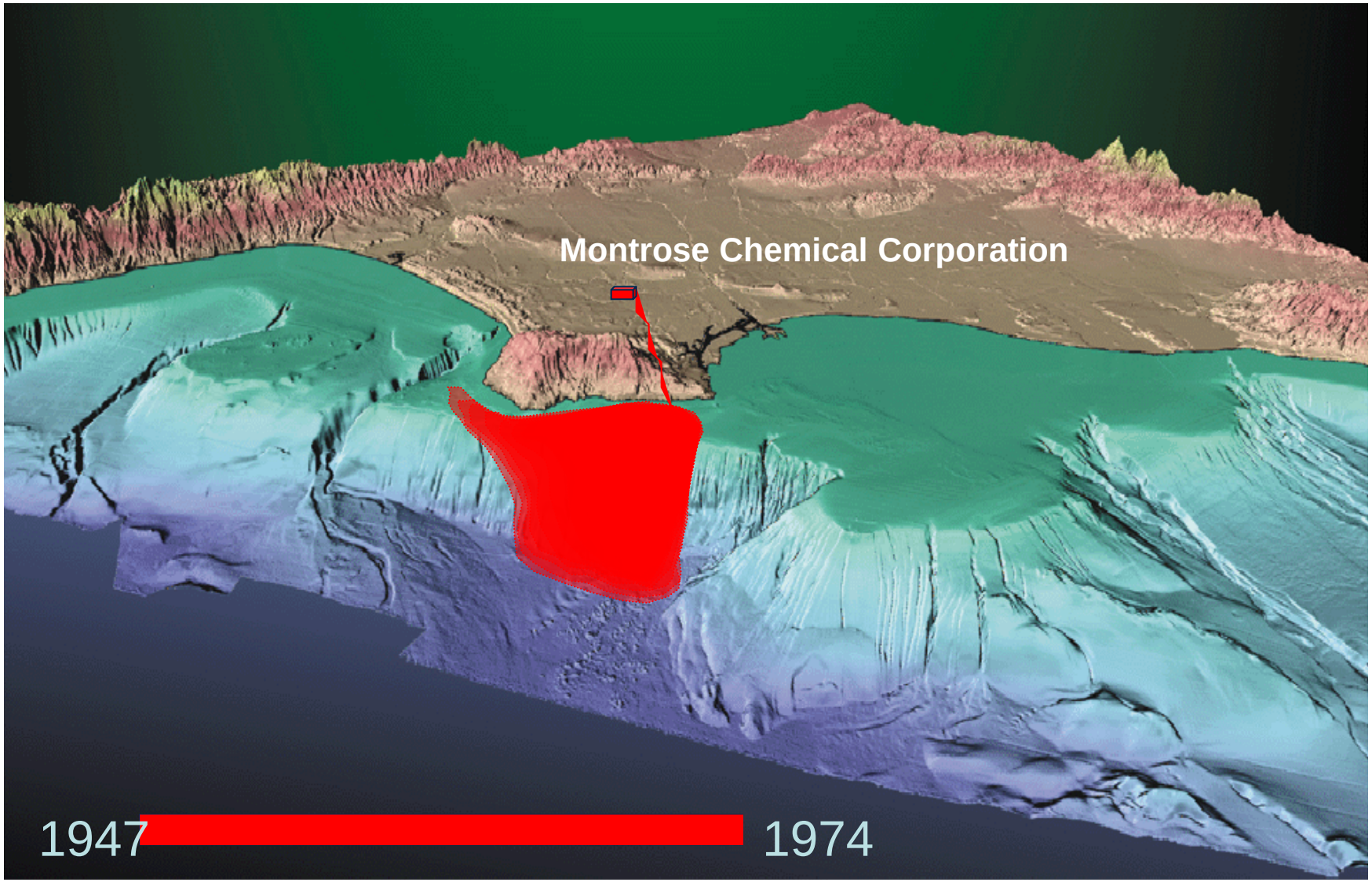
MONTROSE SETTLEMENTS RESTORATION PROGRAM

Channel Islands Naturalist Corps Presentation • Tuesday April 15, 2008

www.montroserestoration.gov

History of DDT and PCB Contamination

FISHERIES



Source: P. Sharpe, Institute for Wildlife Studies

United States of America and State of California v. Montrose Chemical Corporation et al.

- Litigation began in 1990 and ended in 2000
- Scientific evidence of natural resource injuries collected
- Final settlement approved in 2001
- Natural resource restoration awarded ~ $30 million
- EPA was awarded funds to facilitate clean-up efforts

Seabird Restoration-Channel Islands

Ashy Storm-Petrel

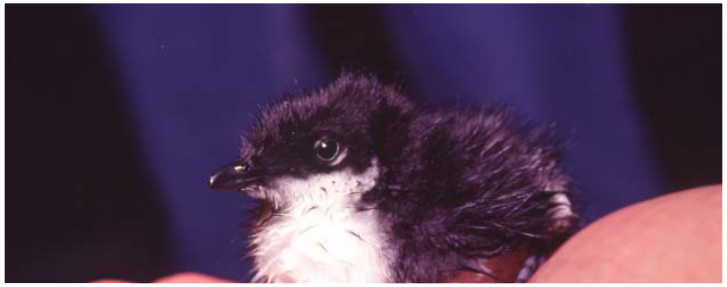
Xantus's Murrelet

Cassin's Auklet

California Brown Pelican

Habitat Restoration

Goal: *Restore seabird habitat through habitat enhancement, social attraction, and reductions in human disturbance.*



Activities to date:

- vegetation mapping to plan for removal of non-native plants
- installation of nest boxes
- social attraction equipment has been placed on Orizaba rock
- educating public to protect seabirds

Seabirds are important ecosystem indicators

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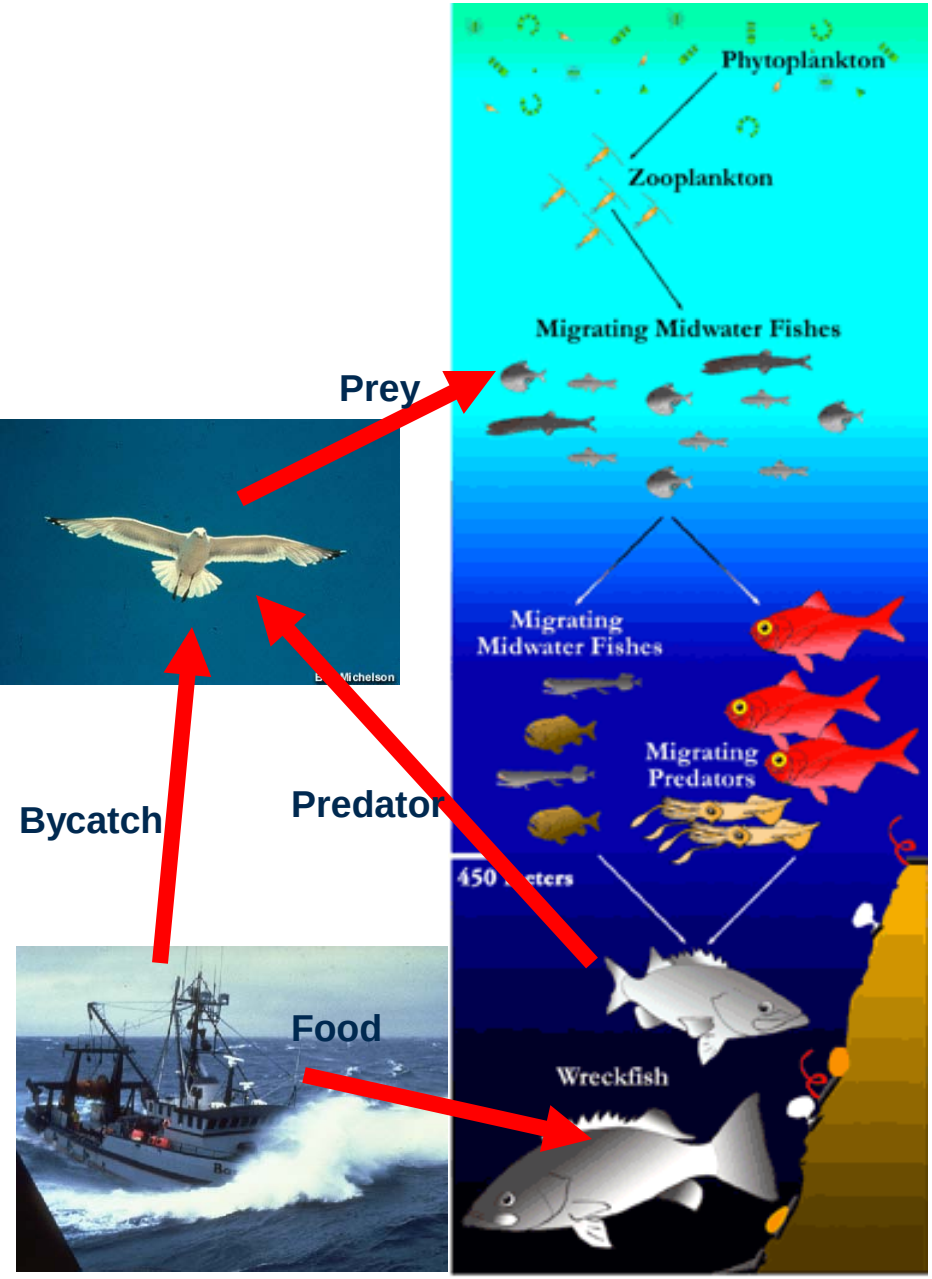
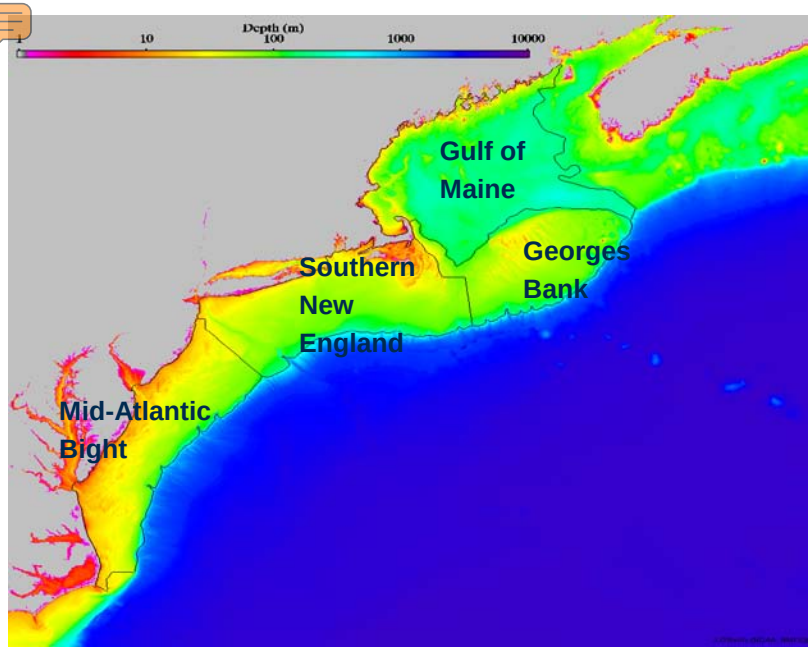
Seabird Data Used in Ecosystem Models

Seabirds as Part of the Northwest Atlantic Ecosystem



Northeast Fisheries Science Center

(compiled by Debra Palka)



EMAX (Energy Modeling and Analysis eXercise)

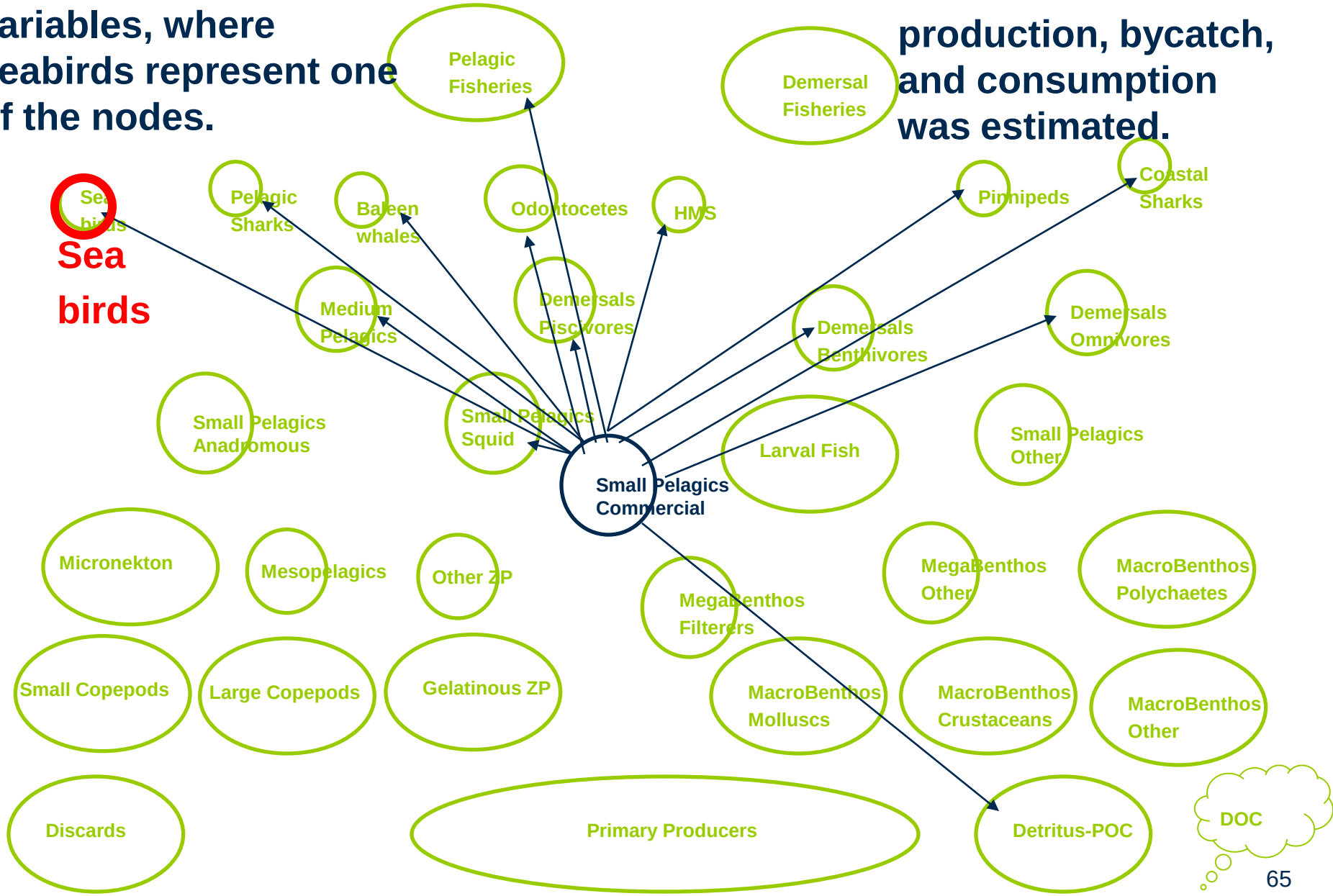
The primary goal was to establish an ecological network model of the entire Northeast US food web that reflected contemporary conditions (1996-2000) in four major regions of the ecosystem.

Link et al. 2006. Documentation for the Energy Modeling and Analysis eXercise (EMAX). Northeast Fish. Sci. Cent. Ref. Doc. 06-15.

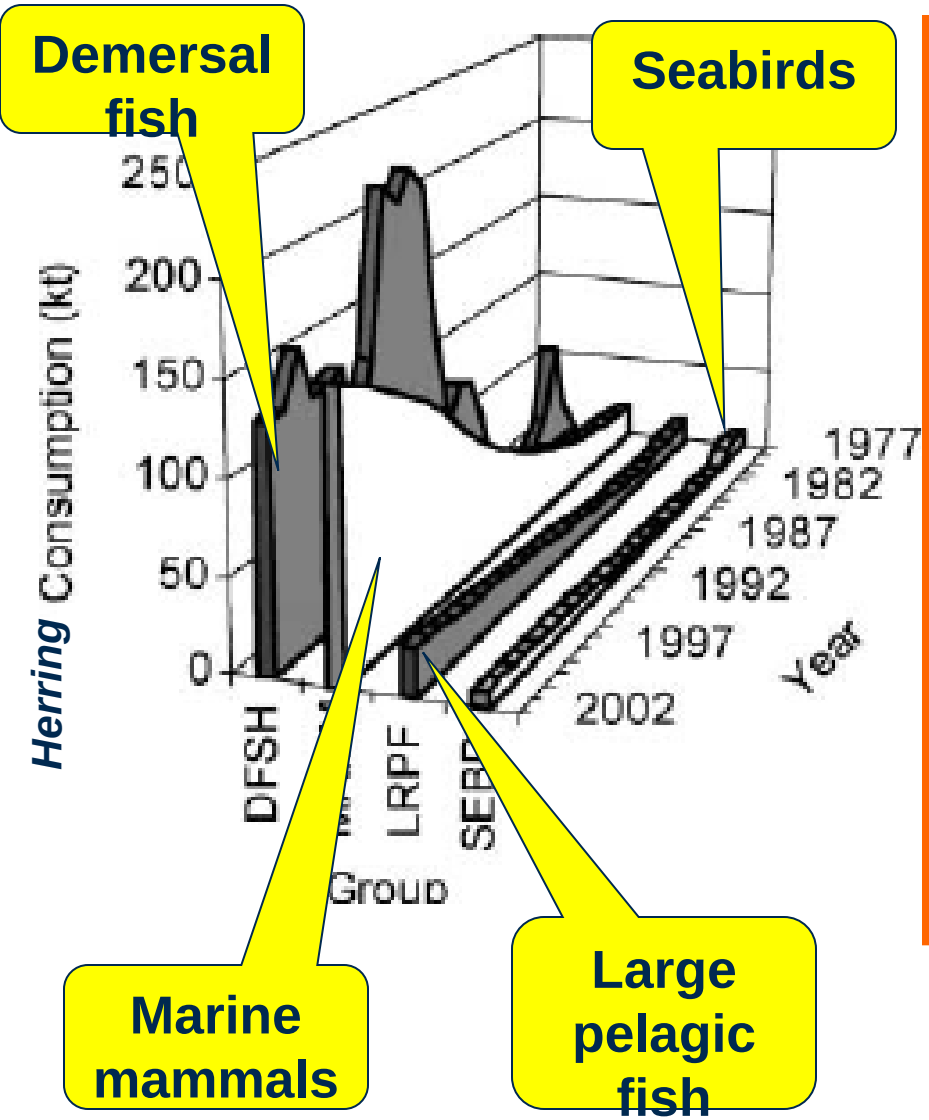
EMAX model

Model had 36 network nodes or biomass state variables, where seabirds represent one of the nodes.

For each node, abundance, biomass, production, bycatch, and consumption was estimated.



How much herring is being eaten by seabirds, marine mammals and fish?



Sensitivity analyses suggested diet composition and daily consumption influence estimated herring consumption more than predator stock size.

Conclusion: We need more information on diet composition and daily consumption.

Now and the future

To assess the status of the species in the Northwest Atlantic we need to learn more about the abundance and diet of seabirds (and other species), including inter-annual and intra-annual variability.

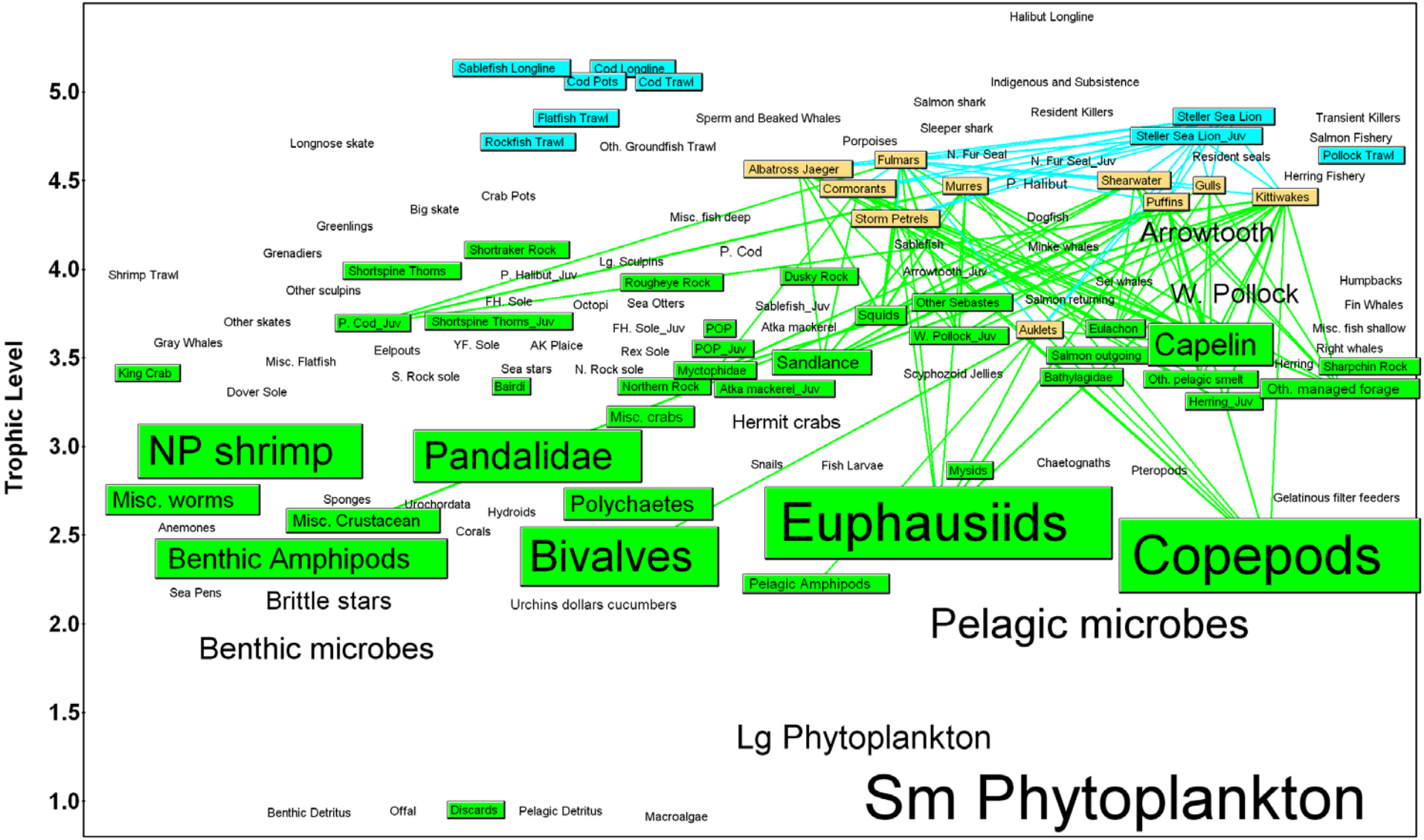
To do this NEFSC is currently developing additional types of ecosystem models and collecting the following seabird data:

-Estimates of abundance of seabirds, marine mammals and sea turtles using shipboard and aerial surveys conducted up to 4 times a year (AMAPPS project)

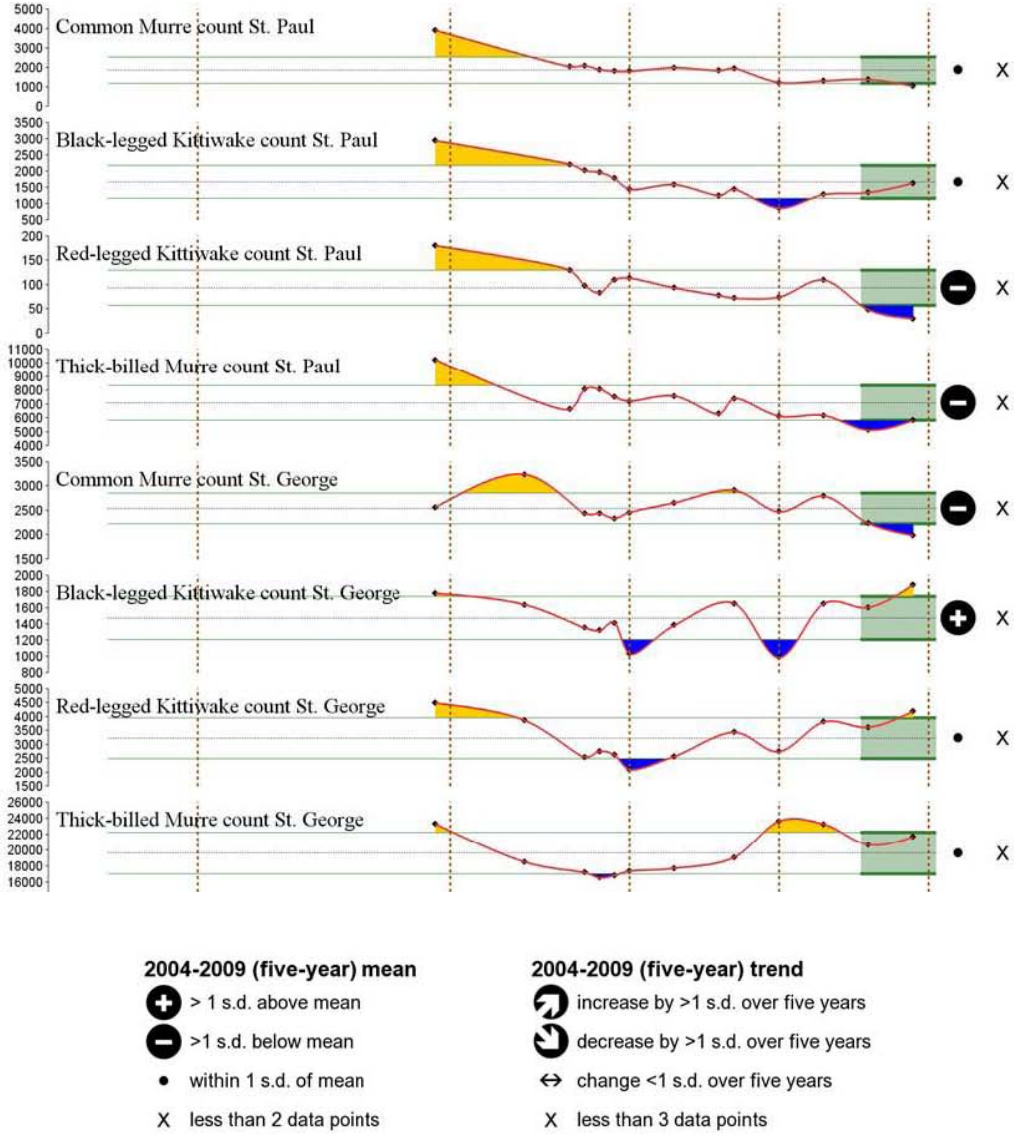
-Estimates of the level of seabird bycatch in fishing gears

-Estimates of seabird diet composition using birds that were incidentally taken in fishing gear

Seabirds in the Gulf of Alaska food web model



Ecosystem trends – Pribilof Islands top predators



- Included in the Executive Summary of the 2009 Ecosystem Chapter
- Also included seabird phenology and reproductive success data
- Example of data-based indicators that can be used, along with model-based indicators, in an ecosystem assessment

Science, Service, Stewardship

Atlantic salmon diet in coastal waters: spatial and temporal forage patterns with inferences from alternative sampling platforms

Mark D. Renkawitz & **Timothy F. Sheehan**
NOAA Fisheries Service
Woods Hole, MA, USA

April 21, 2010

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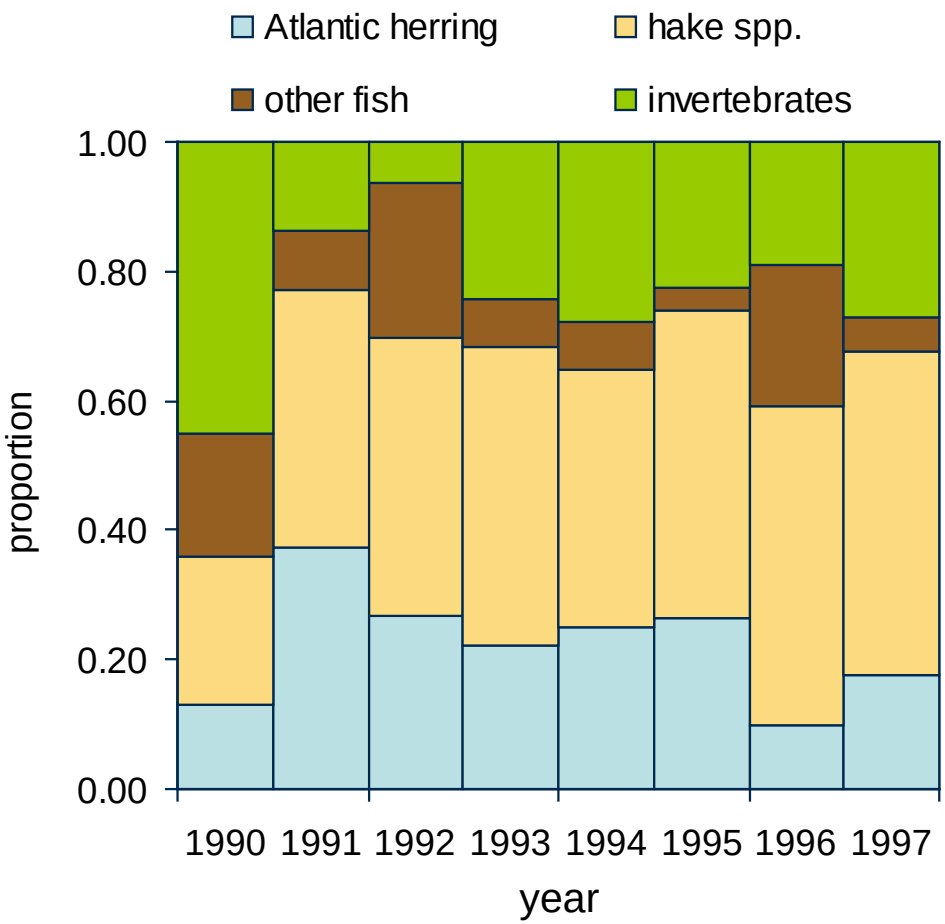
Dietary overlap with terns

Photo courtesy of John Van de Graaff

Photo courtesy of John Van de Graaff



Data Source: Hall et al. 2000

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NATIONAL SEABIRD PROGRAM ANNUAL BUDGET

FY	04	05	06	07	08	09	% change
$ Amt							
Requested	227	253	409	564	564	443	49%
Received	200	227	227	227	229	229	13%

Activities

- ✓ Both domestic and international
- ✓ Mostly bycatch-related, given funding sources and NPOA-driven

Current Program….+++

- ✓ Energetic staff
- ✓ Small & relatively manageable
- ✓ Regionally focused, flexibility
- ✓ Sees results

Current Program….- - -

- ✓ Not well known
- ✓ No written plan
- ✓ Resources lacking
- ✓ More outreach needed
- ✓ Needs more networking
- ✓ Gaps in what we need to do

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Future of National Seabird Program

- ✓ Workshop
- ✓ Strategic Plan
- ✓ FY13-17 PPBES Seabird Alternative

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Future of National Seabird Program

Workshop Objectives

- Initiate development of strategic plan
  - Describe NMFS seabird activities & partnerships
  - Guide NMFS management & science on seabirds
  - Seabird input to NMFS long-term planning & budget
- NMFS seabird contacts meet each other
- ‘strategic’ thinking
- Work on seabird-related performance measures

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Future of National Seabird Program

Workshop

- ~40 participants –NMFS, FWS, invited experts
- Facilitated
- ID goals & strategies, regional & national
- Recommendations
  - Workshop report
  - ‘Single’ home for seabirds
  - Strategic Plan
  - Needed resources (staff, $$)

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FUTURE NMFS SEABIRD PROGRAM ANNUAL BUDGETS

FY	04	05	06	07	08	09	10,11,12	FY13-17 initiative
$ Amt								
Requested	227	253	409	564	564	443		$1.5M ?
Received	200	227	227	227	229	229	Expect level funding	?????

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Future of National Seabird Program

- Strong headquarters presence & support
- Content & programs
  - ✓ monitoring & assessment (bycatch report)
  - ✓ fisheries observers
  - ✓ ecosystem surveys
  - ✓ existing NOAA platforms
  - ✓ Strategic planning process & execution

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BIRD WORK AT
OTHER NOAA LINE OFFICES

NOS

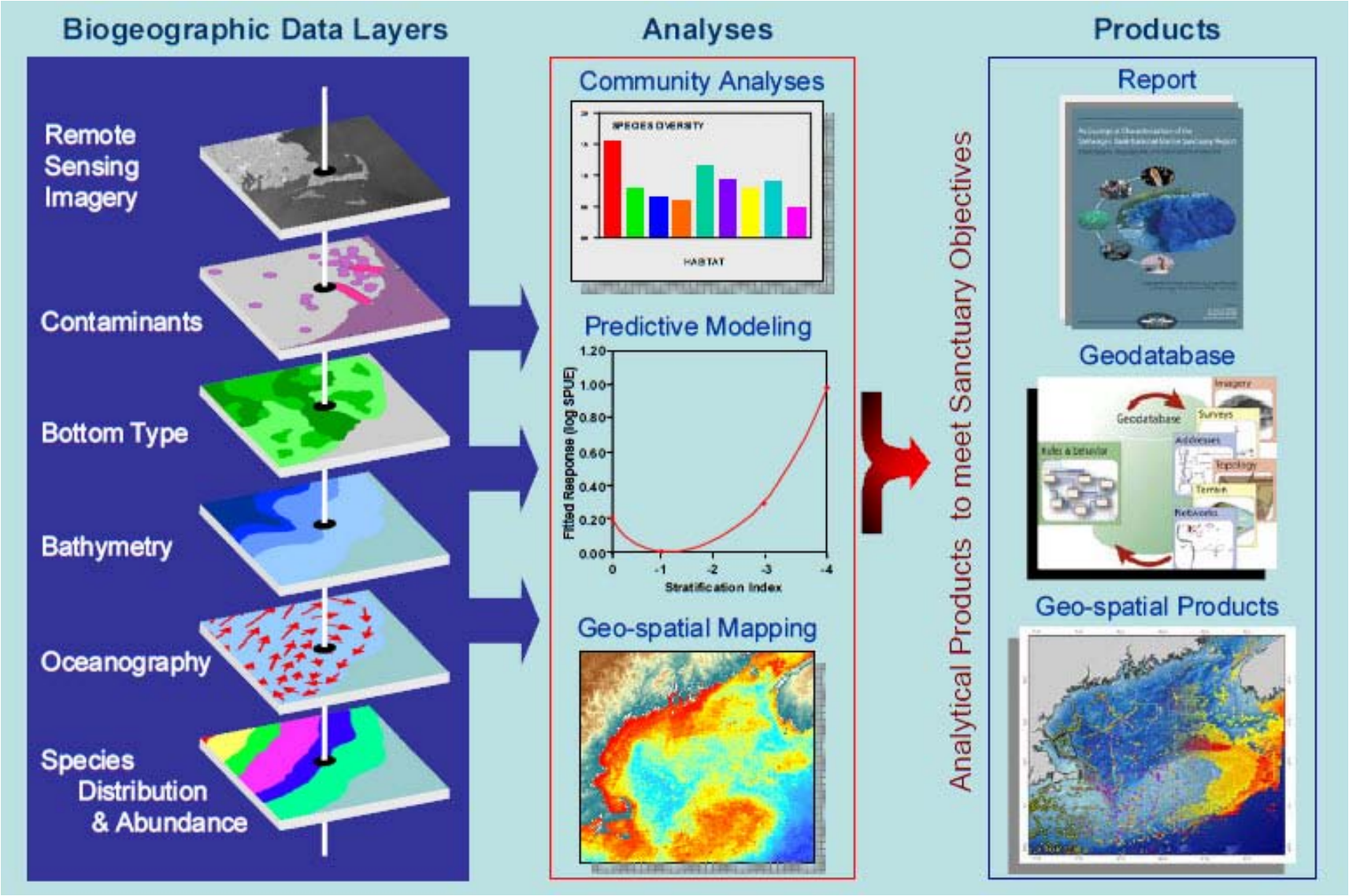
National Centers for Coastal Ocean Science (NCCOS)

Center for Coastal Monitoring and Assessment (CCMA)

Biogeography Branch

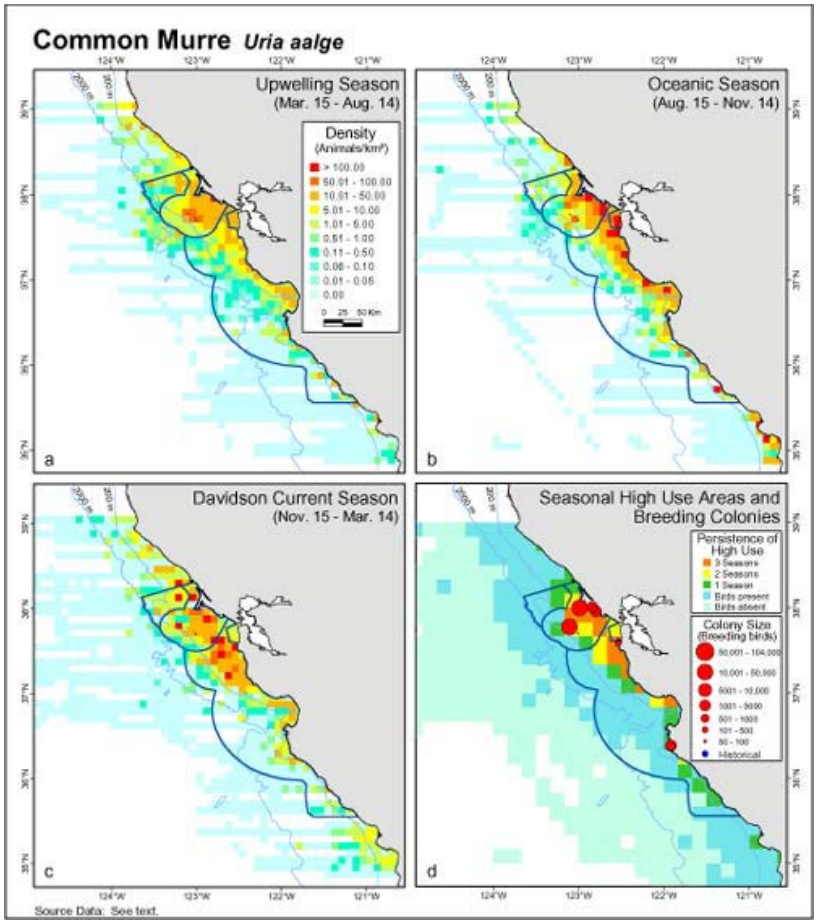
Contact: Tracy Gill

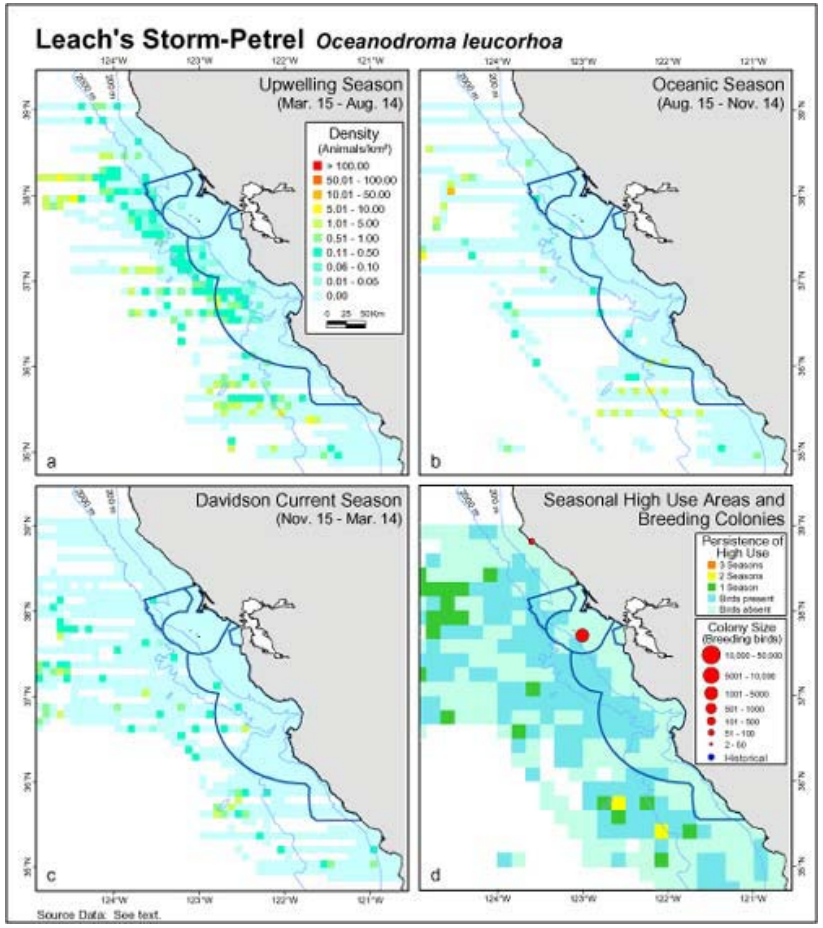
Generalized Biogeographic Assessment Approach



Biogeographic Assessments of Marine Birds off North/Central CA
Single Species Maps Identify Key Areas & Time Periods

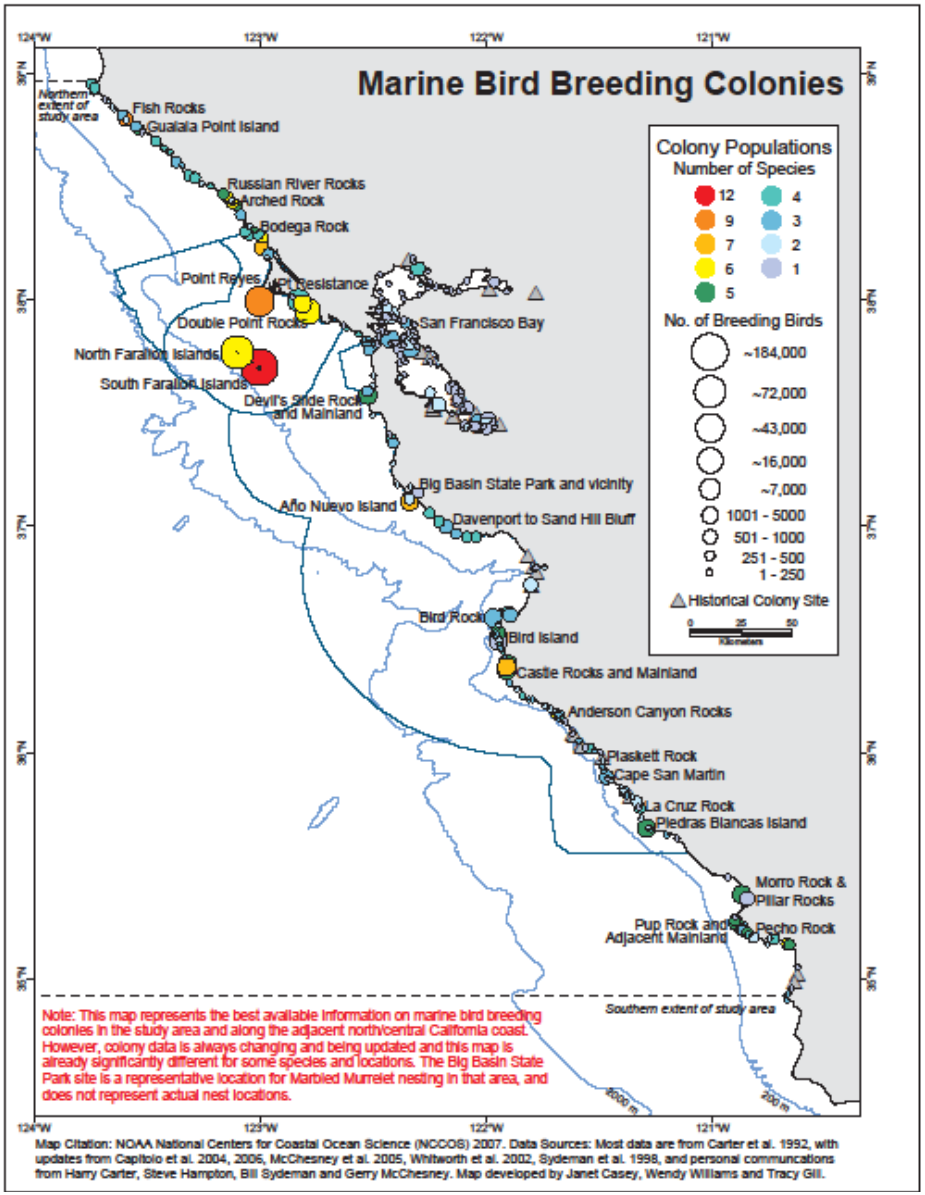
Maps of species density at sea by ocean season, colonies, and a metric for Identifying areas of persistent high use. Maps for 45 marine birds; Data from CDAS (1980-2003)





http://ccma.nos.noaa.gov/ecosystems/sanctuaries/california/welcome.html

Marine Bird Breeding Colonies along North/Central CA

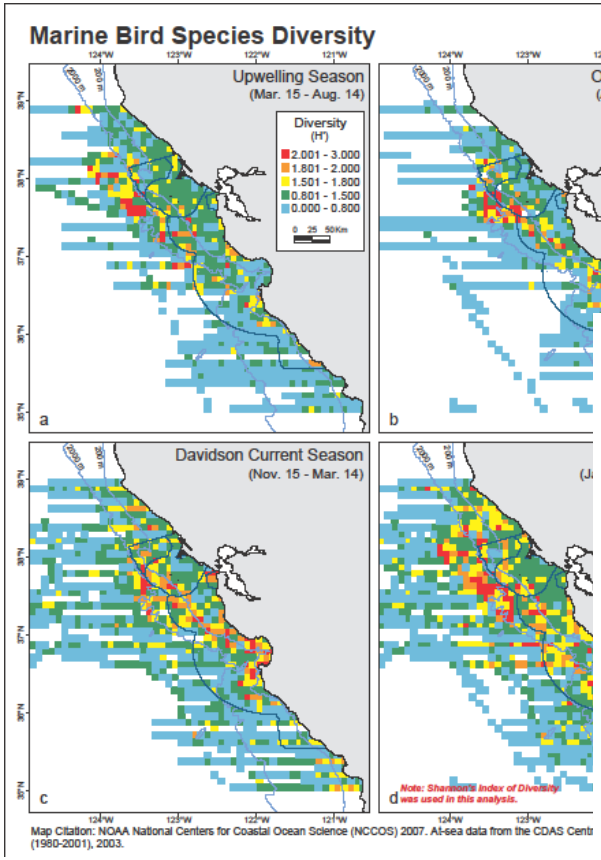


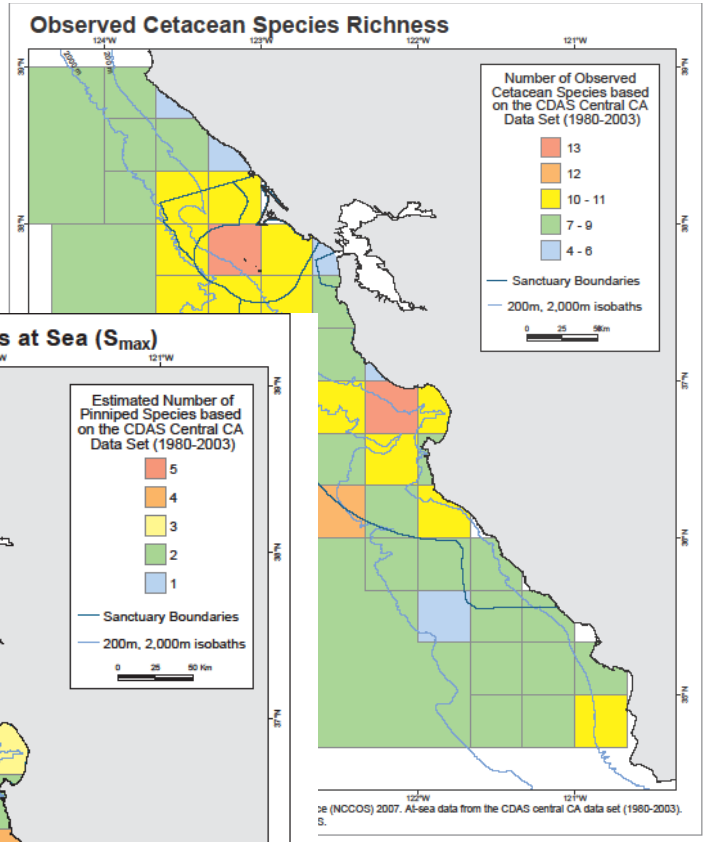
This map shows the number of species at each colony, along with the number of breeding birds there. The map includes historical sites as well.

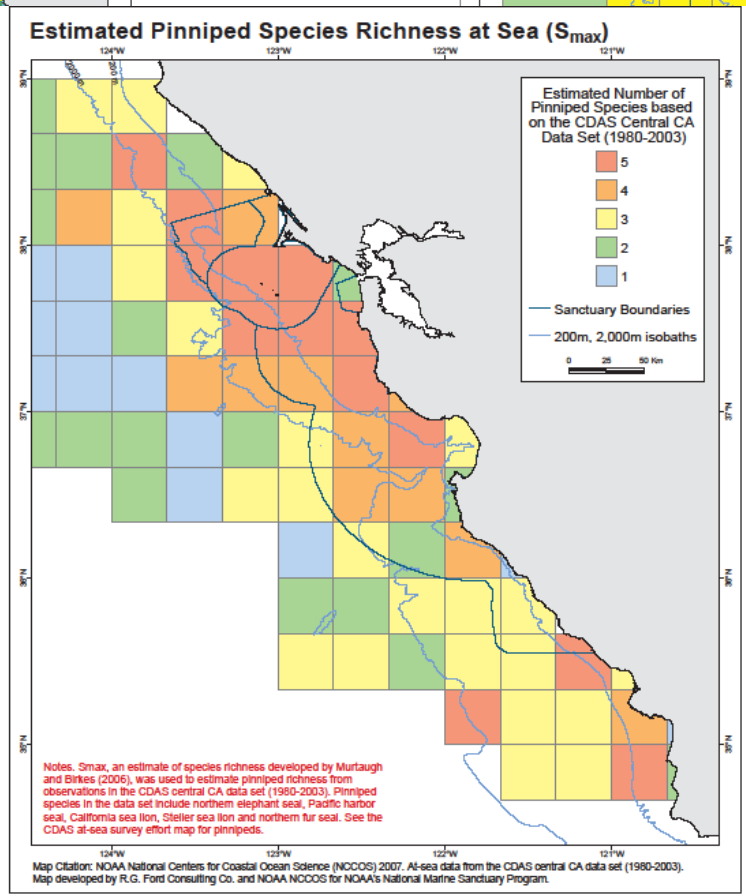
Other seabird products from this assessment can be downloaded from:

http://ccma.nos.noaa.gov/ecosystems/sanctuaries/california/html/birds/welcome.html

Diversity of Seabirds and Richness of Marine Mammals off North/Central California



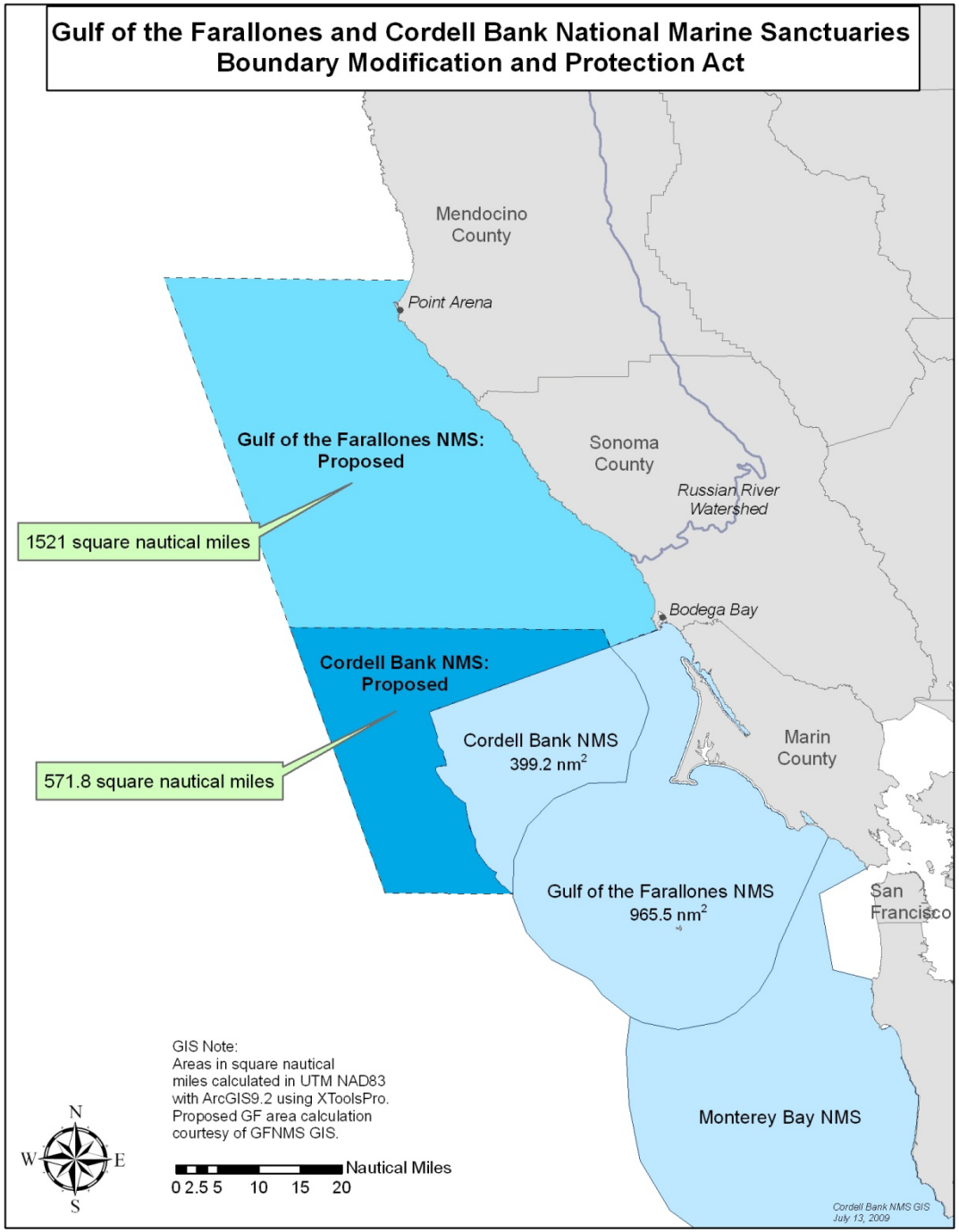




Important Areas for Birds at Sea off North/Central CA

	Biomass/Density			Diversity		
Area	**Davidson Current Season**	**Upwelling Season**	**Oceanic Season**	**Davidson Current Season**	**Upwelling Season**	**Oceanic Season**
Cordell Bank	x	**X**				
Farallon Escarpment (slope)	**X**	x	x	**X**	**X**	**X**
Farallon Ridge (includes Farallon Island area)	**X**	**X**	x			
San Francisco Bay Tidal Plume		x	**X**	**X**		
Pioneer Canyon				**X**	x	x
Año Nuevo Shelf	**X**		**X**			
Ascension, Año & Cabrillo Canyons	**X**	x	x	**X**	x	
Monterey Bay Inshore	**X**	x	**X**	**X**		
Monterey Bay Canyon	**X**		x			
Carmel Canyon				**X**		
Point Sur Shelf			x			
Point Sur Slope				**X**	x	
Estero Bay & San Luis Obispo Bay	**X**		x			

BIOGEOGRAPHY BRANCH
CENTER FOR COASTAL MONITORING AND ASSESSMENT

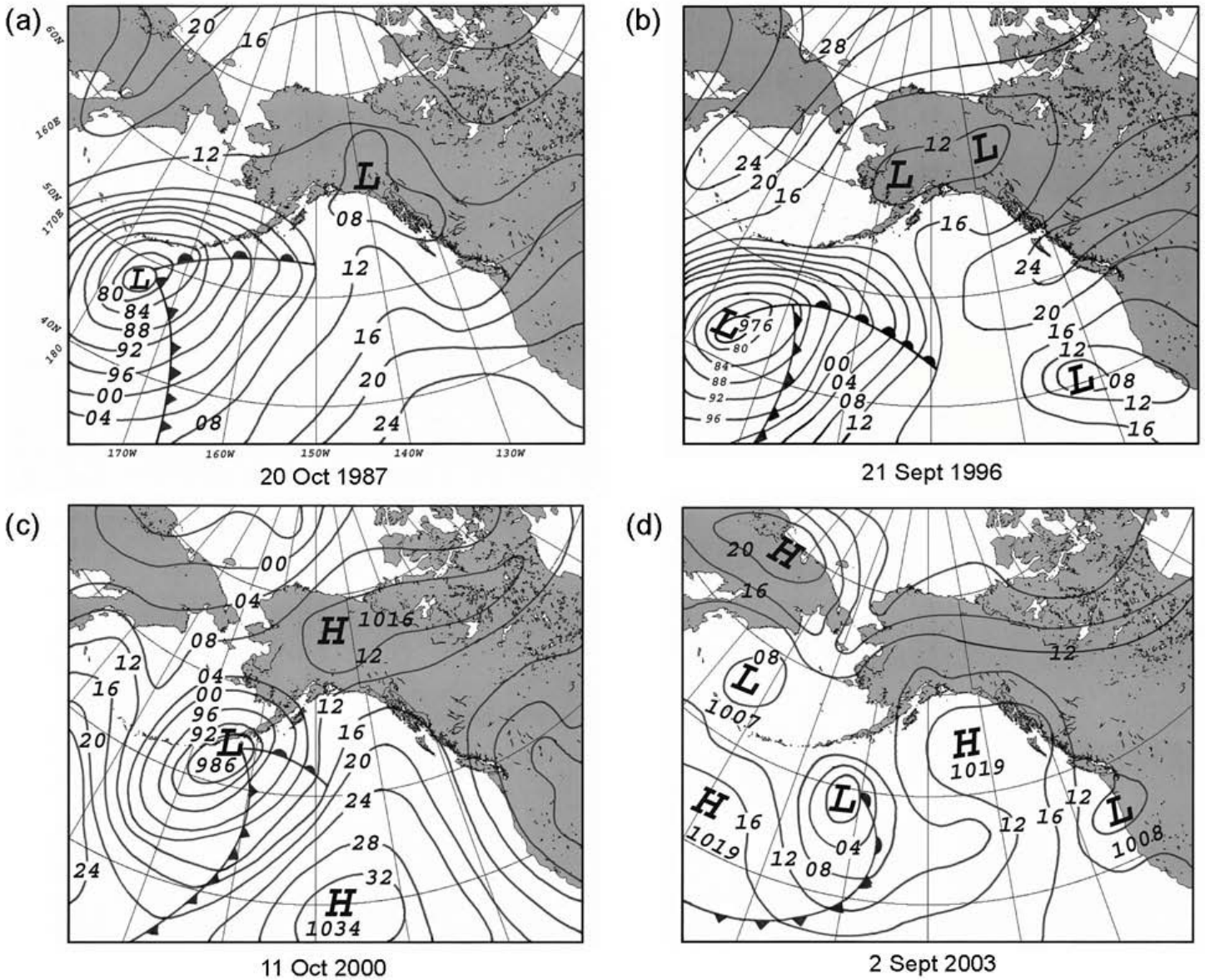

Gulf of the Farallones and Cordell Bank National Marine Sanctuaries
Boundary Modification and Protection Act
Mendocino County
Point Arena
Gulf of the Farallones NMS: Proposed
1521 square nautical miles
Sonoma County
Russian River Watershed
Bodega Bay
Cordell Bank NMS: Proposed
571.8 square nautical miles
Cordell Bank NMS
399.2 nm²
Marin County
Gulf of the Farallones NMS
965.5 nm²
San Francisco
Monterey Bay NMS
GIS Note:
Areas in square nautical miles calculated in UTM NAD83 with ArcGIS9.2 using XToolsPro.
Proposed GF area calculation courtesy of GFNMS GIS.
N
W
E
S
Nautical Miles
0 2.5 5 10 15 20
Cordell Bank NMS GIS
July 13, 2009

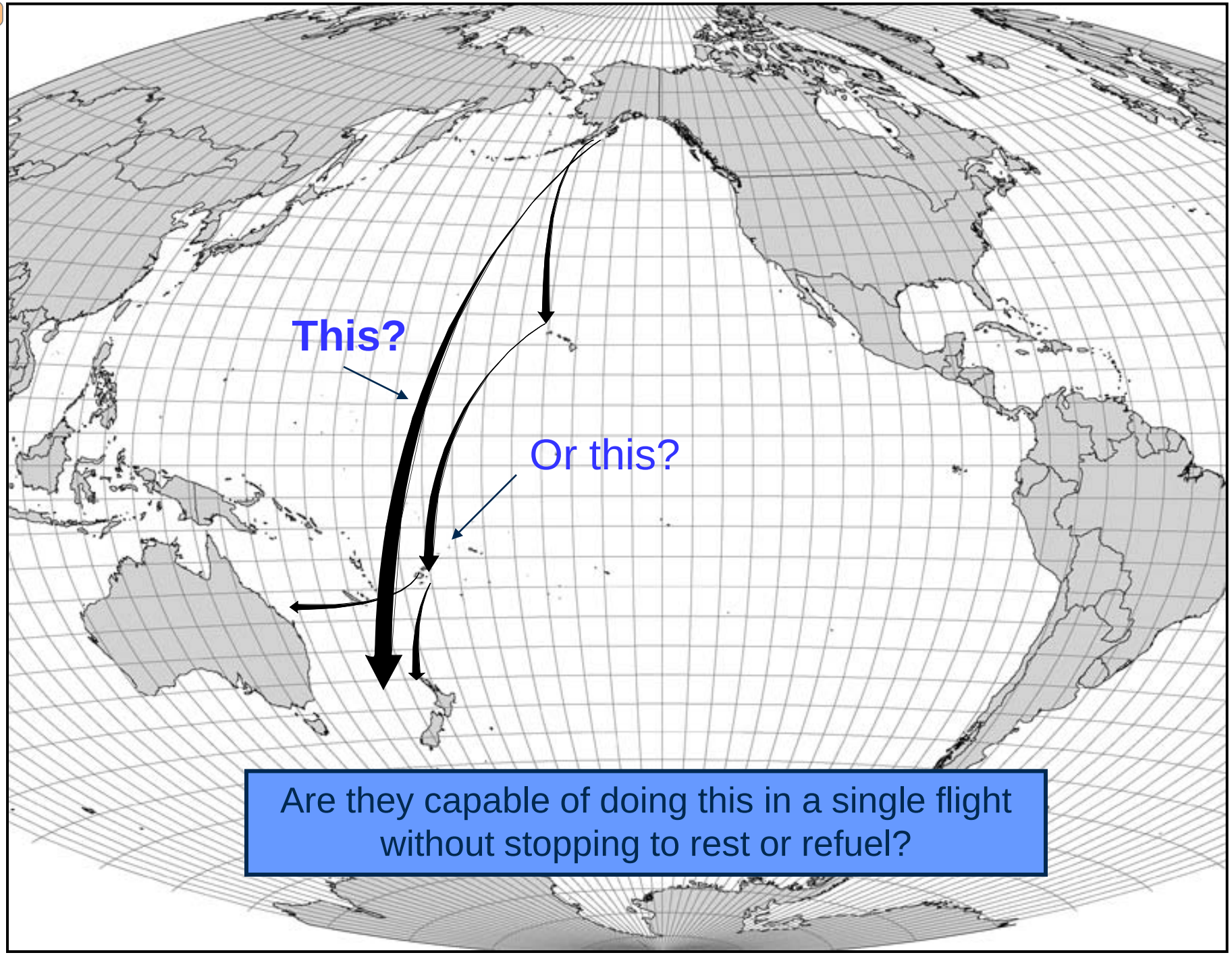
NWS

Dr. Gary Hufford, Alaska Region

Climate Services Program Manager

Systems associated with observed departures of godwits.

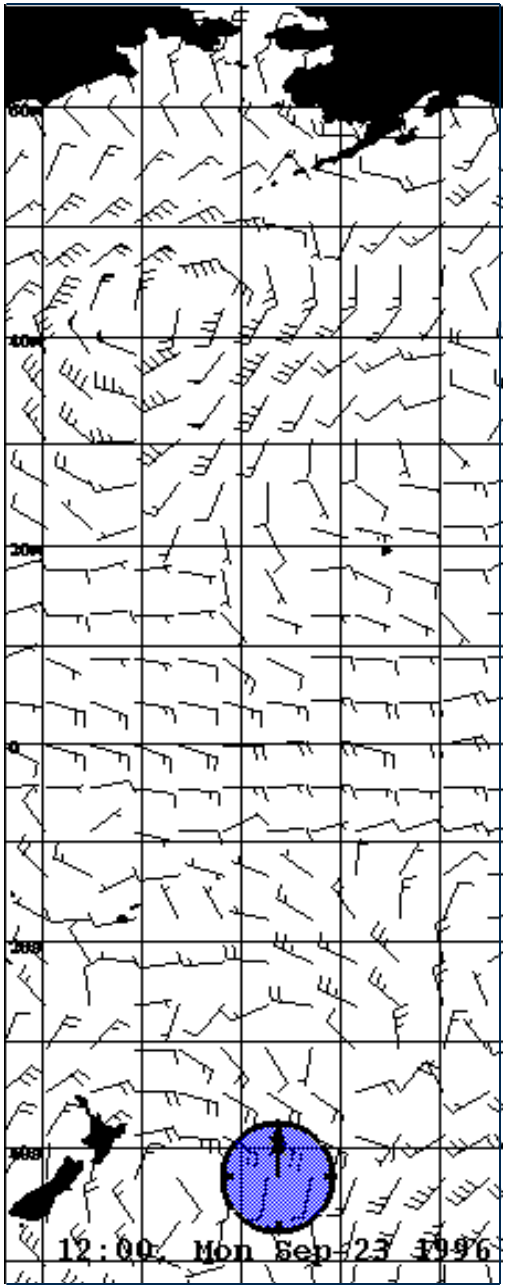




Are they capable of doing this in a single flight without stopping to rest or refuel?

Alaska godwits carry record fat loads

850 mb



Polar easterlies

Westerlies

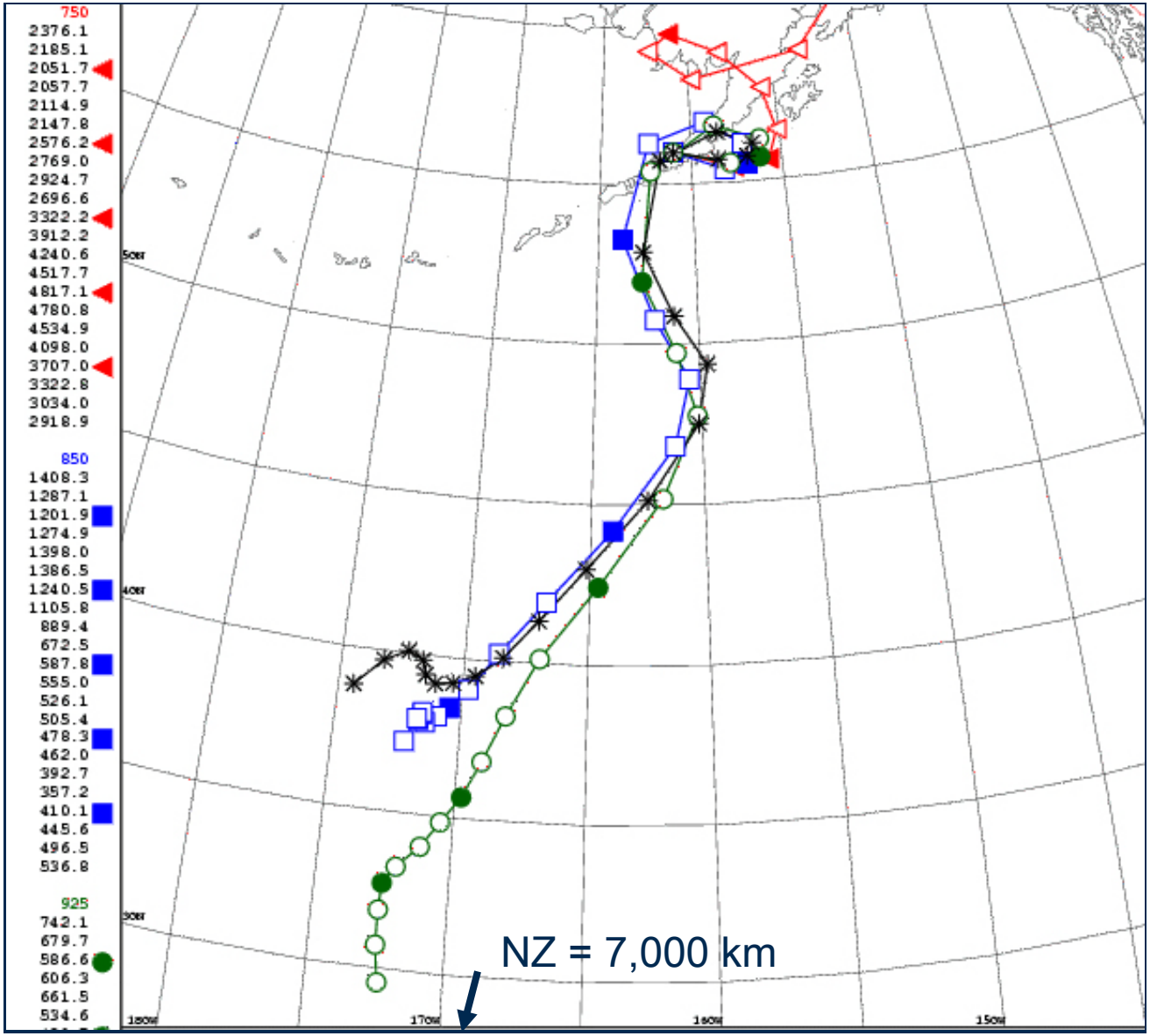
NE trades

Doldrums

SE Trades

Westerlies

23-28 September 1996



Height ASL

- Surface
- 750 m
- 1,500 m
- 2,300 m

Crossing the ultimate ecological barrier: evidence for an 11,000 km-long nonstop migration from Alaska to New Zealand by Bar-tailed Godwits

Robert Gill, *USGS*

Theunis Piersma, *NIOZ*

Gary Hufford, *NOAA*

Rene Servranckx, *Env. Canada*

Adrian Riegen, *Miranda Nat. Trust*

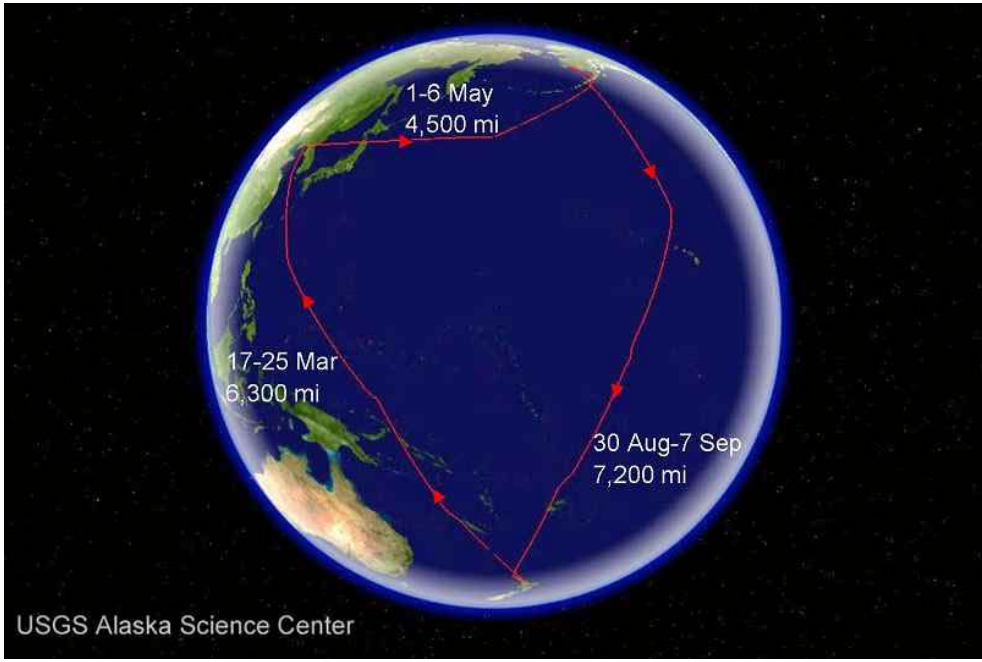
Environment Canada

NIOZ

USGS

NOAA

Miranda Naturalists' Trust
Miranda Shorebird Centre


1-6 May
4,500 mi
17-25 Mar
6,300 mi
30 Aug-7 Sep
7,200 mi
USGS Alaska Science Center

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Kerim Aydin, NMFS, AFSC; Lisa Ballance, NMFS, SWFSC; Greg Balogh, USFWS; Lee Benaka, NMFS, SF; Jennifer Boyce, Jeff Shenot, NMFS, HC; Eric Breuer, Steve Brown, Mridula Srinivasan, Steve Swartz, NMFS, ST; Joan Browder, NMFS, SEFSC; Doug DeMaster, NMFS, AFSC; Lisa Etherington, NOS, NMSP; Shannon Fitzgerald, NMFS, AFSC; Tracy Gill, NOS (Glenn Ford and Janet Casey , R.G. Ford Consulting; David Ainley , H.T. Harvey and Associates; NCCOS Biogeography Branch staff; Gerry McChesney USFWS; Harry Carter, Carter Biological Consulting; NOS, Office of National Marine Sanctuaries); Tom Good, NMFS, NWFSC; Philip Hoffman, NMFS, PR; Gary Hufford, NWS; Nicole LeBoeuf, NMFS, IA; Ed Melvin, Washington Sea Grant; Richard Merrick, NMFS, NEFSC; Debra Palka, NMFS, NEFSC; Mark Renkawitz, NMFS, NEFSC; Gina Shield, NMFS, NEFSC; Lewis VanFossen, NMFS, PIRO…AND MANY OTHERS!