Whale Workshop Notes: 1/16/14

Lisa Bonacci's Presentation:
DEC Management and Conservation of whales
-Limited in the past, goal of various DEC programs and plans
-SWAP (State Wildlife Action Plan)- Blue, Fin, Humpback, North Atlantic Right, Sei, and Sperm Whale
-Two major threats DEC wants to focus on are ship strikes and wind farms
- A question was raised about fisheries/entanglement being a major threat

-Looking to build on long-term monitoring

Matt Schlesinger's Presentation:
-Goals: data, methods, different needs, take advantage of existing data, define best combination of survey methods, what are the migratory trends and critical habitat area
- There is a 20 year old report and also a newer report that shows density maps (hot spots) for species of greatest concern.
Main question: What are the most appropriate combinations of techniques for long-term monitoring of whale occupancy and residence time in the NY Bight?
Questions asked:
- Are there areas that are under consideration?
- What is the purpose of the monitoring: mitigation for management and conservation for long-term?

Rob DiGiovanni's Presentation:
-Why monitor?
- To determine number, understand frequency and potential impacts

-Why important?
- In 2001, 6 whales washed up from ship strike, including a Right whale calf. Why were there so many that year? Are there changes?
- Seem to be changes in the last 20 year in the system as whole including more seals and leatherback turtle entanglements.
- Animals change from year to year but there is no doubt that they are in NY waters.
- Stranding occur everywhere along the coast of LI.

-Typically 3 or 4 large whale strandings a year, 94 cetaceans stranded this year
- Aerial survey platforms- twin otter now being used!
-November 2004-April 2005 survey
- 12 different species
- 249 individual sightings

- Right whale sightings
- One right whale was sighted on March 13, 2005
- A right whale was also sighted in February 2006
- Other sightings of right whales just from shore

Summary of survey effort:
- 1 mile lines and each block is 20 miles long

- harbor porpoise and common dolphins to the west
- whales were found in line with Shinnecock and to the east
- also recorded ship traffic seen during survey

-Shipping traffic: looking at co-occurrence, they always seem to be overlapping. Why do some wash up some years and not others? How many "floaters" are we missing?
-What is being done now?
-Aerial surveys in mid-Atlantic- determine seasonal abundance
-survey lines went out about 40 miles in VA (project funded by a Sect 6 grant)
-Satellite tagging of sea turtles
-Aerial program off Maryland

- significant sightings on the outside of the wind farm

-we know we have animals that are entangled and interact with vessels (example: In 2010, a whale washed up with blunt force trauma from a vessel strike)

- The aerial survey work done w VA and MD saw mainly sea turtles and bottle nose dolphins, very few large whales.

- How do we get information out to the public?

- issue brought up from audience: we hear about whale washing up in news but we do not hear a follow up
- need to talk about this as a network

-Proposed survey

- Three year project. For list of objectives for each year as well as details about each year refer to slide in presentation.
  - 1st year: broad scale (aerial, acoustic)
  - 2nd year: broad and fine scale
  - 3rd year: replicate

-Integration with stranding data is important.
Questions from audience:

- Is just one year of going broad scale going to be enough to let us know where they are really going to be?
- We need multiple datasets.

Sofie van Parijs' Presentation:
-Passive acoustics
-Focus is monitoring and mitigation of threats to baleen whales
-Add value to stock abundance surveys
-Threats: noise pollution, habitat loss, ship strikes
-What we need to know

- space and time: when, where, how long?
- behavior
- group composition
- abundance

-using multiple data streams
-All our data are limited in space and time
-making sure we have some level of coverage
-Aerial/boat surveys, acoustics

-passive acoustics: versatile, not restricted by weather and daylight, monitors 24/7, can go anywhere
-Whenever you listen, you hear whales
-Visual sightings vs. passive acoustics: put them together to see what is really going on
-Towed acoustic arrays (shipboard), bottom mounted recorders, AUV-gliders.
-Use gliders to get real time data
-Collect data at 3 spatial scales:
Example 1: Large spatial scale, short temporal scale, AMAPPS
-Tow arrays drown out lower range species like baleen whales, huge # of other species collected though
-Sperm whales spend only a little time above water so acoustics work better
-Results:

- 415 detected
- 288 localized in NEFSC
- double the number in acoustics compared to visual abundance
- Acoustics (increases abundance 100-150%) can add to visual sightings

Example 2: Medium spatial, long temporal scales
-Buoys- west side detections, no detections further east
-Buoys were not in the same area as the visual sightings were
-Overlaid sightings data with acoustic data, matched up well
Example 3: Small Spatial, Long Temporal scales-Stellwagen Bank
-more R. whales present in the fall

-2013 R. whales in areas further south, very few sightings during that time period.
-Migration corridors

- minke whale migration routes
- still not known for baleen whales, spend a lot of time underwater, management issues include ship strike, Naval activities, energy development, climate change.

-Sofie is working with Aaron Rice to pull together PA datasets to comprehensively look for R. whales.
-Gliders: WHOI, can look for a year at a time, ideal for baleen whales, more info on WHOI website
-Real time monitoring and mitigation
-Applications for fish, including spawning areas for cod, when aggregations form and for how long.

Aaron Rice's Presentation:
-Biological risk assessment, including looking at what mechanism leads to risk
-understanding bioacoustics

- sound is essential to many species of marine vertebrates

-investment on computer side (let the computer do the work in finding sounds), initial investment saves a great deal of time later

- computer finds a signal of interest

-Marine Autonomous Recording unit (MARU)

- Archival recorder to collect sounds, bottom mounted, records up to four months, can provide real time monitoring. Ex. MA, artic etc

-Monitoring along the Atlantic coast
1) Whale acoustic surveys in NY Bight

- Goal: determine SGCN
- Spring: low levels of right whale occurrence
- Autumn: low for right whales
- Winter: low for right whales
- Fin whales all the time
- Most of the calls in the deeper units
- Blue whales primarily offshore
- Fin whales all over, lower in harbor area
- Since NY project have made a number of improvements

2) Whale acoustic surveys in Mass Wind Area

- 1st year: five focal species
- can track whale movement through different sensors
- compare with Neaq aerial survey efforts

- Four surveys MA,VA,NC,GA
-VA: some occurrence 11 months of the year
-GA: essentially throughout the year
-R. whales appear to be spending a lot of time in the mid-Atlantic in 2013
-continental scale picture of whales along the coast
-getting right whales (and other whales) in places we did not expect
-use calls that don't sound like other whales so computer will not confuse species
-progress is being made moving towards being able to model abundance for some species
-publication will be submitted for review in the next couple of months

Susan Parks' Presentation:
-behavior insights from tagging
-what does behavior tell about detectability
-individual whales
-diving behavior and sound production
-ship strike and entanglement zone in water column
-call rate of different species and/or individuals
-need behavioral information to determining strategy
-why do we need tags? Visual observations are limited
-data that tags can provide

- dive profile info
- position data
- 3-D subsurface movement
- Acoustic recordings of sound production

-tags high to low detail/duration, range of costs
-Bruce Mate 2007, Deep Sea Res, R. Whale sat tags
-Friedlander 2009, Mar Eco Prog Series, D-tags, 3D subsurface behavior
Satellite and Fast-loc GPS tags
-deployed remotely using cross bow
-allows for large spatial scales

-Acoustic tags (D tags, Acousonde (commercially available))
- records the sounds they produce and hear but don't give position data

-Right whale – mortality from vessel collisions and entanglement
-right whale dive profiles from Bay of Fundy for 45 tag deployments between 2000-2005 (a lot of rolling around at the surface)
-Habitat dependent foraging behavior
- feeding right whales spent >90% of their time just beneath the surface in Cape Cod bay
- during this year the food was just right below the surface
- behavior tracking what prey is doing

-call rates vary by behavior- most right whales have low call rates unless socializing (no call when traveling and foraging), therefore, migrating R. whales may not be detected acoustically
-Attachment methods:
- invasive – long term, can be remotely deployed, cause physical damage
- non invasive – no harm, short term (hours to days), pole deployed

-Deployment methods: pole or air launch
- Pole- control placement, any tag, v close approach,
- Air-increased range, more tags placed, decreased placement control

Feasibility (common practice) and limitations (cost, sample size)
-which tags
-habitat use: satellite/TDR
-occupancy and movement: satellite/TDR
-acoustic: acoustic tags
-all of the above: combo tags

Howard Rosenbaum's Presentation:
-Objective of the NY Seascape
- Restore healthy populations of threatened species
- protect marine habitats

-Rebuilding the NY aquarium to engage public
-Key questions:
- How are whales using the NY Bight region?
- How long are the present?
- How important is NY Bight/NY waters?
- How does habitat use vary over time?
- How important are NY waters for each species?

-Whale surveys
-Methods: aerial, vessel, acoustics
- Method used depends on goal, species, spatial and temporal scales, resources available

-Aerial surveys
- Pros: distribution and abundance, good spatial coverage, data collection (biological)
- Cons: limited to daylight, limited temporal coverage

-Passive acoustic

- Pros: long data series, good seasonal presence, temporal coverage, diel coverage
- Cons: limited to vocalizing animals, limited spatially, limited for abundance estimates

-Satellite telemetry methods

- Pros: good for occupancy and habitat use, good spatial and temporal coverage

-Shipboard surveys

- Pros: collection of biological and oceanographic data

-EEZ scale movements
-interaction with anthropogenic features
-multiple approaches are needed to yield the greatest success
-integrating the techniques
-thought needs to be given on prioritization of objectives, target species, time constraints, leveraging existing data, cost-benefit analysis
-WCS has a number of papers in press,1 coming out in Cons. Biol., that may be relevant

Debi Palka's Presentations:
-AMAPPS: SE and NE Science centers
-Objectives:

- collect new data (broad scale data all protected species in area)
- some finer scale data at around 3 sites (BOEM areas of interest)
- conduct tag telemetry studies
- coordinate with FWS board aerial surveys

-Assess population size, develop models to translate these survey data to seasonal, spatially explicit characteristics
-Density ests correct for bias due to perception, availability and species specific behaviors
-Habitat density model-different methods for different species
-Prediction of future distribution
-Aerial surveys: FWS- 4 planes that run simultaneously
-NMFS aerial and shipboard surveys
-broad scale and fine scale (where wind farms are)
-passive acoustics: towed arrays, bottom mounted, working towards using all data in estimates
-Habitat and trophic data (sst, chlorophyll, thermocline depth, fish & benthic data, EK60 backscatter, plankton (VPR, Bongos), CTDs, MOCNESS, Isaac Kidd)
-Modeling habitat density estimates
-Integrating other types of data
-Working on addnl methods of bias correction for modeling
-Seals: harbor, gray, photo haulout sites, radio tags, habitat use, bio info
-Loggerheads: tags and aerial surveys, SST and subsurface temp info (collected by tags)
-Interagency agreement up in 2014, collaborators interested in continuing work
-Future: include more agencies and non-summer surveying

Time Cole's Presentation
-aerial surveys
-seasonality of R. whale sightings
-reengineered surveys to a saw tooth design, randomization of trackline, wind and sea state determine where surveying will be done on a given day

-each flight is 5 hours (plane has two fuel tanks)
-efficiency of survey has increased, more R. whales seen per flight though less flight hours
-surveying has helped to determine to dynamic area management zones
-effort over the last 4 fiscal years was 25,000 square nmi
-moving towards blending aerial surveys with passive acoustic detections from ocean gliders
-stationary glider detected 3 right whales
-Paper by Baumgartner et al 2013 compare platforms

Amy Whitt's Presentation:
-Study to provide NJDEP with baseline data in advance of wind development nearshore, outer boundary 30 m isobath
-Fine scale study area from Cape May to Barnegat Bay
-Methods: shipboard surveys
- aerial surveys: abundance and density estimates

-aerial survey effort: double saw-tooth, random start
-shipboard survey
passive acoustic monitoring
-conventional distance sampling
-density surface modeling
Acoustic
Results:
- seasonality of detection
- 615 sightings, 8 species including right whale, fin whale and humpback
- 4 sightings of right whales
- 37 sightings of fin whales and year round acoustic detection
- 17 total sightings of humpback whales
- 4 sightings of minke whale in fall and spring
- cow and calf R. whale pair observed during shipboard survey one May

-lessons learned:
- most of data was from shipboard surveys; it allowed more time to see if they were present
- no aggregations of marine mammals were observed except bottle nosed dolphins. Aerial surveys seem to work better in areas where they are aggregations. Have concerns about utility in areas where there are no aggregations (NY is likely similar to NJ, though there was some comment from the audience that this might not be the case for some whale species).
- more shipboard survey time in winter and only aerial in the summer
- weather constraints, Jan-Apr worst, would be a good idea to schedule more ship time them since less flight time will be possible
- more acoustic analysis time
- shallow water passive acoustic recorders-lots got trawled up fishermen

-GMI report available online
-Outreach: developed two public reporting apps for NOAA, just for SE right now but will be for other areas too if successful

Scott Kraus' Presentation:

-Three year project in MA

- Year 1: 2011-2012 MA wind area
- Year 2: added in RI area
- Year 3: will do both areas again

-set up track lines a mile apart
-465ft obscured when you are flying 1,000ft
-2 observers and 2 pilots
-camera is not good at picking up big things, like whales because of field of view, better at small stuff
-camera allows for species identification of sea turtles, in belly camera shoots continuously along the trackline
-acoustic and aerial sightings
-blue whales and fin whales could have been 50 miles away and acoustics picked it up
-numbers are in too small amounts so you cannot assess density
-huge interannual variability! Need to do at least 3 years of homework before you pick out areas to focus on
-cautious about timeframe looking at past survey effort, ex) Seatap surveys missed some aggregations
-combine multiple survey and assessment methods

- each method gives you a different picture

-post-hoc integrative analysis could be possible
-shipboard surveys do allow for oceanography, could help with predictions
-paper in Endangered Spec Res next month

Discussion:
Notes divided by people speaking as best as possible; ------- denotes a comment where person speaking was unknown

-*Matt Schlesinger*
Is there agreement that

- Need multiple methods
- All are clear on pros and cons of each method (don't really need to outline)

What does NY state need/want and what methods can be used to achieve these goals?
-mitigate ship strikes, wind energy, and entanglement

-*Lisa Bonacci*: major threats to focus on

- Ship strikes
- Disturbances from offshore wind power (construction, noise pollution, interference with migration, etc.)

Comments from participants-
-Need 3 years of baseline data (esp Scout Kraus)

- Annual timing
- Distribution

- Length of occupancy in NY bight

-Leveraging existing data
-Many suggestions for snapshot (broader) view first then fine scale. Possibly fine scale would only start after the initial 3 years.

-Methodological Questions:
-question about false detection with new technology?
Gliders:

- onboard processing; use quadratic discriminant function analysis
- gliders are real time with about ~1 hr delay
- only transmits sample when surfaces (rest needs to be retrieved after)

Aaron Rice:
RE: Algorithms- mathematical, have been improved, reduction in error, constantly improving

Debi Palka:
example of problem with acoustics: humpback songs are currently the least detectable, need improvements to ID these songs

Kim McKown:
Are unmanned planes (drones) an option- new type of methodology used for manatee surveys
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- Eventual methods could be simple but we have poor baseline data, so need to start with basic surveying
- Also, costs are high i.e. small area for Amy's NJ project but it was likely expensive
- Nothing will likely be cheap, but the equipment will be necessary and will depend on what methods are chosen
- Could be an option in the future

Karen Chytalo:

- Neaq came up with whale maps for seasonality in NY
- Found that it was mostly fin whales in the area
- There is SOME idea what is here but NEED the migratory patterns, residence times, habitat, etc.

- pick characteristics that are very distinct to the species to get accurate results
- we need more descriptive information on how long are they staying, timing, are the cued by something, should we have modifications for shipping lanes?

Scott Kraus:
what methods are needed depends on what information is wanted

- i.e. abundance/distribution→ more in depth surveying needed
- simple abundance→ pop-up tags will do

side note RE acoustics:

- Must take into consideration soundless animals-- are they making no noise or are they not there?

Howard Rosenbaum:
not starting completely from scratch

- Leverage existing information (we are in different places for different species)
- What are our targets?
- Should we look at different areas for different species

Note: There were some comments from Scott Kraus and others that we were not as far along as that because data was not collected systematically and in a consistent manner so data sets are only somewhat comparable. Baselines are still not really known.

Mina Innes:
We are in very preliminary stages but overarching goals include:

- broadscale survey with coverage of the whole area
- also site specific data/information (i.e. windfarm area)
- localization of certain areas to pinpoint concentrations
    - Need to pinpoint areas of activity
- Also need seasonality component

Note on NY Bight Area:
Hard to get people to think of this area as not just a migratory corridor, so need year-round surveys to help show what this area is really used for by whales

- need data for all seasons
- using passive acoustics year round
- 6 methods: vessel surveys, aerial survey, acoustics, telemetry, opportunistic data, strandings data

Lisa Bonacci:

- Dept. of State's goals are similar to what DEC is thinking currently with the specific areas being shipping lanes and the wind farm.

Howard R:

- work originally funded by DEC (Neaq maps?, Cornell work?) is a snapshot now we can pair this with other data
- Can be used as one approach for helping with the Department of State's wish list.

Aaron Rice:

- Acoustic receivers off of Cape Cod were mandated by NOAA and funded by industry

Artie Kopelman?:

- 5 year data set available for area off Montauk

Tim Cole:

- minimum would be presence/absence (acoustics best bang for buck), density, seasonality/interannual variability (would require counts-aerial surveys or ships, continuous monitoring)
- -need to look at how sustainable a method is to do over the long term

David Laist from MMC:

- Objectives for minimum: what, where, when
- Medium: more detailed, finer scale
- High-end: everything else
- Build pyramid for each level
    - Primary: aerial, shipboard, and acoustics (PAM and Gliders)
    - Secondary: opportunistic, strandings, telemetry

- What is wanted from each survey type?
- Seaturtle.org-→good example of satellite telemetry

Amy Whitt:

- Are fin whales resident or just passing through? No (overall answer from group)
- Doesn't make sense to do tagging on fin whales
- Would not tag if they are just passing through because would not get site specific data

NEAq representative and Amy Whitt:
6 spots are required to ID an individual whale (not seeing this with fin whales typically)

Does this effort help at a management level? What about "silent" whales?

Scott Kraus:

- Floaters will present a problem because once you start surveying you will find many more, mitigating ship strikes will likely quickly become the first priority, esp because of public perception
- Wind farms will likely be the second priority
- European windfarms aren't giving us a good idea of what happens with whales
- If we put up wind farms on either side of shipping lanes whales may avoid the wind farms; they may move to into shipping lanes and be more prone to shipping strikes. This will present major management issues, law suits, PR problems

Karen Chytalo:
-shipping is already increasing in this area with widening of Panama canal

Howard R.:

- who's here and why? Don't know about residency (i.e. fin whales)
    - 1st step identify what's here
    - Next step: why are they here
    - Third step: manage it based on this findings

Overall first step needed is basic survey work for 3 years (need the 3 years because things vary widely year to year)*

- How important is this area to these species?
- How many vessel surveys and aerial surveys

Scott Kraus:
MA aerial and acoustic surveys: annually cost ~ $800,000 (covers 2 flights per month)

Amy Whitt:
NJ's study cost $7 million for 2 years

- covered a smaller area than NY Bight
- This also included surveys for birds and other megafauna

Debi Palka:
Suggestion—bird should be included when considering windfarm areas

Matt Schlesinger:
Agreed, but this project needs to solely focus on whales

Costs of other monitoring programs:

- In MA- aerial survey and acoustics pop-ups-cheap level $800,000 (a year? For three years?), this is for 2 flights a month, also need to consider that the area of the NY Bight is much bigger
- NJ baseline study-including other animals (birds etc), 7 million for two years, again a much smaller area than here

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- Have some baseline, may not be the same for all species
- Could start tagging w a small number of animals
- For long term monitoring need baseline data somewhat continuously
- Management kicks in a medium scale, need some density info for possible density trigger
- Some believe there are more animals here than in NJ, should be more sightings, could get density info
- In min get the most you can from previous info, data sets prior to 10 years ago could be problematic
- Tim Cole- monitoring responsibility w respect to right whales is that if you see a R. whale something stops or is adjusted

- Many right whales may not be making noise and may be hard to see in aerial surveys too
- How well do tagged animals reflect the broader population?
- The minimum may not be the same for all species
- Scott Kraus disagrees that we have the minimum for any of the large whale species
- Need consistency over many years

Looking at a map, must decide where to put acoustic arrays

Way to organize ideas: use matrix

Note on Gliders in matrix: gliders are another form of PAM technology (just use different space and temporal aspects). Only consider them differently if cost is significantly different

MATRIX: ($1 million dollar/year level)

	Who	Where	When	How Many	Why (habitat use and behavior)
Aerial	✓ Right:✓✓✓	✓✓✓	** ✓/✓✓/✓✓✓	✓✓✓ requires a lot of data	*** ✓✓
Ship	✓✓✓	*✓✓✓	✓✓	✓✓✓	✓✓✓
PAM/Glider	✓✓✓	✓ Array:✓✓✓		Array: ✓	Baleen: ✓ Sperm: ✓✓✓
D tagging	-	✓✓	✓	-	✓✓✓
Satellite tagging	-	✓✓✓	✓✓	-	✓✓

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Species differences, at low end minke, r whale, humpback, also depends on extent of monitoring (more checks as move from min, med, max level of funding)
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More checks as move from min, med, max level
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Feeding, moms and calves