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Bigelow contingencies

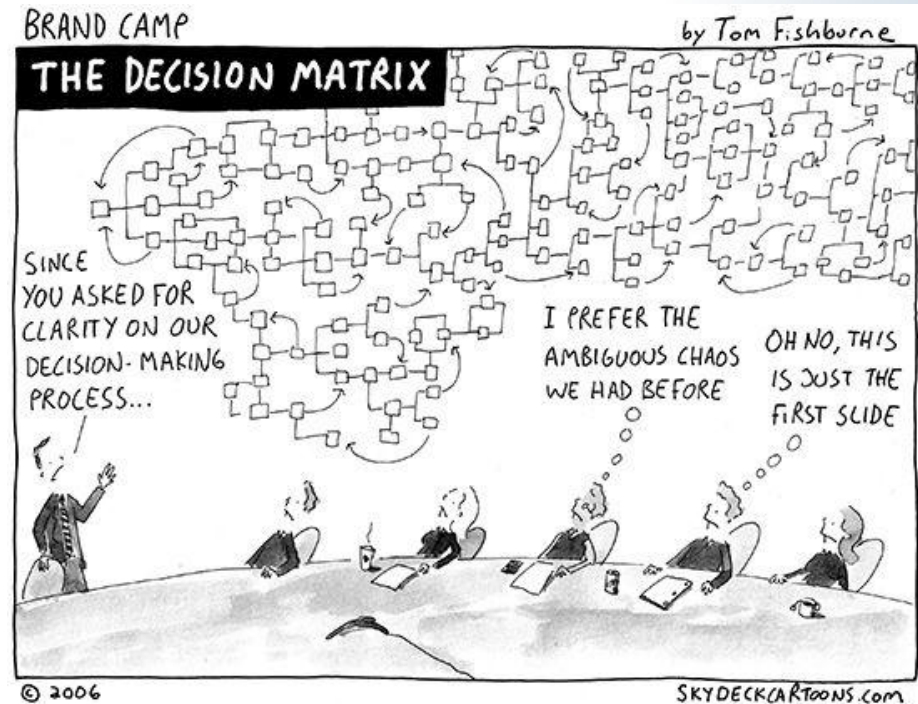
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NTAP, July 20, 2023

Outline

1. Intro: need for contingency plan & current NOAA actions
2. Background: information to inform discussion
3. Discussion: “decision matrix” assessing options with evaluation criteria
 - a. no decision today
 - b. brainstorm together what different solutions might look like, pros and cons of each

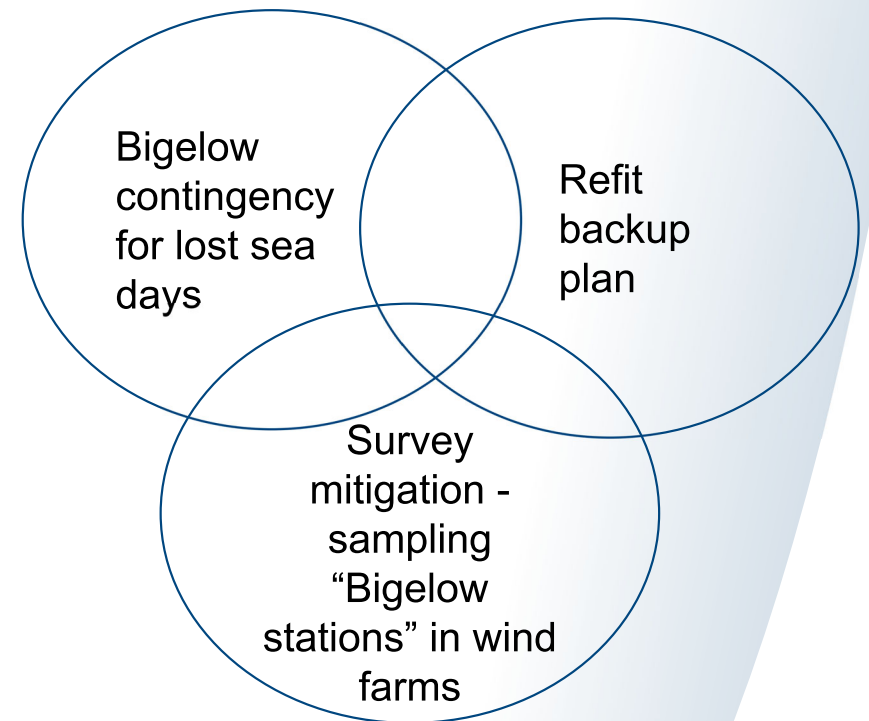


Please stop me if you have questions ...

Why do we need a contingency plan?

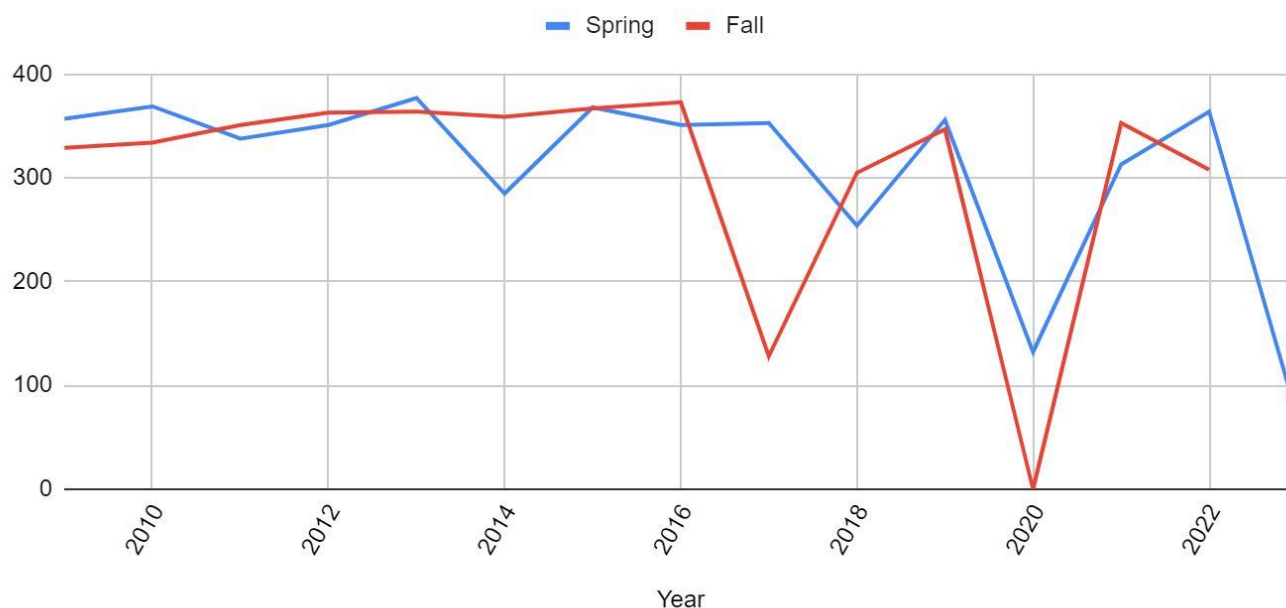
1. Bigelow availability decreasing over time
2. Mid-life repair period: 10/2027-9/2028 (all of FY28) (also, 2029 refit for Pisces)
3. Link to offshore wind survey mitigation

CONTINGENCY NEEDS



Bigelow survey success

Bigelow # of Valid Tows



Spring 2014	started late (March 31) due to mechanical issues (interface between the diesel and electric motors)
Fall 2017	started late (Oct 16) due to engine replacement, used Pisces; weather also a challenge
Spring 2018	started late (March 14) due to delays with shipyard repairs; weather
Fall 2018	weather (strong winds) and minor ship repairs needed during Legs 3 and 4
Spring & Fall 2020	spring survey ended early (March 18) & no fall survey due to COVID
Spring 2021	started late (March 13) due to non-COVID medical issue with vessel staff
Fall 2022	loss of 14 days during Legs 1 and 2 due to COVID; weather also a challenge
Spring 2023	started late (May 8) due to delays with shipyard repairs; daytime only ops due to vessel staffing limitations



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Impact on assessments

The fall and/or spring multispecies bottom trawl survey informs assessments for 51 of 63 stocks assessed by the NEFSC.

Assessments use multiple data inputs, not just these two surveys.

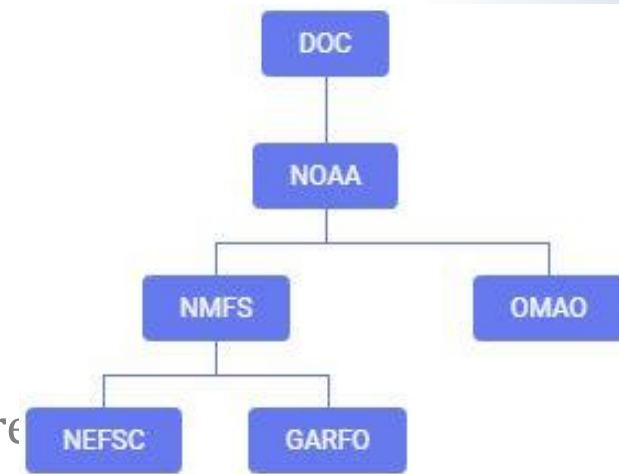
Many are robust to “hiccups” in the time series, but the consistent performance problems are very concerning.

We cannot know specifically how this year’s loss of stations will impact each of the assessments - this topic is addressed by management and research tracks as well as the Northeast Regional Coordinating Council (NRCC).



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Why do we use the Bigelow?



1. Capability, functionality

- a. Custom-designed for fisheries surveys
- b. Enough berthing for 24 hr ops (15-person science crew)
- c. Efficient: 20+ day endurance
- d. Fast: ~12 kt transit speeds
- e. 200 ftm depth of survey stations
- f. Production processing - designed to enable rapid sampling of large catches (length, weight, otoliths, scales, stomach contents), full complement of scientific data collected into onboard databases, acoustic data collection (quiet ship, sophisticated equipment), environmental data collection (plankton tows, oceanographic measurements)

2. Consistency

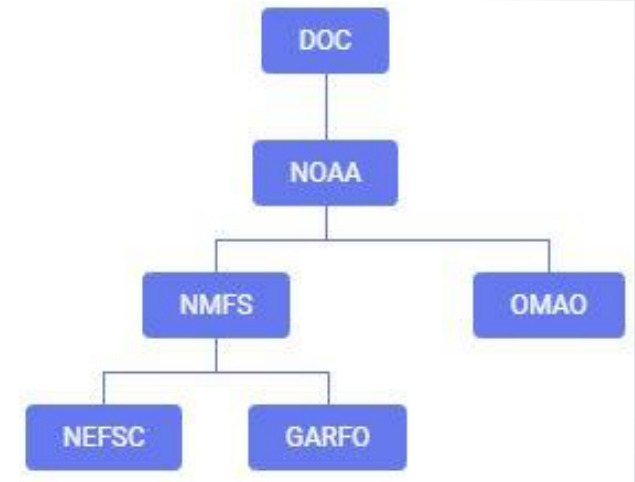
- a. Bottom trawl survey is sensitive to vessel and gear effects. Using very similar vessels lessens variability.
- b. Less sensitive to fuel costs and day rates increases

3. Cost - “free” to NOAA Fisheries for OMAO ships

- a. NEFSC costs ~\$250k per survey
- b. AFSC costs ~\$1.3 mil per survey

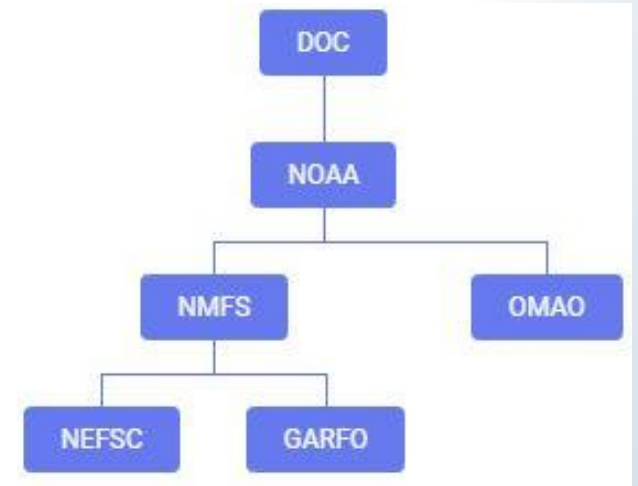
No survey platform is perfect: Bigelow operational constraints

1. Undercapitalized - more sea days needed than available
 - a. Doesn't affect Bottom Trawl Survey because these are priority 1 and 2 for NEFSC on OMAO vessels
 - b. Does affect other surveys: marine mammal, Ecosystem Monitoring
2. Staffing - many staffing and culture challenges, increased reliance on augmenters & less redundancy in skills, consistent with maritime industry-wide trends
3. Planning and communication constraints - survey delays because of hard-to-predict contract work; levels of hierarchy/bureaucracy; Naval Station Newport limitations



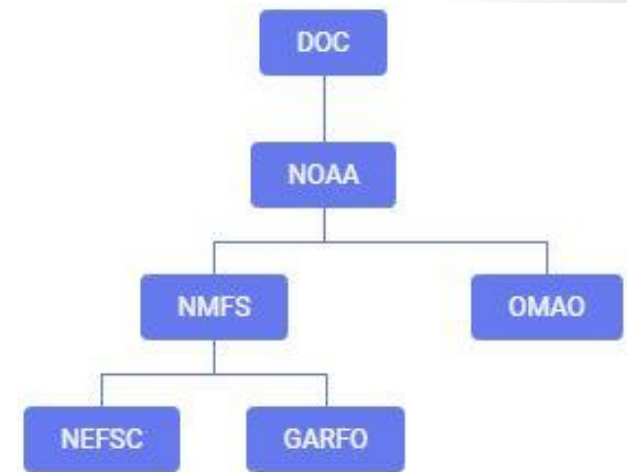
What are NOAA and NMFS doing to address constraints?

1. Supporting OMAO fleet recap plan
2. Inflation Reduction Act (IRA) funds
 - a. NOAA Fisheries initiating national survey program
 - b. advanced technologies (active & passive acoustics, optics, uncrewed systems, eDNA)
3. Addressing communications & training
 - a. clearer priorities that can be implemented; make sure Pisces is ready
 - b. increased accuracy of information
 - c. nationwide trawl-training for OMAO crew



What is NEFSC doing to address constraints?

1. Preparing a decision tree
 - a. If NEFSC doesn't have staffing plan from OMAO in time ... trigger backup plan?
2. Participating in fleet recapitalization discussions
3. Supporting crew training wherever we can
4. Developing a written contingency plan identifying our options - pros and cons of each option, preferred alternatives
 - a. We need NTAP's help here!
 - b. Will seek review by NOAA Fisheries and OMAO so everyone on the same page



NEFSC Bottom Trawl Survey

Objectives:

- Monitor trends in abundance, distribution, and life history for demersal fish (informs stock assessments)
- Monitor ecosystem changes (informs status of ecosystem reports, stock assessments and climate assessments)

Survey design: Stratified random

- strata were determined by depth and region
- ~370 station locations randomly selected per season, fall & spring
- # per stratum based on stratum size and variability of catch

	1963-2008	2009-present
Vessel	Albatross IV	Henry B. Bigelow
Net	Yankee #36 trawl (9.1 m/30 ft bridles)	four-seam, 3-bridle bottom trawl (36.6 m/120 ft bridles)
Sweep	Roller	Rockhopper
Doors	450 kg/990 lb Euronet Polyvalent	550 kg/1200 lb Poly-ice oval

Albatross IV
1963-2008

Longest continuously running, standardized fish survey in the world.

Standardized surveys minimize the variability typical for commercial fisheries data and thus generate more consistent indices of stock abundance (Doubleday and Rivard, 1981)

Henry B. Bigelow
2009-present

Lots of support for survey data - more not less

1. **Stock Assessment Improvement Plan:** “Maintain and improve fishery-independent data collection capabilities.”
2. **‘Omics Strategic Initiative:** “Provide adequate laboratory space in facilities and ships to collect, process, and store samples for ‘omics analyses” with a specific goal of “By 2024, add sampling capability for environmental DNA (eDNA) and other ‘omics analyses to routine missions, including fisheries independent and exploration surveys.”
3. **Northeast Regional Climate Action Plan Action 13:** “Maintain ecosystem survey effort in the Northeast U.S. Shelf ecosystem including the Bottom Trawl Survey”
4. **The EBFM Road Map:** expand on fisheries independent surveys and ensure that they go beyond “the typical abundance and basic biological and catch data.”
5. **National Research Council Review** (late 1990’s): develop additional time series to use in assessments
6. **Moulton Task Force** (2019): pair alternative data sources to existing trawl surveys to sample at higher spatial or temporal resolution

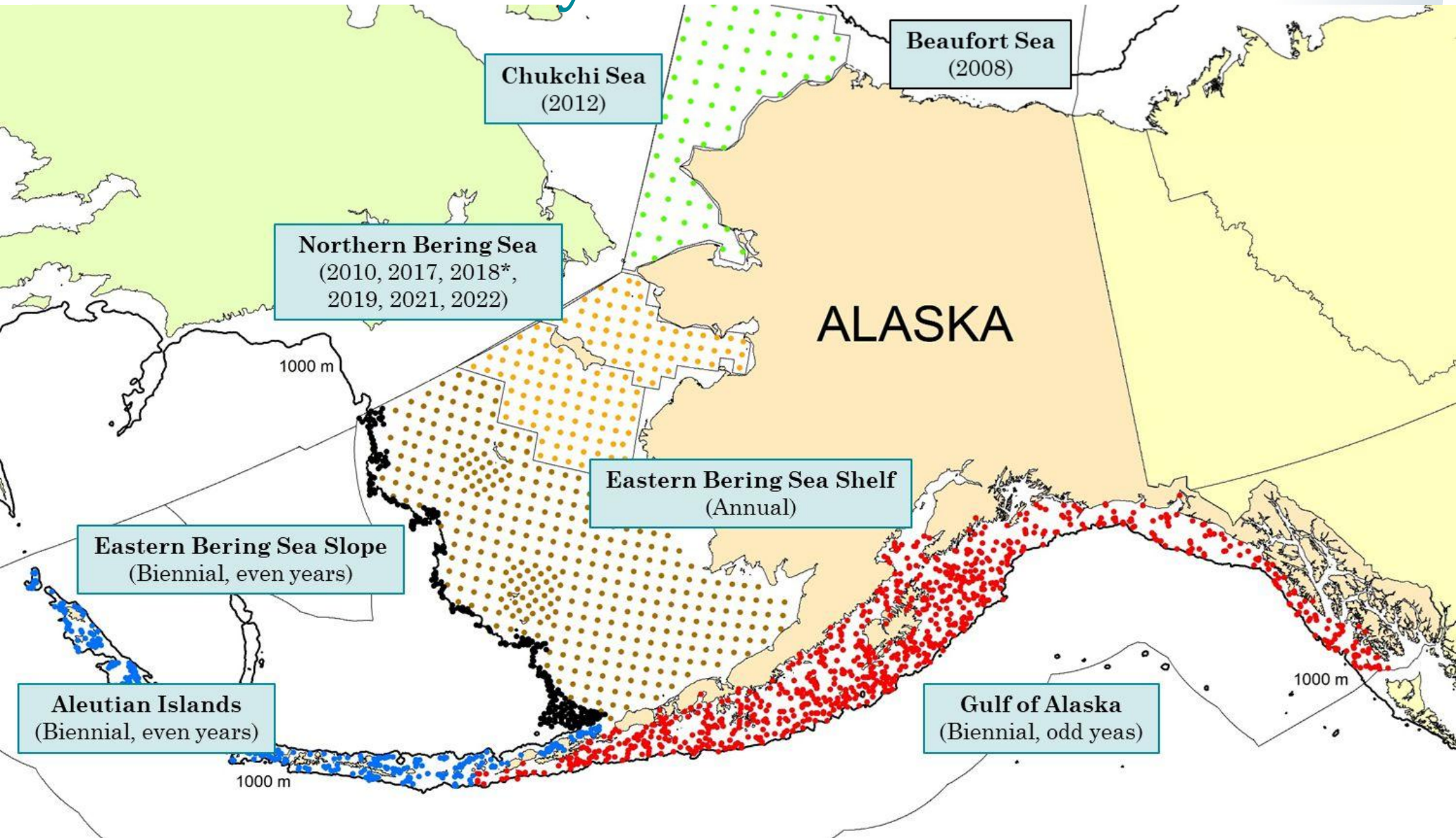


Why don't we use industry vessels?

- We do for some surveys, but this survey has been able to depend on the same research vessel
- Was announced in 2015 that NEFSC was going to start using industry vessels for multispecies bottom trawl survey similar to AFSC



AFSC uses industry vessels



AFSC uses industry vessels

Attribute	NEFSC	Gulf of Alaska	Aleutian Islands	Bering Sea Shelf
Survey frequency	2 per year	1 every other year	1 every other year	1 per year
Number of tows	377	550	420	376
Number of days per vessel per yr (approx)	120	37	35	68
Area per station (km²)	625	388	153	1311
Number of vessels	1	2	2	2
Depth range (m)	18-366	10-1000	10-500	10-200
Vessel length (ft)	209	120-160	120-160	120-160
Vessel horsepower	2*1500	min 1500	min 1500	min 1500
Time of day	24 hr	daylight only	daylight only	daylight only
Scientific crew	15	6	6	6
Vessel crew	23	5	5	5
Autotrawl?	Y	Y	Y	planned

Industry vessels

Advantages

- Knowledgeable and experienced captains
- Experienced crew (critical for gear maintenance & efficient trawling)
- Builds trust with fishing community
- Cost savings
 - Daily cost of a fishing vessel can be less than a research vessel
- Flexibility
 - Typically less down time

Disadvantages

- Less environmental data available
- Daytime-only sampling
- Calibration/standardization issues (platform changes, winch & vessel power differences, nets)
- Government contracting
- Potential for conflict of interest
- Less competition for contracts = rising costs; rising costs = less coverage
- If no qualified vessels then no survey (regardless of cost)



2016 Industry vessel RFP in the northeast

Support requirements

- trawl capable 15-366 m
- deck space, sorting table
- 24-hr ops (overnight stays, multiple days (typically ~20))
- ability to implement FSCS system
- auto trawl system
- acoustics
- capable of routine deployment and retrieval of CTD & Bongo
- fishing in heavy sea conditions; 200+ miles from shore
- transit speed 11-13 kt
- capable of routine deployment and retrieval of NEFSC standard survey trawl gear



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2016 Industry vessel RFP in the northeast

Few vessels capable of towing NEFSC gear to full range of depths

No autotrawls

Reduced berthing limits time at sea, ability to do 24-hr sampling limited

Other concerns:

- rising costs
- disinterest due to more lucrative fishing opportunities
- need to recompute contracts every 5 years (introduces uncertainty, potential lack of consistency - experienced in Alaska as well)
- will competition with wind developers continue to drive prices us?



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Industry vessels are options in the contingency plan

NTAP has consistently supported continuing the bottom trawl survey on the Bigelow:

1. Assess catch efficiency, particularly for flatfish
2. Augment with additional industry-based surveys

Now.... also consider surveys that can be backup to Bigelow and sample in wind farms



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Discussion - questions

Anything to correct?



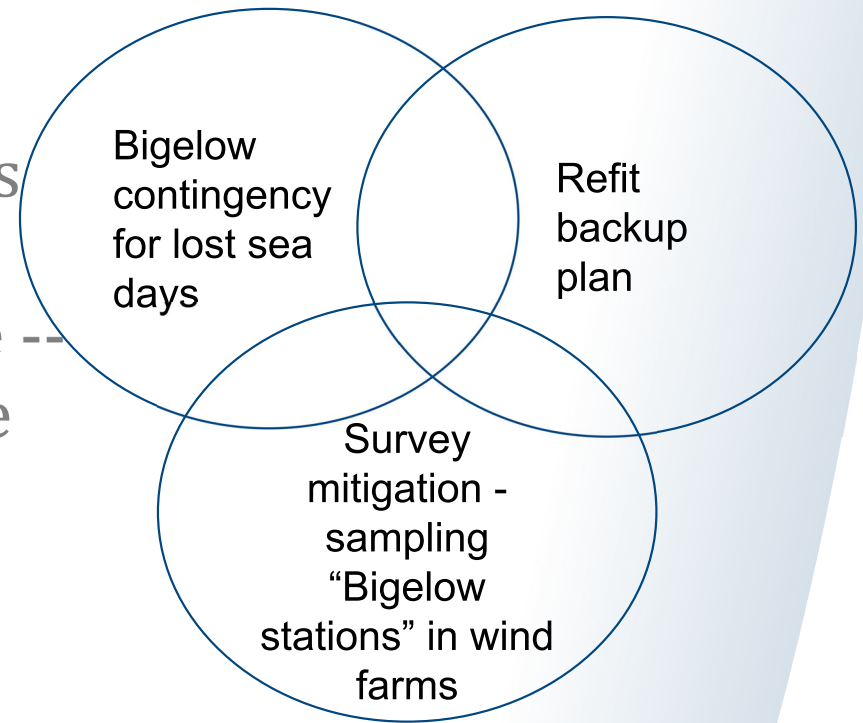
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Contingency options

Goal:

- consider options for multispecies bottom trawl survey when Bigelow sea days are unavailable -- contingency for the Bigelow time series

CONTINGENCY NEEDS



In other words:

- Who would we call in October if we can't sample all of the stations with the Bigelow?

Decision matrix

Helps guide discussion around a complex topic. Helps identify the options that need to be considered. Helps identify areas of disagreement and gaps in knowledge. It does not necessarily give "the right answer." It serves as a guide to the discussion.

Option	Criteria 1 (importance)	Criteria 2 (feasibility)
Option A	4	3
Option B	3	4
Option C	2	5

Example: picking a restaurant for dinner

	Cost	Allergy risk	Entertainment	Distance
Steakhouse	5	4	3	2
Italian	3	2	1	4
Mexican	3	2	2	5
Japanese	4	3	5	3

Options

Objectives:

- Monitor trends in abundance, distribution, and life history for demersal fish (informs stock assessments)
- Monitor ecosystem and oceanographic changes (informs status of ecosystem reports & stock assessments)

1. Pisces - sister ship to Bigelow
2. Bigelow + a NOAA research vessel calibrated to Bigelow
3. Bigelow + an industry vessel calibrated to Bigelow
4. Bigelow + another groundfish time series



Option 1: Pisces

Pisces - sister ship to Bigelow

- Sample what you can with Bigelow
- Fills in for remaining stations
- Replaces Bigelow if Bigelow unavailable
- Must be kept in ready condition
- No calibration needed



Option 2: Bigelow + calibrated NOAA vessel

- Sample what you can with Bigelow
- Replace GM with larger NEFSC trawl vessel, have it on priority standby (if Bigelow loses stations and Pisces is unavailable, this vessel will pick them up and any other scheduled work will be postponed)
- And Class C vessels in plan to come online in 10 years
- Same problems? Staffing, prioritization, stymied by bureaucracy and/or contract timelines
- Calibration needed



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Option 3: Bigelow + calibrated industry vessel

- Sample what you can with Bigelow
- Have industry vessel on priority standby (if Bigelow loses stations and Pisces is unavailable, this vessel will pick them up and any other scheduled work/fishing will be postponed)
- Could also be a trawl-capable research vessel
- Operational logistics are more complicated, particularly with last minute schedule changes, mobilization, etc
- Contracting uncertainty every 5 years (or less)
- Calibration needed



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Option 4: Bigelow + 2nd groundfish time series

- Sample what you can with Bigelow
- Develop a 2nd time series with industry (preferred) or research vessels over same survey area (i.e. sampling frame)
- Calibration - the 2nd survey could cover unsampled Bigelow stations
 - Would be calibrated and conduct 24-hour sampling
- No calibration (2 separate surveys) - leaves gaps in Bigelow coverage
 - Similar to NEAMAP expansion concept
 - Expansion of Canada's survey?
- Consistent with calls for expanded survey effort



Other options

Bigelow + small fleet of industry vessels

- When sea days are limited, Bigelow targets GOM/GB and/or deeper Mid-Atlantic stations
- Have 2-4 additional vessels that can sample if needed, preference for industry-based, could be other platforms
- Calibration needed

considerable overlap conceptually with option 3 (Bigelow + calibrated vessel) - but more complex

Bigelow + non-extractive sampling

- Use Bigelow extractive sampling on subset of stations & acoustic/optic/eDNA on others

major change to survey approach, goes beyond the scope of Bigelow contingencies, disruptive to stock assessment process

No Bigelow - industry-based survey only

major change to survey approach, goes beyond the scope of Bigelow contingencies, very disruptive to stock assessment process, risk of loss of biological, oceanographic and ecosystem data



Other options?



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Evaluation criteria

- Scientific value (data equivalent or better than what we have now)
- Feasibility (can be done)
- Reliability (option is available for 20+ years, standardized methods can be used)
- Flexibility (can be available with little notice for 1 or more days)
- Complexity (how hard is this to manage)
- Future impact (resilient to anticipated changes including offshore wind)
- Enthusiasm



Other evaluation criteria?

Goal: consider options for multispecies bottom trawl survey when Bigelow sea days are unavailable -- contingency for the Bigelow time series

Directions: rank each option for each criterion from 1-X. Low score will win - so your favorite option for a given criterion should be a #1. Use each number 1 through X only once in column!

RANK EACH COLUMN: LOW SCORES ARE BETTER

Options	Evaluation Criteria							Notes
	Scientific value/data quality (1)	Feasibility (2)	Reliability (3)	Flexibility (4)	Ease of management (5)	Future Impact (6)	Enthusiasm (7)	
Pisces								
Bigelow + calibrated NOAA vessel								
Bigelow + calibrated industry vessel								
Bigelow + uncalibrated vessel(s)								
<input type="checkbox"/>								



Decision matrix on your own ...

Discussion will resume at XX:XX



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Goal: consider options for multispecies bottom trawl survey when Bigelow sea days are unavailable -- contingency for the Bigelow time series

Directions: rank each option for each criterion from 1-X. Low score will win - so your favorite option for a given criterion should be a #1. Use each number 1 through X only once in column!

Discussion:

- is a “favorite option” emerging?
- are options missing?
- what are pros and cons of each option?
- as the NEFSC develops its plan, are there other criteria we should keep in mind?
- what other information do we need or assumptions do we need to investigate?
- process for plan development - subcommittee like we did for the operations manual?



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Other fisheries surveys use either industry or research vessels

NEAMAP -daytime only sampling

- VIMS, F/V Darana R., 90'
- ME/NH, F/V Robert Michael, 54'
- MA, R/V Gloria Michelle, 72' (NEFSC)

State surveys in NJ, NY, CT -daytime only sampling

- NJ - R/V Seawolf, 80' (UNOLS)
- NY Ocean Trawl Survey - R/V Seawolf, 80' (UNOLS)
- CT Long Island Sound Trawl Survey R/V John Dempsey, 50' (CT DEP)

Non-trawl surveys

- NEFSC clam survey - F/V Pursuit; 24-hr sampling
- NEFSC Scallop - R/V Sharp (UNOLS); 24-hr sampling
- Coastal shark bottom longline survey - F/V Eagle Eye II
- Gulf of Maine bottom longline survey - F/V Mary Elizabeth and F/V Tenacious II

Survey programs weigh many factors when considering a survey platform:

- **size of vessel**
- **survey timing costs**
- **availability of commercial and research vessels**
- **consistency of the platform over time**
- **scientific and vessel crew size**



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