

Whales in the New York Seascape



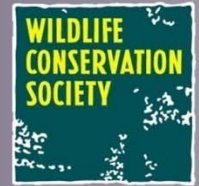
Contrasting & integrating various whale survey approaches:

Considerations for the New York Bight

Drs. Howard Rosenbaum and Merry Camhi
Wildlife Conservation Society



Photo: Matt Leslie, WCS

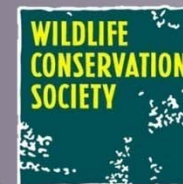


Mission

WCS's Global Conservation Program saves wildlife and wild places by understanding critical issues, crafting science-based solutions, and taking conservation actions that benefit nature and humanity

- Headquarters at Bronx Zoo
- Operate NY Aquarium & 4 NYC Zoos
- Extensive Global Conservation Program in 65 countries

Ocean Giants



Dolphins



Whales



Whale sharks



Mantas

Ocean Giants Program



Sea turtles

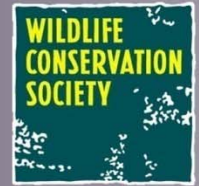


Sharks



Pinnipeds

WCS Marine Program



Objectives for the New York Seascape



- Restore healthy populations of threatened target species
- Protect key marine wildlife habitats
- Help build New York Ocean Ethic & local marine constituency



Photo: Julie Larsen Maher

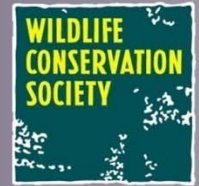


Photo: Merry Camhi, WCS



Photo: Tim Collins, WCS



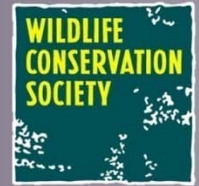


Ocean Wonders: Shark!
New York Aquarium Opening Summer 2016

- ~1 million visitors per year
- Science, Technology, Engineering & Math (STEM) education
- Translate science to public
- Build support for local whale research & conservation

Research in the New York Bight

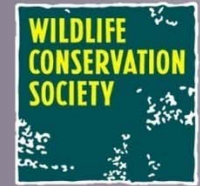
Challenges for whales & whale research



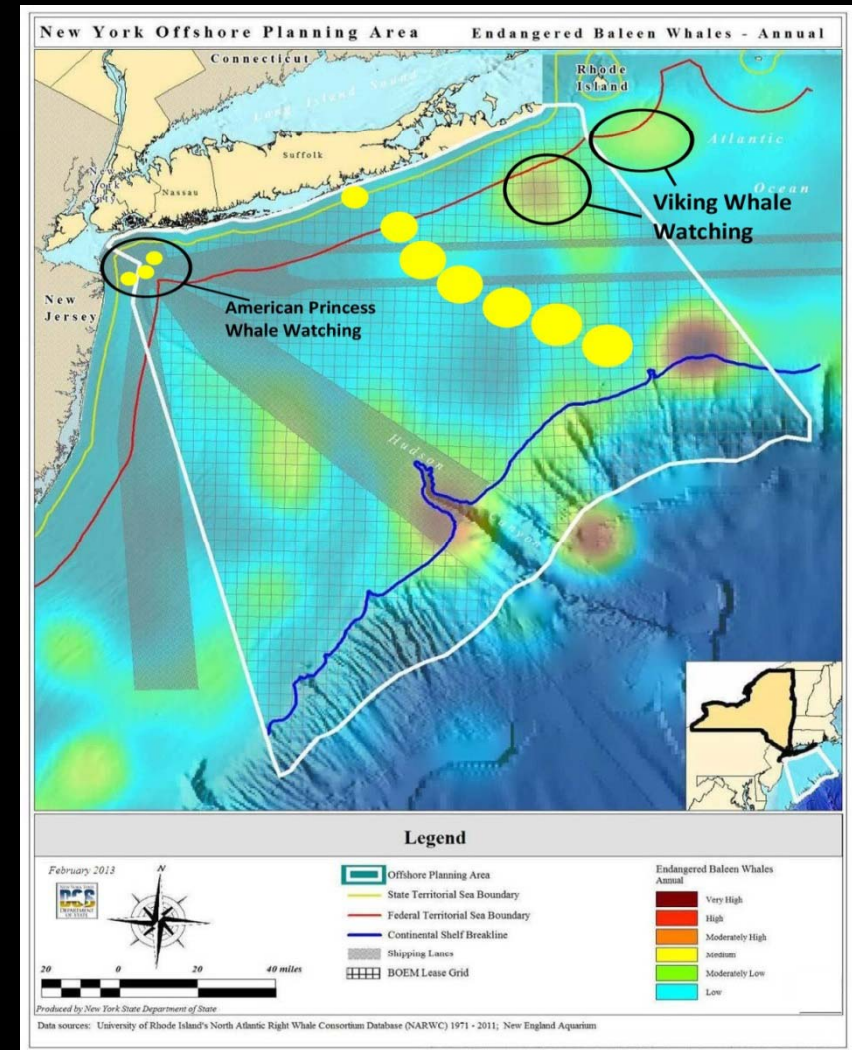
- NY-NJ Harbor one of world's busiest
 - 11 ports with 240 miles of shipping channels
 - Largest oil importing & 2nd largest container port
- Offshore energy development
- \$14.3 billion from fisheries, tourism, healthy waters
- Marine sector growing by 6%/yr

“Most urbanized marine ecosystem in the U.S.”

Previous research in the New York Bight



- URI/NARWC
 - 1978-2011 (base map)
- Cornell bioacoustics survey
- New Jersey Department of Environmental Protection (NJDEP)/Geo-Marine
- Northeast Fisheries Science Center (NEFSC)
- Atlantic Marine Assessment Program for Protected Species (AMAPPS)



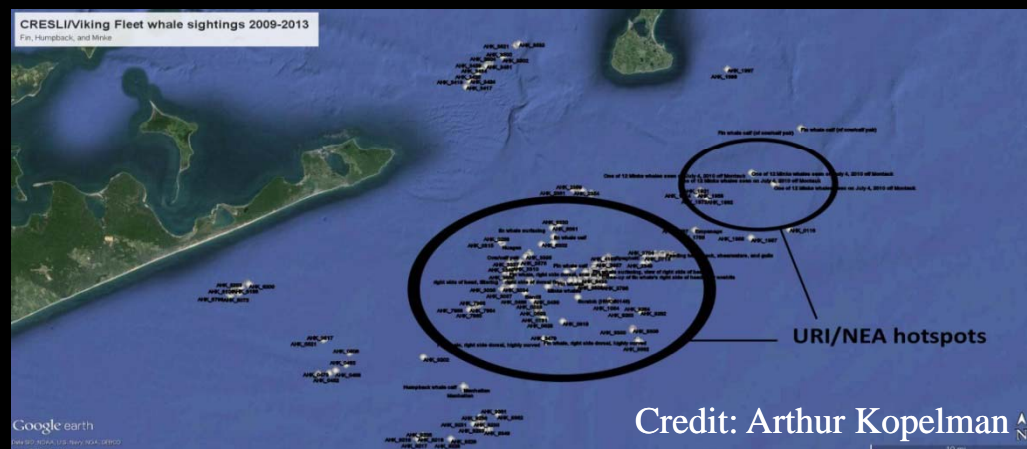
Credit: NYSDOS

Collaborative Research in the New York Bight

Section 6 Proposal

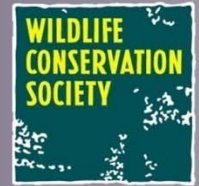


- New York Marine Endangered Species Working Group Proposal
 - Multi-platform study
 - Collaboration between NYDEC, NJDEP, WCS, RFMRP, TNC, NYSG, CRESLI, SUNY Stony Brook, CUNY
- Goals
 - Synthesize existing data
 - Population distribution
 - Abundance assessments
 - Cetacean prey density
 - Health assessments
 - Population connectivity
 - Stranding trends
 - Habitat characterization
 - Education/outreach



Photos: WCS and RFMRP

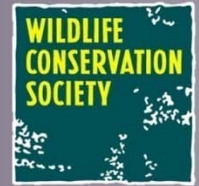
Key questions for research in the NY Bight



- How are whales utilizing New York Bight waters?
 - Habitat use
 - Behavioral use of important habitats (i.e., foraging, resting)
- How long are whales present?
 - Residency, occupancy, arrival dates
- How many whales are there?
 - Densities and Abundance
- How does habitat use vary depending on species and over time?
 - population connectivity, range expansion (i.e., humpbacks)
- How important are NY waters for each whale species?



Whale surveys



- Various methods used
 - Aerial
 - Vessel (visual & acoustic)
 - Small boat work
 - Passive acoustic
- Method chosen depends on:
 - Management Objective
 - Research questions
 - Target Species
 - Spatial/Temporal Scales
 - Resources available
- Pros and cons to each method
- For purpose of this workshop, the following comparisons are illustrative and not exhaustive



Photo: Salvatore Cerchio, WCS



Photo: David Donnelly

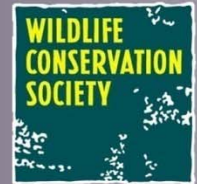


Photo: Salvatore Cerchio, WCS



Photo: Melinda Rekdahl

Aerial survey methods



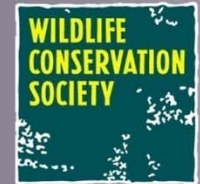
Pros	Issues
Distribution & abundance estimates	Occupancy/residency/arrival times*?
Relatively cost effective given area size	Observations limited to daylight hours/good weather



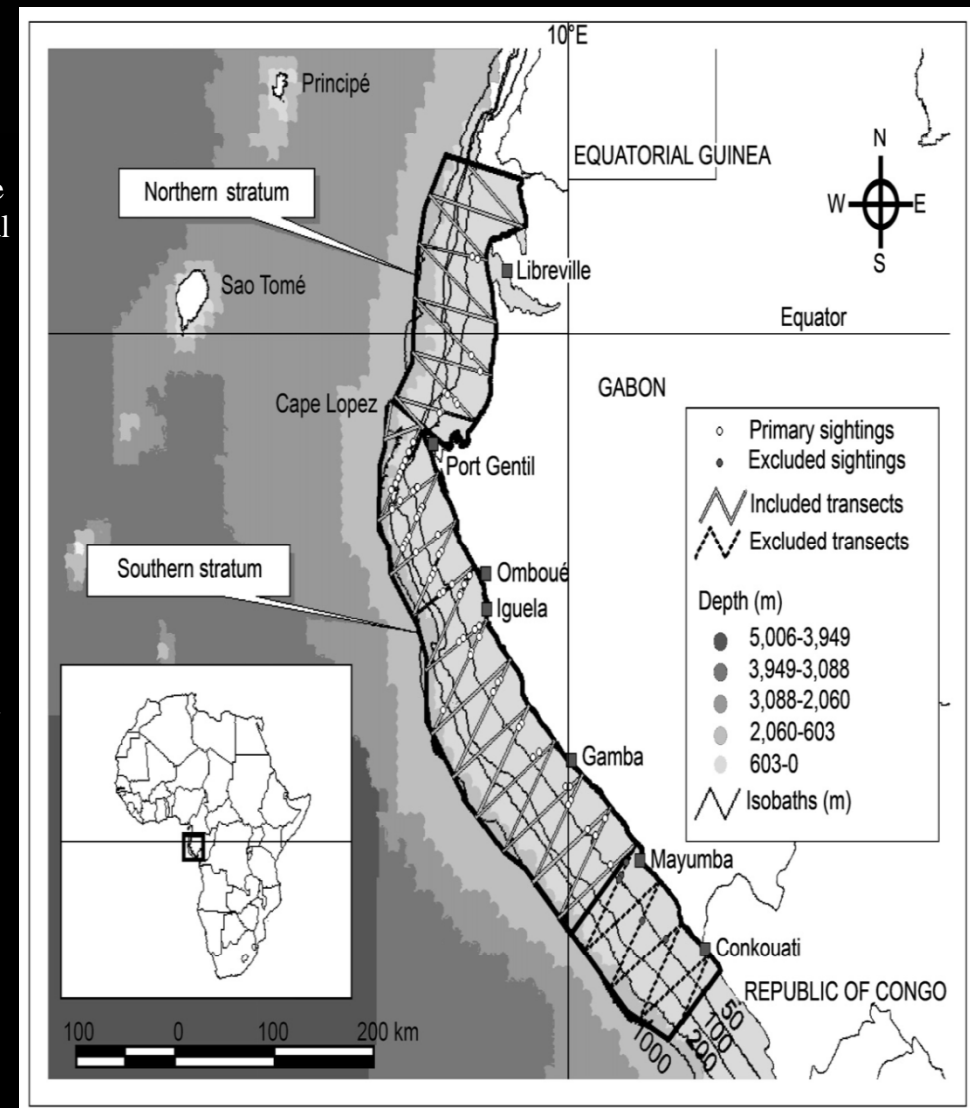
Photo: Melinda Rekdahl

Aerial survey methods

Determining distribution and abundance



- WCS coastwide census of humpback whales in Gabon
(Strindberg *et al.* 2011. Line transect estimates of humpback whale abundance and distribution on their wintering grounds in the coastal waters of Gabon. *J. Cetacean Res. Manage.* (special issue) 3, 153-160)
- Given objectives, large survey area (1,488 nm) and funding, aerial surveys were most optimal
- Abundance estimate obtained and nationwide distribution during migration and peak breeding
- Need for greater temporal coverage and repeat surveys



Vessel survey methods (visual and acoustic)

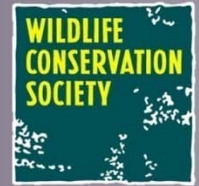


Pros	Issues
Distribution & abundance estimates	Limitations in determining occupancy/ arrival dates, etc.*
Vessel time - good spatial coverage	Generally limitations in temporal coverage
Additional biological and oceanographic data collection	Limited to good weather/ daylight hours (visual); partially addressed with passive acoustics



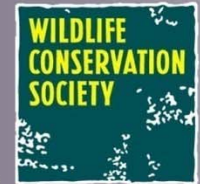
Vessel survey methods (visual and acoustic)

Determining distribution, habitat use, SPUE



- WCS Gabon vessel surveys (visual)
 - Defined key cetacean habitats
 - e.g. humpback whale M/C
- WCS Madagascar vessel surveys (visual and acoustic)
 - Diversity and distribution of cetaceans on remote coast
 - Effective detections of humpback whales visually and dolphins acoustically
 - Broad scale surveys identified areas for fine-scale surveys and small boat work

Passive acoustic survey methods



Pros

Good for seasonal presence, occupancy
-Long and continuous data series

Good temporal coverage

Diel coverage and not weather dependent

Issues

Limited to vocalizing animals - how representative?

Limited spatially (depending on no. units)

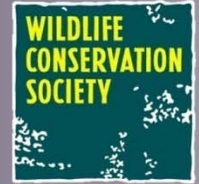
Limitations for abundance estimates
(relative abundance for some species)



Photo: Salvatore Cerchio, WCS

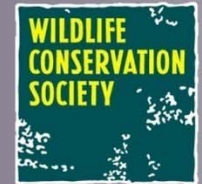
Passive acoustic survey methods

Determining distribution, occupancy and residence time



- WCS acoustic monitoring in Angola (Cerchio *et al.* in press)
- Inshore and offshore distribution
- Strong seasonality in detections reflecting whale presence
- Habitat use in relation to industrial activity
 - Significant affect on humpback whale singing correlated with seismic survey

Satellite telemetry survey methods



Pros	Issues
Good for occupancy, residency, behavior and habitat use (individual)	Representation - large enough sample size needed to infer population level movements
Good spatial and temporal coverage	Limitations in tag longevity and generally small sample sizes



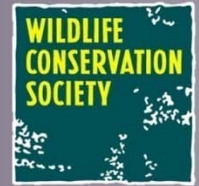
Photo: Salvatore Cerchio, WCS



Photo: Salvatore Cerchio, WCS

Satellite telemetry survey methods

Documenting occupancy, habitat use, and more



- Humpback whales in eastern South Atlantic

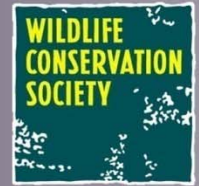
(Rosenbaum *et al.* 2014. Long-Range Movement of Humpback Whales and Their Overlap with Anthropogenic Activity in the South Atlantic Ocean. *Conservation Biology*, online Feb 5, 2014)

- EEZ scale movements

- Occupancy
- Habitat use
- Migratory movements
- Degree of overlap with anthropogenic activity (E&P, Shipping)

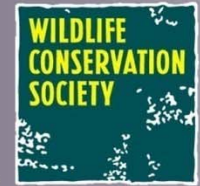
- Interaction with anthropogenic features
(RPI = relative potential impact)

Whale survey method trade offs



- The management objectives and filling specific data gaps will drive survey design
- A combination of methods is often needed to address a number of different questions and/or for a number of different species
- To address the knowledge gaps and goals of a NY project, which covers a large area and multiple species, a multiple platform approach is likely to yield greatest success
- Consideration for stock/population assessments, connectivity with other areas, and behavior for target species (Photo-ID, genetic analyses, tagging)

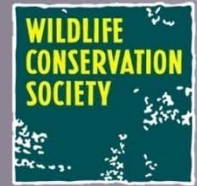
Some examples of whale survey trade offs



Project goal: Spatial distribution/ habitat use
(*assuming good survey coverage)

Species	Aerial*	Vessel* - visual	Vessel* - acoustic & visual	Passive acoustic	Satellite telemetry	Photo ID	Genetic analysis
Humpback whale							
North Atlantic Right whale							
Fin whale							
Blue whale							
Sperm whale							
Sei whale							
Minke whale							

Some examples of whale survey trade offs

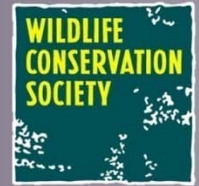


Project goal: Temporal occupancy within a given area

Species	Aerial	Vessel - visual	Vessel - acoustic & visual	Passive acoustic	Satellite telemetry	Photo ID	Genetic analysis
Humpback whale							
North Atlantic Right whale							
Fin whale							
Blue whale							
Sperm whale							
Sei whale							
Minke whale							

Multi-year & multi-platform approaches

An example



Aerial surveys
Broad-scale surveys



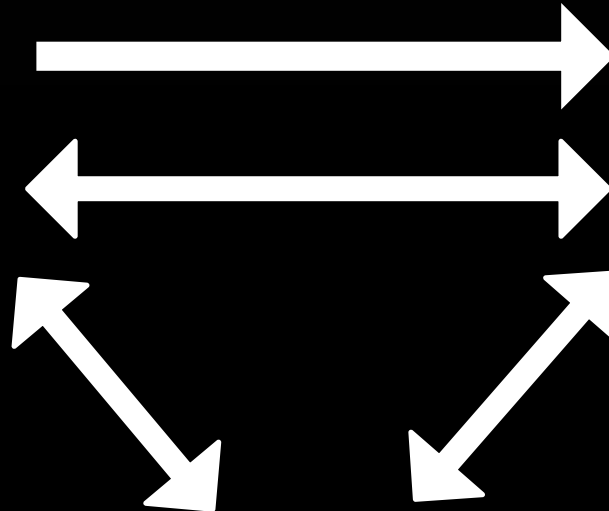
Vessel surveys (w/acoustics)
Broad-scale and/or targeted
areas



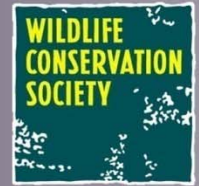
Passive acoustic in
targeted areas – e.g.,
document occupancy
within key areas



Small boat
Satellite tag/biopsy



Summary



- Leveraging existing information
- Target species
- Prioritization of objectives
- Size and logistics for the study area
- Analysis of data –when is it needed?
- Budgetary and timing constraints (# of years)
- Survey methods cost/benefit and trade-offs, for example...
 - Aerial surveys may be more cost effective than vessel surveys
 - Vessel surveys may offer more options in terms of population context
 - Tagging offers great information but may need large #'s/multiple species



A large whale tail fluke is shown emerging from the ocean, splashing water. The tail is dark and covered in white barnacles. The background is a greyish-blue sky and ocean.

Acknowledgments

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NY DEC

THANK YOU