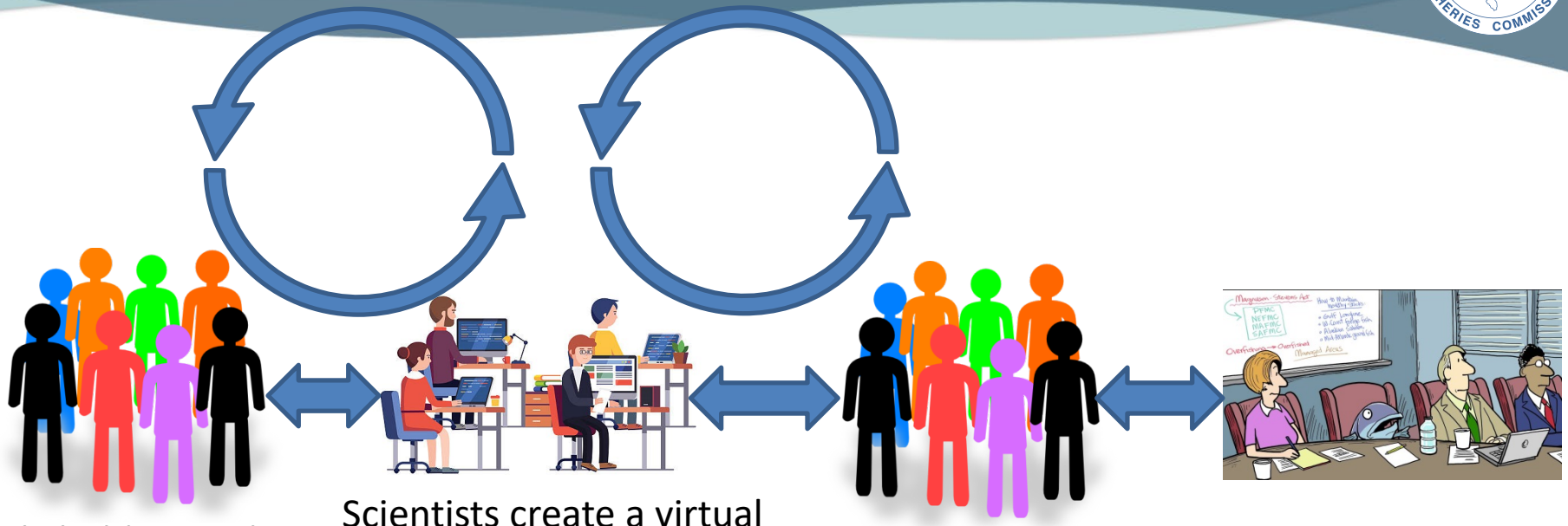
Management Strategy Evaluation Options for American Lobster

American Lobster Management Board
May 3, 2021

Winter Board Meeting 2021

- Management Strategy Evaluation (MSE) process was presented and MSC proposed to prioritize the GOM/GBK lobster stock
- Board discussion around the specifics, including utility for SNE in addition to GOM/GBK
- Lobster TC was tasked by the Board to prioritize options, timelines, and draft budgets to assist the Board consideration of use of MSE for lobster management

The MSE Road Map



Stakeholders and Managers identify:

- Objectives
- Related metrics
- Uncertainties
- Management actions or procedures

Scientists create a virtual reality (simulation) of the system:

- Data collection
- Assessment
- Harvest rule
- Ecosystem dynamics
- Human/fleet behavior
- Economic model
- Other
- Uncertainties
- Record metrics

Stakeholders and Managers Review

- Management action performance…
- …via tradeoffs in metrics

Managers

- Select and implement an action or…
- Have a plan or suite of plans that can be enacted when needed.

(Deroba)

TC Recommendations: SNE

- SNE is lower priority for MSE
  - MSE is intended to produce proactive management strategies for the future, not reactive strategies to current/past stock conditions
  - Scale is smaller (SNE fleet size and landings vs GOM/GBK)
  - Requires new modeling tools currently unavailable
    - How fishery has changed in response to climate change
    - Understanding dynamics of mixed crustacean fishery
  - Likely to require customized model development and data collection at the stock level

TC Recommendations: GOM/GBK

- GOM/GBK is highest priority for MSE
  - 2 phased approach
  - Start with stock level models, then develop spatially explicit models that can account for externalities
  - Multiple phases allow feedback both short and long term and adaptation for potential large-scale changes in near future
  - Can provide nearer term management guidance
  - Provides opportunity to identify needs and develop framework for spatially explicit approach

Option Details: GOM/GBK

- Phase One Purpose
  - Evaluate performance of management strategies at the stock level in response to changes in recruitment with biological, fishery, and socio-economic performance metrics
- Estimated Timeline: 3 years
- Personnel: Lobster TC, ASMFC Staff, Lobster Board Members, Stakeholders, Biological Modeler, Economics Modeler, Professional Facilitator
- Budget $285,000

Parallel Efforts

- Chen lab (UMaine) submitted proposal to NSG to develop population dynamics simulations incorporating environmental effects that could be used in MSE

- NOAA Fisheries has initiated and funded the conceptualization and data collection for economics model

Option Details: GOM/GBK

- Phase Two Purpose
  - Evaluate performance of spatially directed management strategies triggered by external forces
- Allows for consideration of external drivers like climate change, whale interactions, and offshore wind development
- Framework, budget, and requirements to be developed during Phase One

Option Details: SNE

- Lower priority and not recommended by TC
- Purpose
  - Evaluate performance of spatially directed management strategies in response to changes in recruitment and diversification of the fishery with biological, fishery, and socio-economic performance metrics
- Estimated timeline: 5 years
- Cost: $745,125
  - Minimum estimate with potential additional costs dependent on stakeholder objectives

Challenges

- TC determined that additional perspectives are necessary to move forward and develop a work plan for MSE
- Options currently assume availability of ASMFC staff and TC members required to do this work
  - Work loads may need to be reprioritized
  - Competing workloads (Jonah and lobster assessments, whale interactions, etc)

Recommended Next Steps

- Workshop to develop objectives and goals for future lobster fishery
  - Need Board and stakeholder input
  - Big picture goals, both short and long term to guide the focus of the two phases
  - E.g. Menhaden Management Objectives Workshop

Recommended Next Steps

- Develop a steering committee
  - Complete additional scoping and development of comprehensive work plan including outreach with stakeholders and identifying funding & personnel
  - Reps from Board, TC, ASMFC Staff, industry stakeholders, Committee on Economics and Social Sciences, Assessment and Science Committee
  - Need to have some members with MSE experience
  - Ideally ≤ 12 members
  - MSE start date depends on outcome of steering committee findings

Questions?

Update on Development of Draft Addendum XXVII: GOM/GBK Resiliency

American Lobster Management Board
May 3, 2021

Outline

1. Background
2. Action Timeline
3. Review of Abundance Reference Points
4. Review Current Management Measures
5. Technical Committee considerations
6. PDT request for Board guidance
7. PDT recommendations for management options

Background

- August 2017: Board received report from Gulf of Maine/Georges Bank Subcommittee
  - Concern about decreasing trend in settlement
  - **Board initiated Draft Addendum XXVII to increase the resiliency of the GOM/GBK stock**
- Work on Atlantic Right Whale issues prioritized over Draft Addendum XXVII
- Following 2020 benchmark assessment, Board reinitiated work on Addendum XXVII

Background

- Draft Addendum XXVII focused on standardization of management measures
- Addresses the following issues:
  1. V-Notching Definition and Requirement
  2. Minimum Gauge and Vent Sizes
  3. Maximum Gauge Size
  4. Issuance of Trap Tags for Losses
  5. Implementation of Management Measures in LCMA 3

Board Motion

- February 2021 Board motion:

  "Move to re-initiate PDT and TC work on the Gulf of Maine resiliency addendum. The addendum should focus on a trigger mechanism such that, upon reaching of the trigger, measures would be automatically implemented to improve the biological resiliency of the GOM/GBK stock."

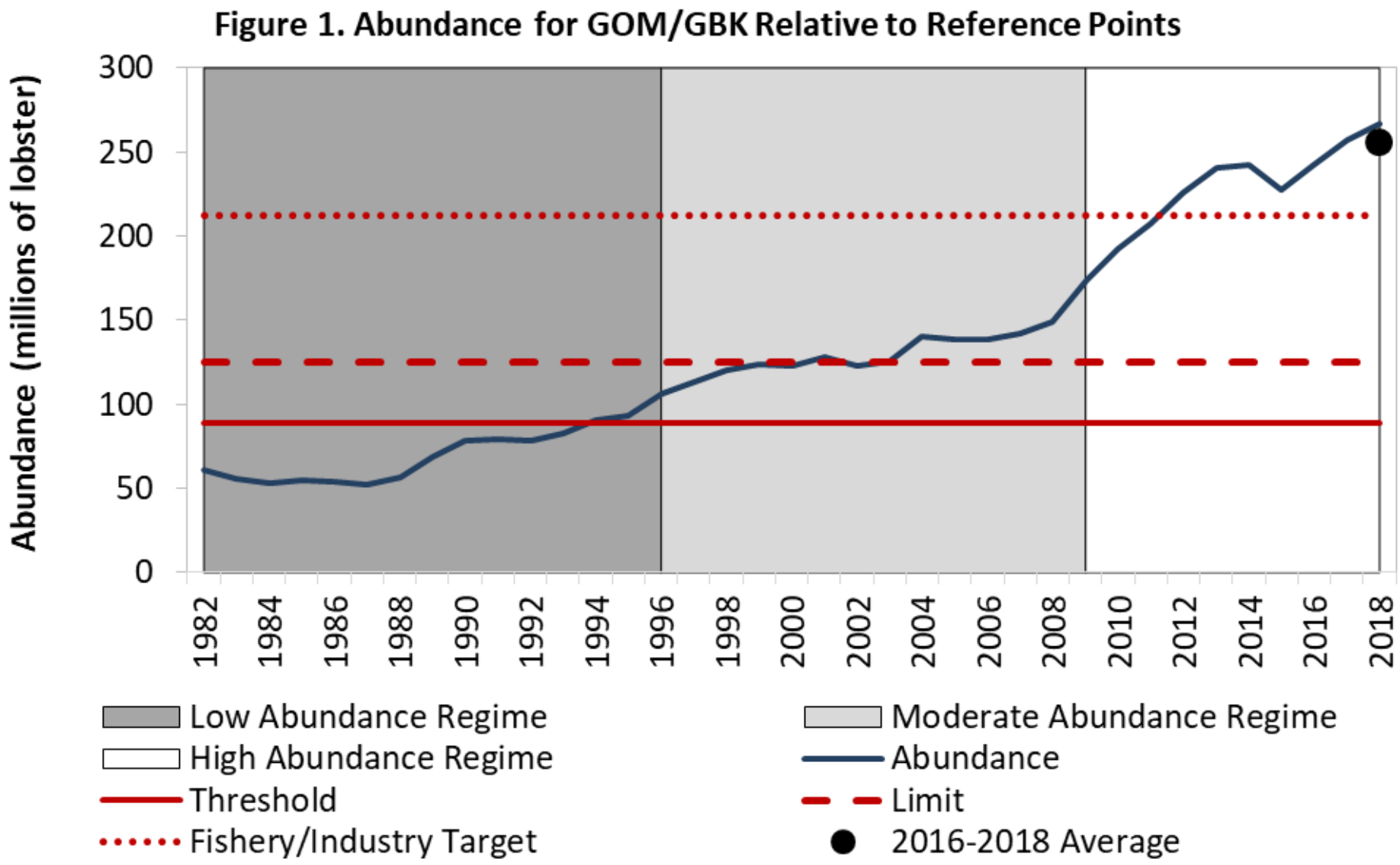
Proposed Action Timeline

February 2021	Board re-initiated work on Draft Addendum XXVII
Feb-April 2021	PDT and TC met several times to develop draft management options
→ May 2021	**Board meeting to review and provide guidance on PDT recommendations**
Summer 2021	PDT develops draft addendum document
August 2021	Board meeting to consider Draft Addendum XXVII for public comment
August-Sept 2021	Public Hearings and Comment Period
October 2021	Board meeting to consider final approval of Draft Addendum XXVII

Abundance Reference Points

- Three abundance reference points
  - **Fishery/industry target**
    - 25th percentile of high abundance regime
    - Stock's ability to replenish itself not jeopardized but abundance levels falling to lower end of current regime
  - **Abundance limit**
    - Median of moderate abundance regime
    - Stock abundance level below this threshold is considered depleted; stock's ability to replenish itself is diminished
  - **Abundance threshold**
    - Average of three highest years during the low abundance regime
    - Stock abundance level below this threshold is considered significantly depleted and in danger of stock collapse

Stock Status: GOM/GBK



Current Measures (GOM/GBK)

Mgmt. Measure	Area 1	Area 3	OCC
Min Gauge Size	3 1/4"	3 17/32"	3 3/8"
Vent Rect.	1 15/16 x 5 3/4"	2 1/16 x 5 3/4"	2 x 5 3/4"
Vent Cir.	2 7/16"	2 11/16"	2 5/8"
V-notch requirement	Mandatory for all eggers	Mandatory for all eggers above 42°30'	None
V-Notch Definition[1] (possession)	Zero Tolerance	1/8" with or w/out setal hairs[1]	State Permitted fisherman in state waters 1/4" without setal hairs Federal Permit holders 1/8" with or w/out setal hairs[1]
Max. Gauge (male & female)	5"	6 3/4"	State Waters none Federal Waters 6 3/4"
Season Closure			February 1-April 30

Technical Considerations

- TC met twice to provide guidance to PDT and discussed:
  - **Indices for Establishing Triggers**
  - **Trigger Levels**
  - **Management Measures to Increase Biological Resiliency**

Technical Considerations

Indices for Establishing Triggers

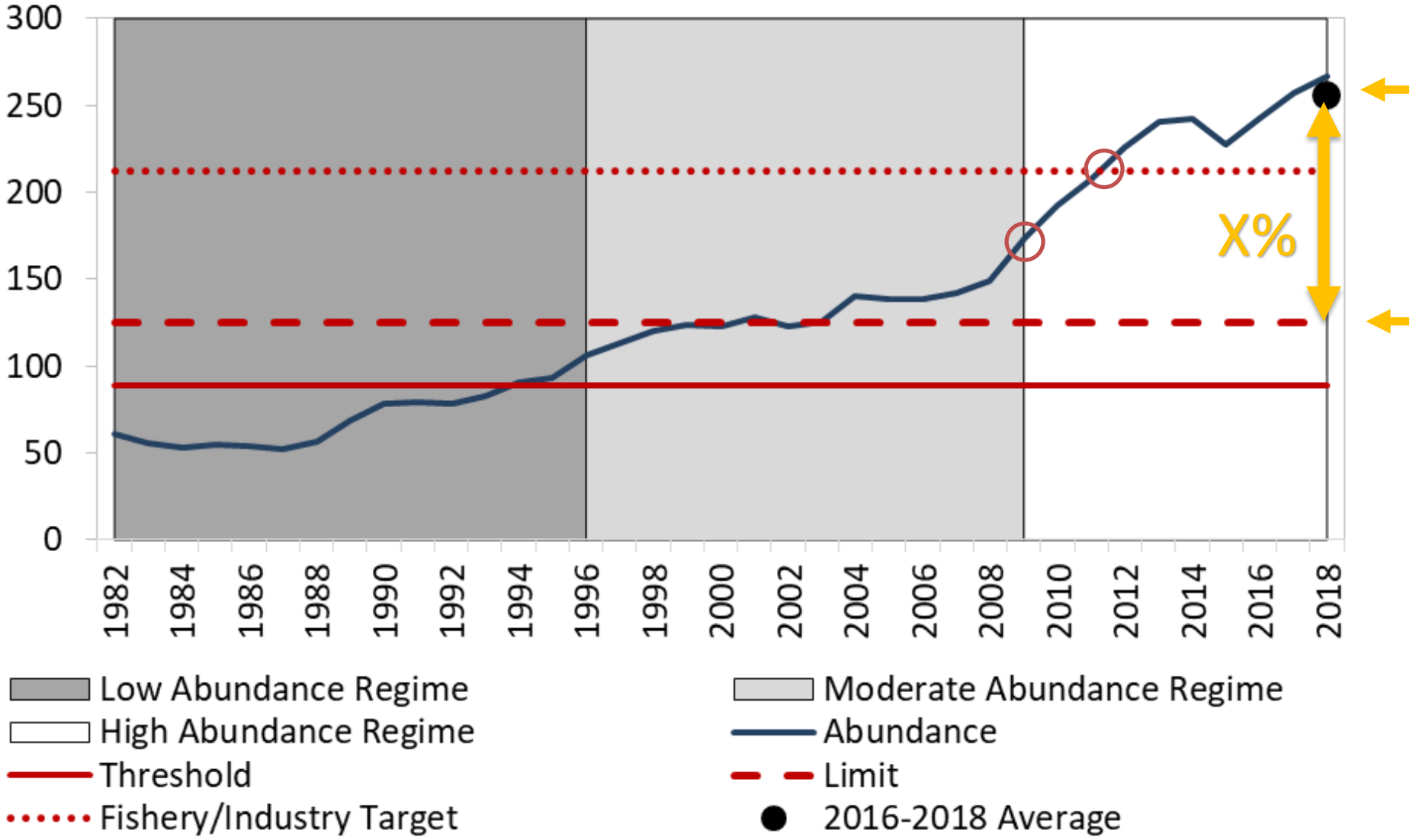
- Index-based triggers would allow for annual updates
- Focus on sub-legal sizes
- ME/NH and MA trawl survey combined
  - single indices by season, survey provided stratum areas, sexes aggregated, constrained to sizes 71-80 mm
- VTS index for pre-recruits
  - Shorter time series, less offshore coverage
- Correlation analysis shows relationship between modeled abundance and the trawl indices
- Modeled abundance from the assessment could also be used
  - assessment results would be needed to trigger action

Technical Considerations

Trigger Levels

- Trigger levels should be related to model outputs and abundance reference points
  - Fishery/Industry Target: more proactive/conservative
  - Abundance Limit: reactive not proactive
- Index-based trigger suggestions:
  - Rate of change in index: e.g., median 10% decline over 3 years
    - median smooths annual variation
    - rate of change could be defined based on SNE index around collapse
  - Magnitude of decline representative of reaching a reference point: e.g. X% decline in abundance index

Figure 1. Abundance for GOM/GBK Relative to Reference Points



Technical Considerations

Management Measures to Increase Biological Resiliency

- Minimum gauge size expected to have the largest impact, even with relatively small changes
  - Increasing min. gauge size would result in marginal decrease in # of lobsters landed, but weight of landings would likely increase
  - Vent size should be changed accordingly with minimum gauge size
- Maximum gauge size effects are less certain
  - Minor changes less likely to be effective due to population size structure
- TC will update analysis of gauge size changes
  - More recent discard data from Area 3

Request for Board Guidance

- What are the Board's objectives with regard to biological resiliency of the stock?
- How proactively does the Board want to react to changes in the stock?
- What are the Board's priorities with regard to standardization of measures across LCMAs versus stock resiliency? Is one more important than the other?
- What are the Board's goals for standardizing measures throughout the GOM/GBK stock?

PDT Recommendations

- The PDT proposes a “packaged” option structure for Addendum XXVIII
  - Preset packages of management measures that would be implemented by a defined trigger
- Board could select some options together
  - Not all options are mutually exclusive
- Options represent different goals or levels of precaution
  - standardization vs. improving resiliency
  - More proactive vs. less proactive

Draft Management Options

Option	Description	
1	Status Quo	
2	Standardized measures to be implemented upon final approval of addendum	
3	Implement LCMA-specific measures to increase resiliency upon reaching a Trigger	
4	Standardized measures to be implemented upon reaching Trigger 1	
5	Measures to be automatically implemented upon reaching Trigger 2 to increase stock resiliency	

Draft Management Options

1. Status Quo

- Maintain current management measures and do not establish a trigger mechanism.
- Cannot be combined with other options

Draft Management Options

2. Standardized measures to be implemented upon final approval of addendum

- **Sub-option 2A**: implement standardized measures within each LCMA to the most conservative measure where there are inconsistencies in measures for state and federal waters within LCMAs in the GOM/GBK stock.
  - Outer Cape Cod (OCC) maximum gauge standardized to 6-3/4" for state and federal waters
  - V-notch definition and requirement standardized to 1/8" with or w/out setal hairs
- **Sub-option 2B**: implement the measures specified in sub-option 2A, AND standardize the V-notch requirement across all LCMAs in the GOM/GBK stock.
  - Mandatory V-notching for all eggers in LCMA 1, 3, and OCC.
- **Sub-option 2C**: implement the measures specified in sub-options 2A, 2B, AND standardize regulations across LCMAs in GOM/GBK for issuing trap tags for trap losses
  - no issuance of trap tags before trap losses occur

Draft Management Options

3. Implement LCMA-specific measures to increase resiliency upon reaching a Trigger

- **Sub-option 3A**: Upon reaching a defined trigger increase minimum gauge sizes by equivalent amounts
  - *E.g. increase Area 1 to 3- 5/16" minimum gauge size, and make equivalent increases to Area 3 and OCC (closer to the size at 50% maturity)*
- **Sub-option 3B**: Option 3A measures, AND decrease maximum gauge size in each LCMA by equivalent amounts

*Cannot be combined with 4-5

Draft Management Options

4. Standardized measures to be implemented upon reaching Trigger 1

- **Sub-option 4A**: Upon reaching Trigger 1 implement a standardized minimum gauge size, vent size, and maximum gauge size for all LCMAs in the GOM/GBK stock
  - *trigger could be an observed decline in index that would approximate reaching Fishery/Industry target abundance reference point (a more proactive trigger)*
  - *Example measures: standard minimum gauge size of 3-5/16" (closer to the size at 50% maturity for Area 1) and maximum gauge size of 6 ½" (compromise that decreases max size in Area 3, increases in Area 1)*
- **Sub-option 4B:** Upon reaching Trigger 1, in addition to the sub-option 4A measures, implement any measures not selected under Option 2

*Cannot be combined with 3

Draft Management Options

5. Measures to be automatically implemented upon reaching Trigger 2 to increase stock resiliency

- **Sub-option 5A:** Upon reaching Trigger 2 implement a change to the minimum gauge size, vent size, and maximum gauge size for all LCMAs in the GOM/GBK stock to increase biological resiliency
  - *Trigger should be set at a lower level of abundance/higher level of stock concern than Trigger 1*
  - *PDT suggested stock abundance below abundance limit reference point (assessment results), and/or an index-based proxy for the abundance limit (annual indices) as trigger(s)*
  - *Measures should include increase to the min gauge size and decrease to max gauge size implemented under Option 4*
- **Sub-option 5B:** In addition to option 5A measures, standardize V-notch definition to 1/16” across LCMAs in the GOM/GBK stock

*Cannot be combined with 3

Next Steps

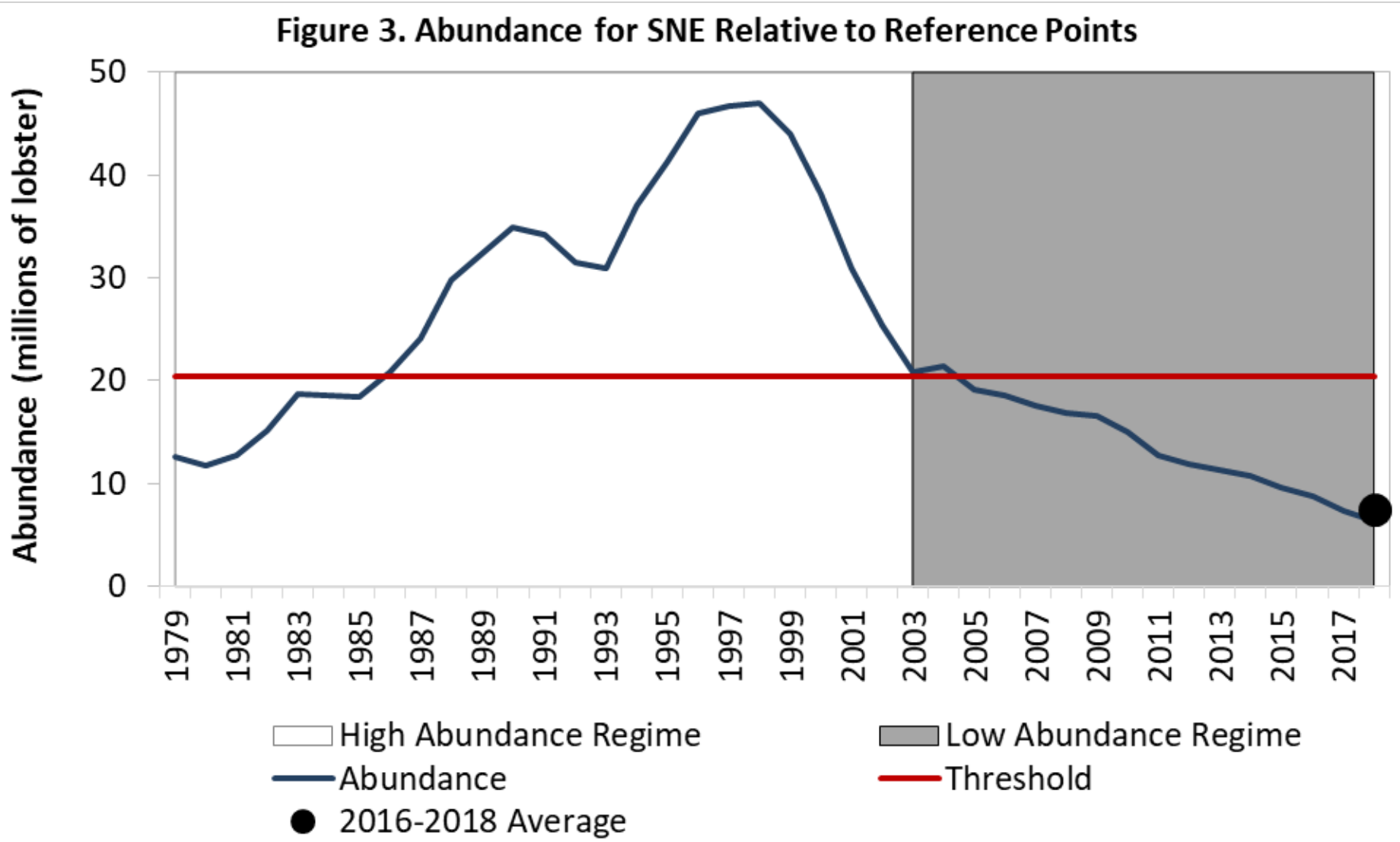
- Board discussion to provide guidance to PDT on Draft Addendum XXVII goals and objectives, priorities
  - Feedback on draft management options
- TC will provide additional analysis to PDT
- PDT will develop Draft Addendum XXVIII document for consideration for public comment at August 2021 meeting

Request for Board Guidance

- What are the Board's objectives with regard to biological resiliency of the stock?
- How proactively does the Board want to react to changes in the stock?
- What are the Board's priorities with regard to standardization of measures across LCMAs versus stock resiliency? Is one more important than the other?
- What are the Board's goals for standardizing measures throughout the GOM/GBK stock?

Questions?

Stock Status: SNE



Electronic Vessel Tracking Project Updates

Anna Webb (MA DMF) and Bill DeVoe (MEDMR)
American Lobster Management Board
May 3, 2021

Report on Electronic Tracking Pilot Program

Bill DeVoe, MEDMR
American Lobster Management Board
May 2021

Updates May 2021

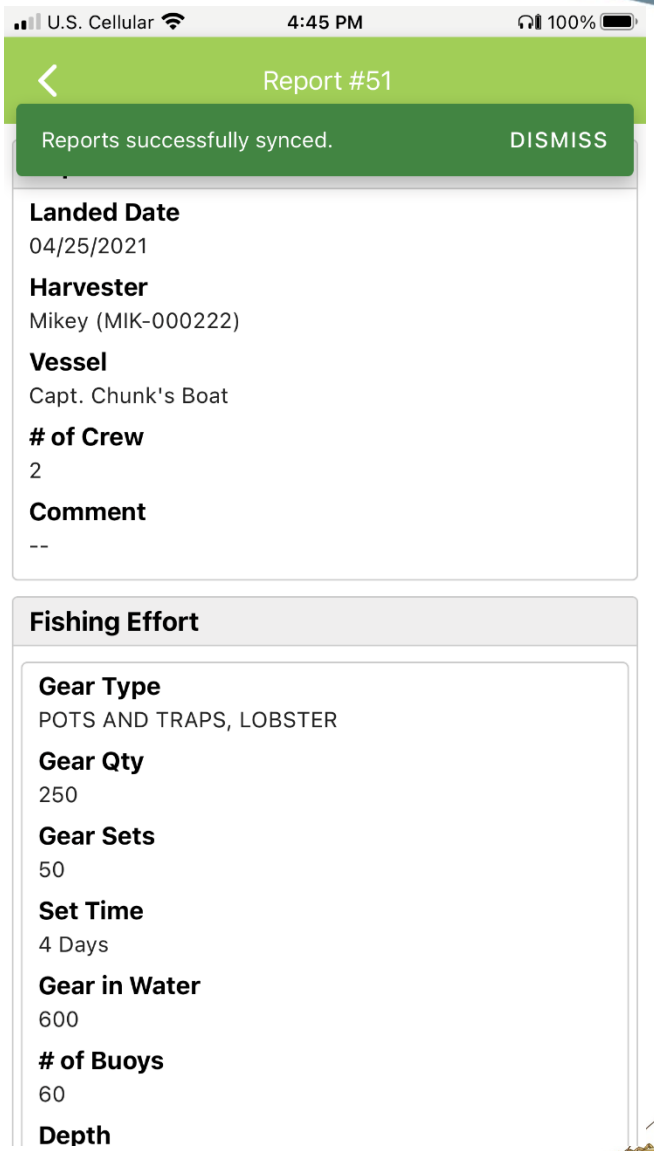
- Previously tested cellular tracking devices from Succorfish, Faria-Beede, Rock7 and Pelagic DataSystems
- Average device cost was ~$350, with cellular data costs per year about the same
- In December 2020, began testing Particle TrackerOne device – significantly lower costs for both tracker and data.
- Currently integrating Particle TrackerOne with harvester reporting and other data streams.

Particle TrackerOne

- Cellular-based tracking device ($160 per device)
- Uses multiple cellular networks for broad coverage
- Cellular data is billed based on usage, not as an unlimited plan
- A 1-minute ping rate requires $7/month plan ($84/year).
- Tracker is open-source and can be modified to add custom functionality beyond basic tracking.
- Powered by USB connector or can be hardwired.
- DMR is currently testing 5 TrackerOne units.

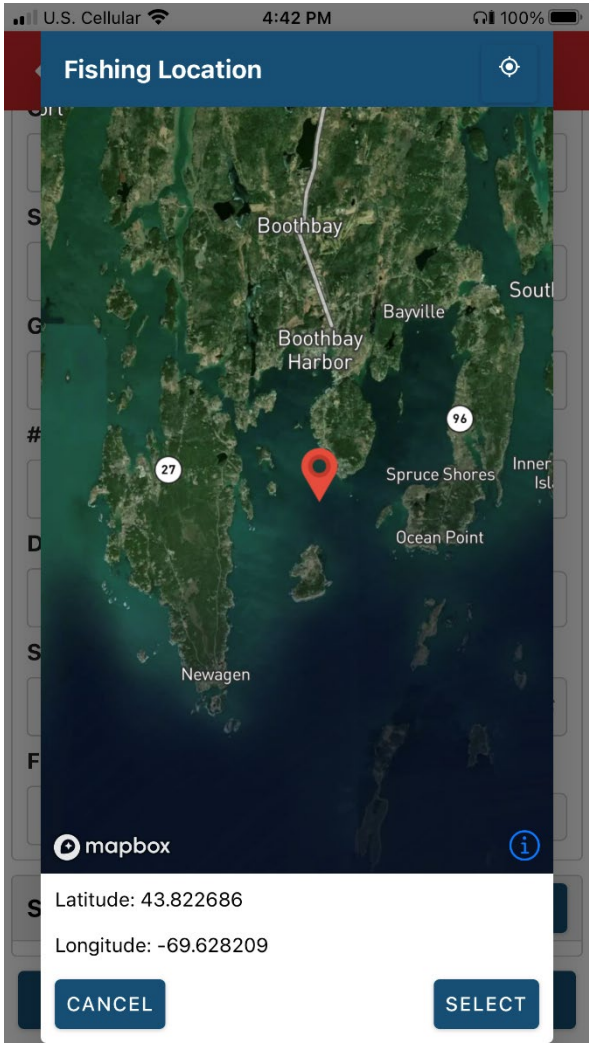
Harvester Reporting

- DMR has contracted BluefinData to develop harvester reporting mobile app VESL.
- Integrating TrackerOne units with harvester reporting this summer.
- Particle website submits tracker data to BlueFin API endpoint.
- Bluefin sends location data along with harvester report to ACCSP SAFIS database.
- TrackerOne is dedicated hardware device, always on vs harvester having to run mobile app for the entire trip



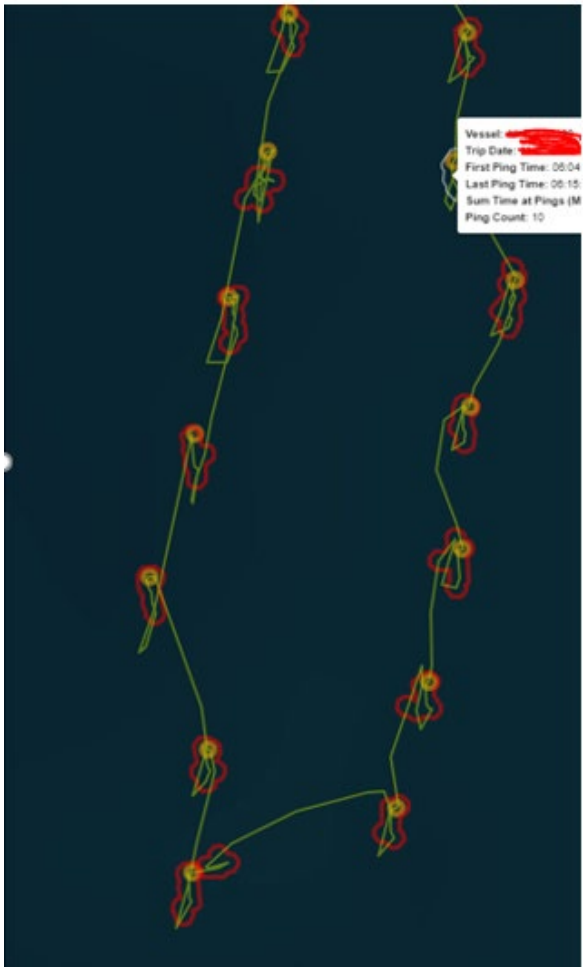
Current Integrations/Work

- Added Bluetooth interface to TrackerOne to allow harvesters to “register” their tracker with their harvester account in VESL. This also allows VESL to check that the tracking device is on and working.
- Testing Bluetooth gear and hauler beacons.
- Tested option of “button board” to allow harvesters to indicate specific events to send back with tracking data.
- Investigating federal VMS type approval process.



Future Integrations/Work

- BlueFin will be adding map interface to VESL for harvesters to view tracks
- Admin interface at DMR for fishery statistics like heatmaps
- Environmental data – integrate TrackerOne with temperature logger in traps to expand bottom temperature data collection
- Geofencing, both after data submission and on the device. Autodetection of homeport to reduce ping rates while in port.
- Possible integration of TrackerOne with plotter or computer on vessel.
- Automated detection of effort locations from track and harvester reported haul count



Integration of Cellular Vessel Monitoring Systems and eTRIPS mobile

-- Linking real time location information with harvester trip reports --

Project partners: Harborlight Software, ACCSP, Rhode Island DMF, and Massachusetts DMF.

Anna Webb, MA DMF

Presented to the American Lobster Management Board

May 3, 2021

Why Cell-based Vessel Tracking?

- Cellular trackers are generally lower in cost than satellite tracking units.
- Works in and out of cellular range, data are stored and transmitted once cellular service is available.
- Data plans can be charged as static monthly or annual cost.
- Ping rates are adjustable with no change in costs.
- Devices utilize direct current or solar power, compatible with most vessels.
- Market is expanding rapidly

Project Objectives & Devices

- **Objectives:**
  - Acquire and test the ability of 5 cellular devices to collect vessel GPS information
  - Develop an API for each device in order to acquire vessel locations and link them to trips submitted via eTRIPS Mobile
  - Test functionality of geofences within eTRIPS mobile
  - Add-ons:
    - Develop a viewing interface within the app for harvester to see tracks.
    - Develop an admin viewing interface to see all tracks within SAFIS.

- **Final Device Selection:**
  - Faria Beede (12v DC)
  - Pelagic Data Systems (solar)
  - Succorfish (12/24v DC)
  - CLS America (Solar/DC via USB)
  - Tablet GPS function

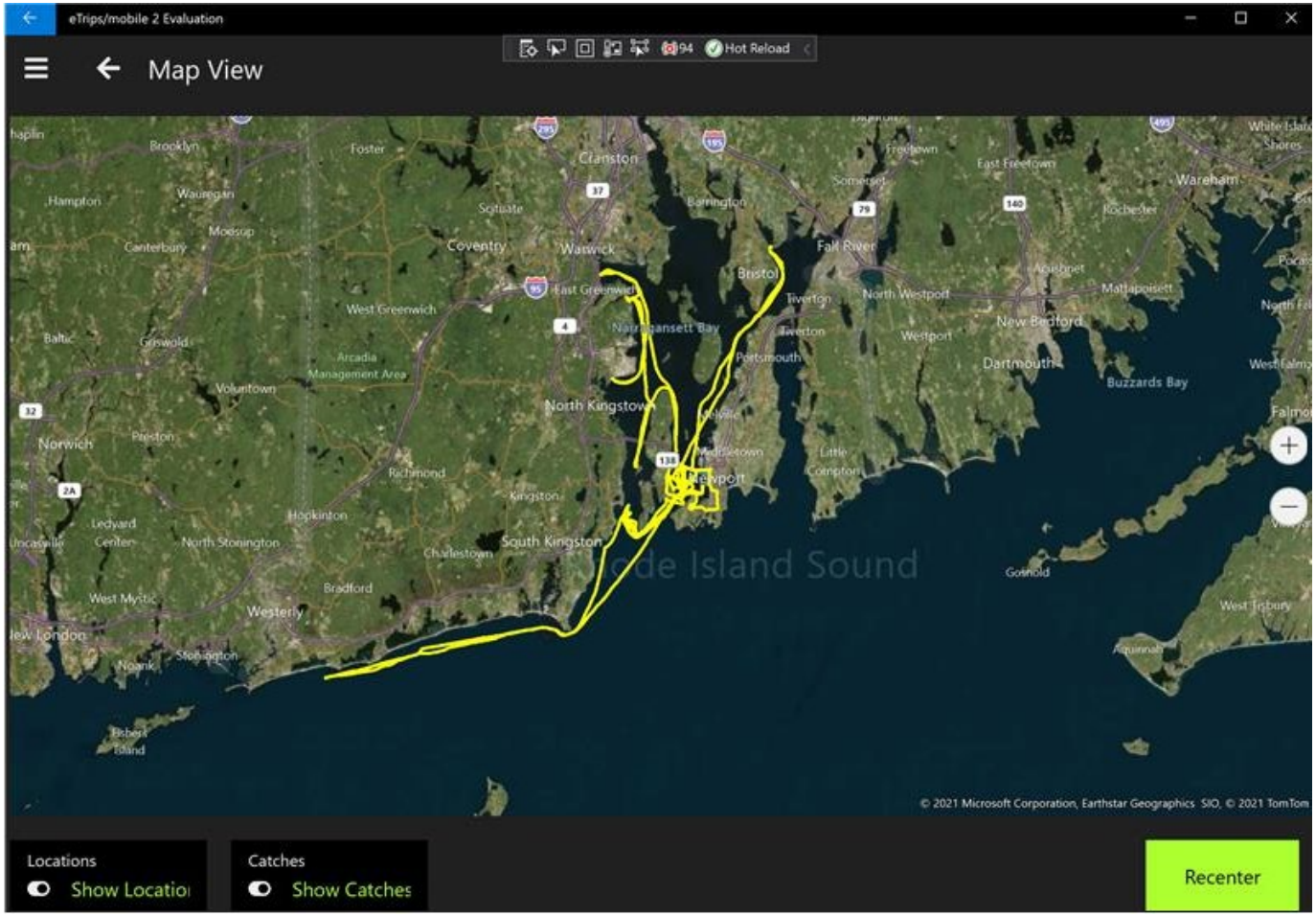
	Unit Price	1 Yr Service	Total Initial Cost*
Pelagic Data Systems	$150	$420	$570
Succorfish	$650	$120	$770
Faria Beede	$395	$300	$695
CLS America	$349	$300	$649

***Excluding Tablet/Phone;** Tablets range in price from $250-$600 depending on make and model.

eTRIPS Mobile: Where it all Comes Together

- eTRIPS/mobile is currently endorsed for trip report submission by state and federal agencies.
- The newly developed tracking version uses the device company APIs to pull in vessel positions to matched trip submissions.
- Works on Windows, Apple, and Android products including laptops, tablets, and phones.
- Works offline; stores data until a wifi connection is re-established (can be off vessel)
- New **Map View** option lets users see tracked trips within the app. If using the tablet as the tracker, there is potential map view can be used in real time.
- App is ready for deployment in Spring 2021, when fishing effort will likely increase.

Example Tracks: eTRIPS mobile Map View



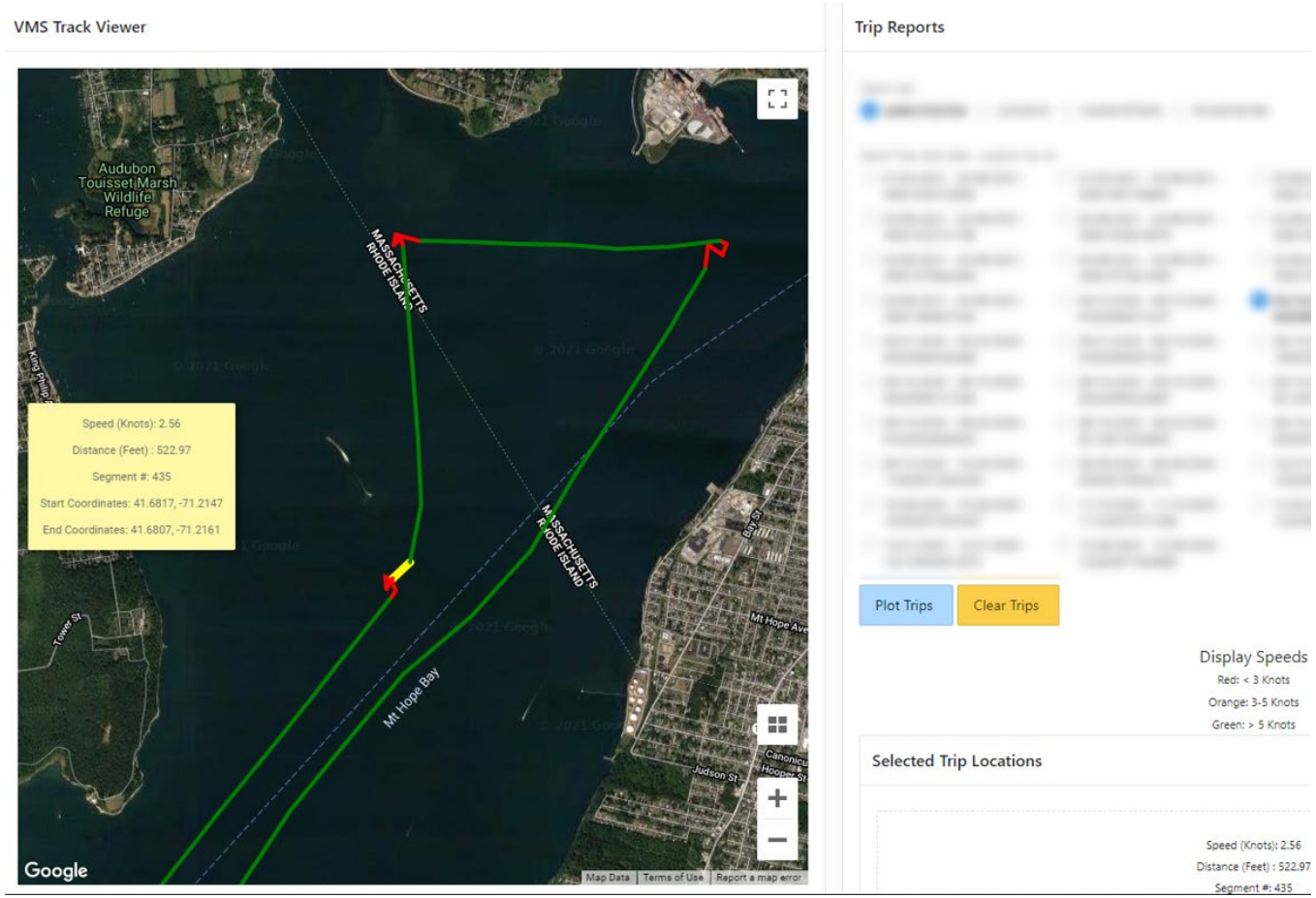
Testing!

- Testing has been limited to staff vehicles and research vessels at this time.
- Successful pulls of tracks from all devices.
- Links to trips appropriately in the database.
- To be launched on volunteer vessels in 2021.
  - Massachusetts has identified two participants and is currently looking for four more.
  - Rhode Island has identified several charter participants and is pursuing additional commercial participants for the Spring.
  - Massachusetts has developed a FAQ on the project including its objectives and potential for law enforcement use for the public/interested parties.

Ongoing

- Geofencing: a virtual perimeter
  - Exploring the integration of geofences into eTRIPS mobile is currently underway.
  - Notifications to users (admin or end user) if vessel is approaching or crosses into a fenced area
  - Possible use cases:
    - Defining ports, which could be used to decrease in port ping rates
    - Identifying closed areas
- ACCSP/Mike Rinaldi has developed a *VMS Track Viewer* within the SAFIS test environment, allowing administrators to view tracks and summary information for trips including ping locations, distance between pings, and calculated speed.
- Deployment on fishing vessels will allow us to start reviewing ping rate data and identifying efforts
- Final grant reports available by late summer 2021. Further field-testing reports later.

Example Tracks: VMS track viewer



Project Conclusions

- Expanded on the work done by ME and MA and further confirmed cell-based trackers are a cost-effective alternative to satellite-based VMS.
- Installation of devices can be complicated and installation technicians may be necessary for broad scale implementation.
- Successfully connected harvester trip reports with tracked data in a test environment. This greatly expands the potential for increasing the spatial resolution of reporting, pending further work on ping rates.
- No tracker displays a significant benefit over another at this point in the project.
- Pending successful Production trips, app with VMS integration could be available for 2022.

Future Directions

- Anticipate partners could apply for funds to:
  - Enact broad scale implementation (purchase of devices and plans and hiring technicians to launch program)
  - Enhance geofencing capabilities
  - Integrate law enforcement components (this is piloted as a data collection tool)
  - Add devices to the pilot (e.g., ME's new Particle device)
  - Incorporate other needs expected in the next 2-4 years
  - Expand on any lobster specific needs?

BOARD CONSIDERATIONS

Benefits and Needs

- Electronic tracking in offshore fishery is needed to provide spatial and temporal information on effort in federal waters to address challenges facing the lobster fishery:
  - Right whales and protected resources
  - Offshore enforcement
  - Protected areas/marine spatial planning

Support for Vessel Tracking

- ASMFC and state partners have supported efforts to facilitate the development of electronic tracking programs:
  - Board-approved electronic vessel tracking pilot program
  - April 2019 letter from ASMFC to NOAA Fisheries recommending development of electronic tracking systems in the federal lobster fishery
  - ASMFC's March 2021 comments on Atlantic Large Whale Take Reduction Plan modifications identified need for improved offshore enforcement for proposed ALWTRP to be effective
  - ME DMR: testing emerging vessel tracking technologies (Particle trackers); work to integrate tracking data with electronic harvester reporting app
  - MA and RI: collaboration on integrating cell-based tracking with ACCSP's SAFIS eTRIPS mobile and creating trip viewers

Board Action

- Board action for consideration:
  - Consider sending a letter to NOAA Fisheries recommending they implement electronic vessel tracking requirements for the federal lobster and Jonah crab fishery