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United States Marine Fisheries Electronic-Catch Reporting: Status Report and Recommendations

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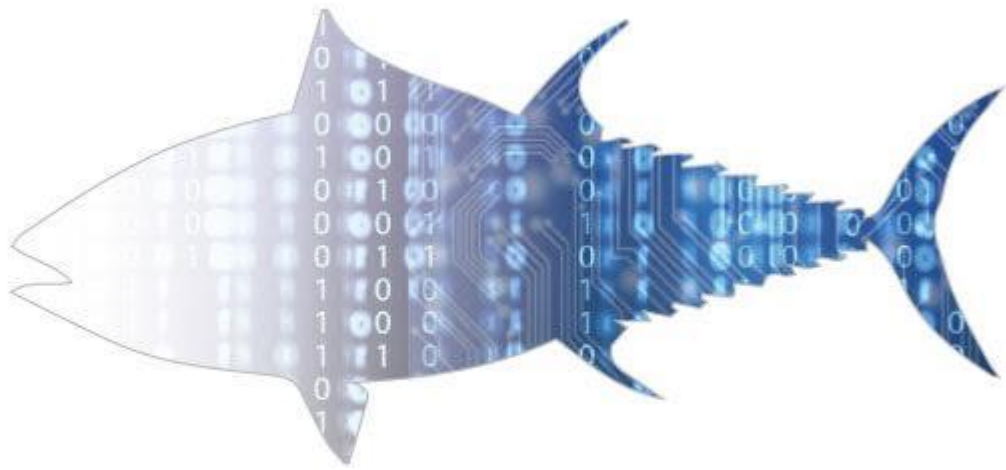
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# ***United States Marine Fisheries Electronic-Catch Reporting: Status Report and Recommendations***



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## ***Fisheries Management: Importance of Data Collection***

Marine fisheries are a powerful economic driver; American commercial and recreational fishing activities combined with ancillary support industries generate nearly 200 billion dollars annually.<sup>1</sup> Fisheries managers—at the state and federal level—are faced with an enormous responsibility: not only must they maintain healthy fish populations, they are obligated to preserve the fishing industry, and balance competing interests between harvesters and recreational anglers. Therefore, fisheries management is more than pure economics or biology, it is a combination of social science, natural resource economics and marine biology. To tackle these complex challenges, fisheries managers must be equipped with high-quality, timely information. Data available to managers is either fishery-independent or fishery-dependent, and receiving both types of information allows managers to execute successful policies.<sup>2</sup>

Fishery-independent information is acquired from activities that do not relate to the harvest of fish and include trawl, acoustic, video and sonar surveys, as well as experimental research and tagging.<sup>3</sup> Conversely, fishery-dependent data is derived from the fishing process itself and is produced by vessel-monitoring systems (VMS), telephone surveys, portside sampling, and logbooks completed by fishermen.

State and federal fisheries managers experience constant pressure to improve management practices; currently 16 federal fisheries are categorized as “overfished”, nine additional fisheries are subject to “overfishing”<sup>4</sup> and the Trump Administration released a June 2017 bulletin committing to expand domestic fishery harvest and export.<sup>5</sup>

One strategy to improve fisheries management policy is to provide state and federal managers with timely, reliable, high-quality data. High-quality information can enable managers to make informed, accurate management policies. Nearly all components of fishery-independent and dependent data collection *can* be improved, but at what cost? Undoubtedly, observer monitoring, research trawls and acoustic surveys provide critical information, but this type of data collection requires complex preparation and a significant cost-investment. Data costs for fishery-dependent data can be lower than fishery-independent information, because the former are a byproduct of commercial fishing activity.<sup>6</sup> Efforts to improve fisheries data collection should focus on improving the logbooks completed by fishermen; these improvements would be a cost-effective measure to dramatically improve the quality of information available to fishery managers. Logbooks are official documents that provide a systematic registry of activity aboard a fishing vessel.<sup>7</sup> By 1999, every federal and state harvest fishery had a version of a logbook that collected information on catch, species composition, fishing effort, and location.<sup>8</sup>

All commercial fish harvesting in the United States is documented, and critical information is therefore supplied by fishermen. If strategies to improve logbooks could be identified, including the development and distribution of electronic reporting systems, fisheries could conceivably benefit nationwide. Electronic logbooks would provide fishery managers with timely, better quality data, and facilitate improved management.

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<sup>1</sup> *Electronic Monitoring and Reporting Explained*. (n.d.). Retrieved June 04, 2017, from <https://www.st.nmfs.noaa.gov/advanced-technology/electronic-monitoring/em-er-explained>

<sup>2</sup> Cooper, A. B. (2015, November 6). *A Guide to Fisheries Stock Assessment* (Rep.). Retrieved <http://www.pewtrusts.org/~media/legacy/uploadedfiles/peg/publications/report/aguidetofisheriesstockassessmentpdf.pdf>

<sup>3</sup> Ibid

<sup>4</sup> *Status of U.S. Fisheries*. Retrieved June 04, 2017, from [http://www.nmfs.noaa.gov/sfa/fisheries\\_eco/status\\_of\\_fisheries/](http://www.nmfs.noaa.gov/sfa/fisheries_eco/status_of_fisheries/)

<sup>5</sup> Blank, C. (2017, June 2). Trump calls out US seafood trade imbalance. Retrieved June 04, 2017, from <https://www.seafoodsource.com/news/supply-trade/trump-calls-out-us-seafood-trade-imbalance>

<sup>6</sup> Cooper, A. B. (2015, November 6). *A Guide to Fisheries Stock Assessment*

<sup>7</sup> *NOAA Fisheries Glossary*. (n.d.). Retrieved from <https://www.st.nmfs.noaa.gov/st4/documents/FishGlossary.pdf>

<sup>8</sup> *Marine Fisheries Information Circular* (Rep.). (n.d.). Retrieved <http://www.ct.gov/deep/lib/deep/fishing/saltwater/marinecirc.pdf>

## ***Scope of Study: Logbooks for Commercial Harvesters and For-Hire Operations***

This study will evaluate the efficacy of electronic software programs intended to replace mandatory commercial fishing paper-logbooks. Commercial fishermen include harvesters and for-hire operators. Harvesters are defined as fishermen that harvest wild marine finfish, crustaceans or shellfish for sale. For-hire operations are classified as commercial fishing businesses offering sportfishing trips for paying-passengers. This paper will not address electronic logbooks for recreational fishermen, electronic monitoring software for fishery observers, or programs designed to collect supplemental information from commercial fishermen.

This project will provide a report on the status of electronic catch-reporting options in 23 coastal states. It is valuable to understand how state data managers follow different processes to design and launch electronic logbooks. In addition to a status-report on electronic reporting options, this document will identify the six core components of successful electronic logbook projects.

### ***Methodology***

To best capture the status of electronic logbook efforts nationwide, I conducted 17 interviews with state data managers and electronic logbook developers.

Each state fishery was researched, and data managers were asked to subjectively describe how electronic logbooks contributed to information collection in their state. I was most interested in obtaining unique regional insight that could identify successful components to guide future electronic logbook projects.

Lastly, I evaluated training materials and assistance options available to fishermen on each state website. I have ten years of experience as a commercial fisherman in San Diego as a captain in the for-hire fishery and participant in the lobster harvest sector. Starting in the spring of 2015, I was solely responsible for the distribution and successful implementation of the electronic logbook program for California's Commercial Passenger Fishing Vessel (CPFV) fleet. My activities included designing training materials and providing operator assistance. Starting from this background, I feel well-qualified to evaluate other active electronic logbook systems in terms of accessibility and functionality from a user-perspective.

### ***Logbooks: Overview***

Fishery data-managers require commercial fishermen in state and federal fisheries to submit information about every trip and harvest event. Traditionally, information has been collected in a paper logbook, supplied by the state or federal agency free of charge to fishermen. Paper-logbooks are printed on three-sheet carbon paper slips bound in booklets. Upon completing a paper-log, the fisherman retains one copy for his records, one copy accompanies the fish to the dealer, and the other is mailed to the state or federal agency. In some fisheries, logbooks must be completed prior to returning to port, while in other jurisdictions logbooks may be completed "at the end of the day" or once a fish is brought to a dealer. Typically, logbooks must be mailed monthly to the regulatory agency, although selected quota-monitored fisheries require weekly mailing<sup>9</sup> or next-day fax submission.<sup>10</sup> Logbooks vary from fishery to fishery, but typically collect core data elements concerning effort, location, and bycatch.<sup>11</sup>

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<sup>9</sup> Socrates, Julia. Personal Communication. 22 May 2017.

<sup>10</sup> *HMS Dealer and Importer/Exporter Compliance Guide* (Rep.). (2017, April). Retrieved [http://www.nmfs.noaa.gov/sfa/hms/compliance/guides/documents/hms\\_dealer\\_compliance\\_guide\\_06\\_2015\\_final.pdf](http://www.nmfs.noaa.gov/sfa/hms/compliance/guides/documents/hms_dealer_compliance_guide_06_2015_final.pdf)

<sup>11</sup> *Atlantic Coast Fisheries Data Collection Standards* (Publication)

Upon receiving fish, dealers must also complete a record of the transaction, and submit a document to the appropriate regulatory agency. For dealers, logbooks also differ between fisheries, but core data elements include the disposition (condition of the catch) and ex-vessel value (market price). The logbook produced by the fisherman and dealer combine to form a “trip-ticket”, a document recording effort, location and catch for every fishing trip. In fisheries where fishermen and dealers have direct contact *and* the fisherman may complete a logbook after returning to port, the fisherman and dealer fill out separate portions of the same form. If a fisherman is required to complete the logbook at sea, or if the fisherman and dealer are separated by large distances, separate logbooks are completed, submitted independently, and data entry staff match the documents by a stamped serial number.<sup>12</sup> In interviews, data managers agreed that untimely submissions, un-validated data, and excessive costs are common problems with paper logbooks (Table 1).

**Table 1: Common problems associated with paper-logbooks**

TIMELINESS	VALIDATION	COST
<ul style="list-style-type: none"> <li>• Typically, logbooks must be completed daily, assembled by the end of the month, and mailed to the appropriate regulatory agency.</li> <li>• In practice, logbooks are sometimes submitted late or not at all.</li> <li>• 17 data managers surveyed around the country revealed that roughly 80 percent of fishermen in their jurisdictions observe reporting deadlines.</li> </ul>	<ul style="list-style-type: none"> <li>• Paper logs must be completed in indelible ink, no fields may be left blank and values can only be within a permissible range.</li> <li>• Reasons why a log cannot be validated:               <ul style="list-style-type: none"> <li>A. Handwriting is illegible.</li> <li>B. Log is incomplete.</li> <li>C. Values are outside possible parameters.</li> </ul> </li> <li>• When a log cannot be validated, information from the log cannot be added to a database.</li> </ul>	<ul style="list-style-type: none"> <li>• A significant cost is associated with producing and processing paper-logbooks:               <ul style="list-style-type: none"> <li>A. Regulatory agencies provide fishermen with paper booklets.</li> <li>B. Data-entry staff manually key-punch logbooks into databases.</li> <li>C. Logs that cannot be validated are mailed back to fishermen for completion, or staff contact fishermen via phone to correct errors.</li> </ul> </li> <li>• Fishermen and agencies are legally obligated to store paper-logs for record keeping.</li> </ul>
<b>Example</b>	<b>Example</b>	<b>Example</b>
<p>In Rhode Island, harvesters are obligated to submit logbooks to the state quarterly. Many logbooks for the entire year are received in December. Late logbook submissions have resulted in Tautog harvest exceeding quotas for 2009-2012.<sup>13</sup></p>	<p>The Albacore Troll logbook collects longitude and latitude coordinates when fish are harvested.<sup>14</sup> If coordinates are not completely and legibly entered for each stop, federal staff must contact the operator to correct information before information can be entered in the database.<sup>15</sup></p>	<p>Oregon is interested in developing an electronic logbook for their state-managed Dungeness Crab Fishery. 342 vessels in the fleet produce paper logs daily, and managers believe the primary benefit of a Dungeness e-logbook would be the considerable cost-savings associated with eliminating paper-log data entry.<sup>16</sup></p>

<sup>12</sup> Ibid

<sup>13</sup> Ares, Nichole. Personal Communication. 11 May 2017.

<sup>14</sup> Commercial Fishing Logbooks. (2012, September 20). Retrieved June 02, 2017, from [http://www.westcoast.fisheries.noaa.gov/fisheries/migratory\\_species/highly\\_migratory\\_species\\_logbooks.html](http://www.westcoast.fisheries.noaa.gov/fisheries/migratory_species/highly_migratory_species_logbooks.html)

<sup>15</sup> Childers, John. Personal Communication. 17 February 2017.

<sup>16</sup> Ainsworth, Justin. Personal Communication. 1 June 2017.

Well-built electronic software programs can solve the problems associated with paper-logbooks. Nationwide, efforts to create electronic logbooks first focused on fish dealers, with the understanding that a permanent, land-based operation would be more conducive to electronic reporting. Florida developed the first electronic dealer logbook in 1984, releasing a desktop-application collecting trip ticket information.<sup>17</sup> The desktop application collected information digitally, but it was transferred to the State on a hard-drive via paper mail.<sup>18</sup> In 2003, the first Windows-based programs were developed independently in Rhode Island and Florida, allowing dealers to submit trip ticket data via modem and internet connection rather than traditional mail delivery.<sup>19</sup> Since 2003, electronic logbooks for dealers have been introduced for most state and federal fisheries.

Designing electronic logbooks for fishermen has proved to be much more challenging: while electronic logbooks for dealer reporting are mandatory in many federal fisheries, most electronic harvester and for-hire logbooks are optional, and paper forms are still accepted. Fishermen are free to choose between paper and electronic logbook reporting options, and while electronic reporting is undoubtedly the preferable option for data managers, low participation in electronic reporting reveals that fishermen still find paper-reporting to be the more convenient reporting option. Being mindful of expenses, yet acknowledging that the electronic logbook must be more convenient than the paper alternative, data managers decide which type of software platform should support the electronic logbook (Table 2).

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<sup>17</sup> Florida Commercial Saltwater Fishing Regulations. (n.d.). Retrieved June 02, 2017, from <http://myfwc.com/fishing/saltwater/commercial/>

<sup>18</sup> Ibid

<sup>19</sup> Introduction to SAFIS. (n.d.). Retrieved from [https://www.accsp.org/sites/default/files/ACCSP\\_GettoKnowSAFIS.pdf](https://www.accsp.org/sites/default/files/ACCSP_GettoKnowSAFIS.pdf)

**Table 2:** Catch-reporting software for fishermen can be supported on three types of platforms.

PROGRAM TYPE	STRENGTHS	WEAKNESSES
<p><b>Desktop Applications:</b></p> <ul style="list-style-type: none"> <li>Developed for and installed on a particular operating system.</li> <li>Most inexpensive program to develop.</li> </ul>	<ul style="list-style-type: none"> <li>Desktop applications are confined to a physical location. This may be inconvenient for some users, but for fishermen accustomed to using a desktop it may be a reassurance.</li> <li>Limited security risks—users have a total control over the stand-alone application.</li> <li>Can operate faster than a web-application, as heavy traffic on the network server can slow web-applications down.</li> </ul>	<ul style="list-style-type: none"> <li>Limited by the hardware on which they are run.</li> <li>May have strict hardware requirements that must be met to ensure that they function correctly</li> <li>May require hardware upgrades or other changes to work.</li> <li>Updates must occur on each computer.</li> </ul>
<p><b>Web-Application</b></p> <ul style="list-style-type: none"> <li>A website adapted, not optimized for phones and tablets</li> <li>Accessed by entering a URL in a browser window.</li> <li>Web-Application runs on browser window. (Internet Explorer)</li> <li>Increasingly inexpensive to design and launch.</li> </ul>	<ul style="list-style-type: none"> <li>Updates takes place without the user realizing it. It is an automatized, online process for all internet-connected users.</li> <li>All users are on the same version.</li> <li>Can be released and updated immediately.</li> <li>Iterations can easily be fixed by programmers creating a system-wide update.</li> <li>Programmed in Java, which is a basic programming language.</li> </ul>	<ul style="list-style-type: none"> <li>More vulnerable to hacks compared to the Mobile or Desktop Applications.</li> <li>Slower than Desktop or Mobile Apps.</li> <li>Program will be optimized for one browser for example Internet Explorer, not Firefox or Chrome.</li> <li>Program will not be able to access all the hardware on a device.</li> <li>If browser is corrupted or crashes, logbooks will be lost.</li> </ul>
<p><b>Mobile-Application</b></p> <ul style="list-style-type: none"> <li>Designed for specific operating system (iOs), and runs on the device hardware.</li> <li>Most expensive option to develop.</li> </ul>	<ul style="list-style-type: none"> <li>Ideal for frequent and repeated use-submitting daily logs.</li> <li>Typically faster than Web-Apps.</li> <li>Can access hardware sensors like microphone, camera, GPS, which enhance user interactions and experience.</li> </ul>	<ul style="list-style-type: none"> <li>Users are required to download and authorize each update.</li> <li>Design requires familiarity with complex programming language: iOs applications are developed with Objective C and Swift code.</li> </ul>

# Regional Informational Guides

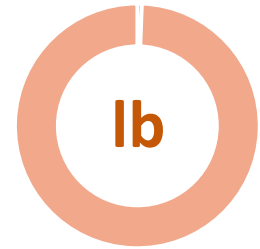
A nation-wide evaluation of State electronic catch-reporting programs must be made in context; it is critical to acknowledge that fisheries vary considerably in commercial importance from state to state.

Furthermore, some states are tasked with managing most important commercial-species, while in other states commercially-important species are predominantly managed by regional fisheries councils under guidance from National Marine Fisheries Service (NMFS).

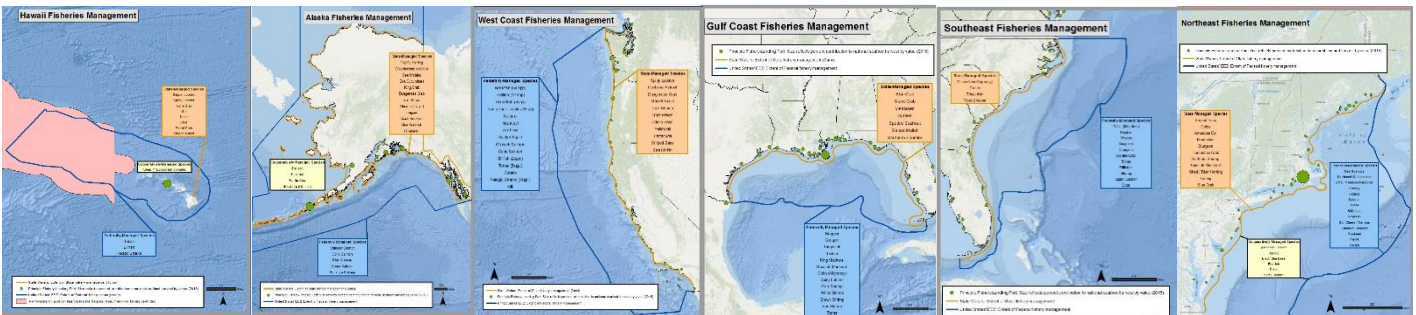
## Regional Informational Guides: Explanation



Before evaluating how states implemented electronic catch-reporting software, consider how the region contributes to national seafood harvest by volume and value. In 2015, American fishermen harvested 5.871 billion pounds of seafood worth 3.598 billion dollars. These graphics communicate regional contribution to national total harvest.



The United States has 23 coastal states which are divided into six regions for analysis. Maps reveal how key (important for harvesters and for-hire fleets) commercial species are managed. Important ports are also identified; electronic logbook projects could benefit from concentrated landings and struggle in areas with widely-distributed wholesalers. It is critical to understand where regional seafood is landed. Ports are indicated by scaled green circles, corresponding to their contribution to total national seafood harvest by value.



	Federal Dealers Year Implemented	Federal Harvesters Year Implemented	Federal For-Hire Year Implemented	State Dealers Year Implemented	State Harvesters Year Implemented	State For-Hire Year Implemented
Maine	2008*	X	X	2016	X	X
New Hampshire	2004*	2012	X	2004*	X	X
Massachusetts	2004	2008	2017	2005	2010	2017
Rhode Island	2004*	2012	2014	2008*	2012	2014
Connecticut	2004*	2012	X	2008*	X	X
New York	2008*	2008	X	2008*	2010	X
New Jersey	2008*	2008	X	2008*	2010	X
Delaware	2008*	2015	X	2008*	2010	X
Maryland	2004	2012	X	2010	2013	X
Virginia	2010	2012	X	2010	2012	X



When electronic logbooks were implemented as a reporting option

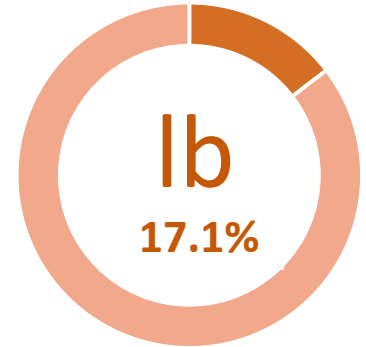


## Northeast: Fishery Profile and Electronic Catch-Reporting Log Options



The Northeast lands the bulk of the nation's seafood by value; American Lobster, Sea Scallops, Menhaden and Surf Clams are key commercially-harvested species.

Key species targeted by for-hire fisheries in the Northeast include Striped Bass, Bluefin Tuna and Tautog.



**Table 3: Electronic Catch-Reporting Log Options in the Northeast:** *Electronic-data collection programs have allowed dealers, harvesters and for-hire operations to satisfy paper-reporting requirements. Introduction of an electronic-reporting mechanism does not necessarily mean it has been adopted widely. Asterisks denote states where electronic reporting is currently mandatory.*

	Federal Dealers Year Implemented	Federal Harvesters Year Implemented	Federal For-Hire Year Implemented	State Dealers Year Implemented	State Harvesters Year Implemented	State For-Hire Year Implemented
Maine	2008*	2011	X	2016	X	X
New Hampshire	2004*	2011	X	2004	X	X
Massachusetts	2004	2011	2017	2005	2010	2017
Rhode Island	2004*	2011	2014	2008	2012	2014
Connecticut	2004*	2011	X	2008	X	X
New York	2008*	2011	X	2008	2010	X
New Jersey	2008*	2011	X	2008	2010	X
Delaware	2008*	2011	X	2008	2010	X
Maryland	2004	2011	X	2010	2013	X
Virginia	2010	2011	X	2010	2012	X

Atlantic States are members of the Atlantic Coast Cooperative Statistics Program (ACCSP), established to manage shared fishery resources.<sup>20</sup> Capitalizing on advances in technology, ACCSP created the Standard Atlantic Fisheries Information System (SAFIS), an electronic logbook program for fish dealers in 2003.<sup>21</sup> SAFIS has since expanded to include web-based applications handling dealer logbooks (*eDR*) and harvester electronic logbooks (*eTrips*) documenting catch and effort.<sup>22</sup> By 2014, SAFIS released an iOS mobile application (*eMobile*), enabling fishermen to complete logbooks at sea. Currently, SAFIS is pursuing swipe card technology, enabling rapid, validated-monitoring of Individual Fishery Quotas (IFQ).<sup>23</sup>

<sup>20</sup> *Atlantic Coast Fisheries Data Collection Standards* (Publication). (n.d.). Retrieved [http://www.accsp.org/sites/default/files/Standards\\_AppendixE\\_CommercialQAQC\\_2012.pdf](http://www.accsp.org/sites/default/files/Standards_AppendixE_CommercialQAQC_2012.pdf)

<sup>21</sup> Ibid

<sup>22</sup> Ibid

<sup>23</sup> Ibid

Fishermen and dealers participating in state and federal fisheries have the option to submit electronic logbooks on SAFIS applications. If states or federal fisheries use independent software to collect data, or produce paper reports, all information is submitted into SAFIS and eventually stored in the ACCSP Data Warehouse.

SAFIS is a flexible reporting option supporting different software platforms, designed for unique fisheries. Select Northeast Atlantic States incorporate SAFIS well into their reporting schemes, while others do not. All states in the Northeast can use SAFIS, but Maryland and Virginia developed independent programs, citing that their fishermen found SAFIS difficult to navigate and poorly designed for their needs.<sup>24 25</sup>

#### *Harvesters:*

Fishing practices in the Northeast dictate that a transporter is often involved to ferry seafood from the harvester to the dealer. Because the harvester and dealer are separated by time and space, two logbooks are completed to document a harvest event. Consequently, fishermen can use the web-application *eTrips* to submit a Vessel Trip Report (VTR) chronicling location, effort and gear associated with the harvest.<sup>26</sup> Fishermen in Maine, New Hampshire, Rhode Island, Connecticut, and Massachusetts can complete VTRs at sea with *eMobile*.<sup>27</sup> In addition to using the two SAFIS applications to submit VTR logbooks, fishermen in the Northeast may use Fisheries Logbook and Data Recording Software (FLDRS), Fishing Activity & Catch Tracking System (FACTS™), or the Dynamic Data Logger (DDL) to produce a digital VTR.<sup>28</sup> While there are five electronic options to submit VTRs, the software is optional and most harvesters continue to submit paper reports.<sup>29</sup>

#### *Dealers:*

Most federally-permitted dealers in the Northeast are required to report electronically.<sup>30</sup> Some seafood dealers use the *eDR* web-application to report directly, but most prefer to use third-party Bluefin Data Trip-Ticket Software.<sup>31</sup> Bluefin Data can be accessed offline, and dealers find it more convenient to enter high-volume purchases than *eDR*.<sup>32</sup> State-permitted dealers are not required to report electronically, and most continue to submit paper reports. Maine and Massachusetts implemented swipe-card technology, where harvesters submit personal information to dealers quickly and accurately by magnetic reader.<sup>33</sup>

#### *For-Hire:*

Most for-hire fisheries in the Northeast are not required to produce a paper or electronic logbook. Catch and effort information are collected through the NMFS Marine Recreational Fisheries Statistics Survey (MRFSS) by interviewing passengers, conducting telephone interviews with operators monthly, and random dockside sampling.<sup>34</sup> MRFSS procedures are robust, but representative sampling will never be as accurate as census-style, complete reporting. Data managers revealed that in the Northeast, Striped Bass, Tautog, Cobia and Summer Flounder management would benefit

<sup>24</sup> Corbett, Heather. Personal Communication. 30 May 2017.

<sup>25</sup> Virginia Commercial Fisheries Regulations. (n.d.). Retrieved June 02, 2017, from <http://www.mrc.state.va.us/Regulations/regindex.shtml>

<sup>26</sup> ACCSP Annual Report 2016 (Rep.). (2017, March 3). Retrieved [https://www.accsp.org/sites/default/files/Annual%20Report%202016\\_FINAL.pdf](https://www.accsp.org/sites/default/files/Annual%20Report%202016_FINAL.pdf)

<sup>27</sup> Ibid

<sup>28</sup> Ibid

<sup>29</sup> Greater Atlantic Regional Fisheries Office and Northeast Fisheries Science Center Electronic Technologies Progress Report (Rep.). (2016, November 15). Retrieved [https://www.st.nmfs.noaa.gov/Assets/advanced-tech/electronic-monitoring/documents/Greater\\_Atlantic\\_Regional\\_ET\\_Plan\\_Update\\_Fall\\_2016.pdf](https://www.st.nmfs.noaa.gov/Assets/advanced-tech/electronic-monitoring/documents/Greater_Atlantic_Regional_ET_Plan_Update_Fall_2016.pdf)

<sup>30</sup> Atlantic Coast Fisheries Data Collection Standards (Publication). (n.d.). Retrieved [http://www.accsp.org/sites/default/files/Standards\\_AppendixE\\_CommercialQAQC\\_2012.pdf](http://www.accsp.org/sites/default/files/Standards_AppendixE_CommercialQAQC_2012.pdf)

<sup>31</sup> Ibid

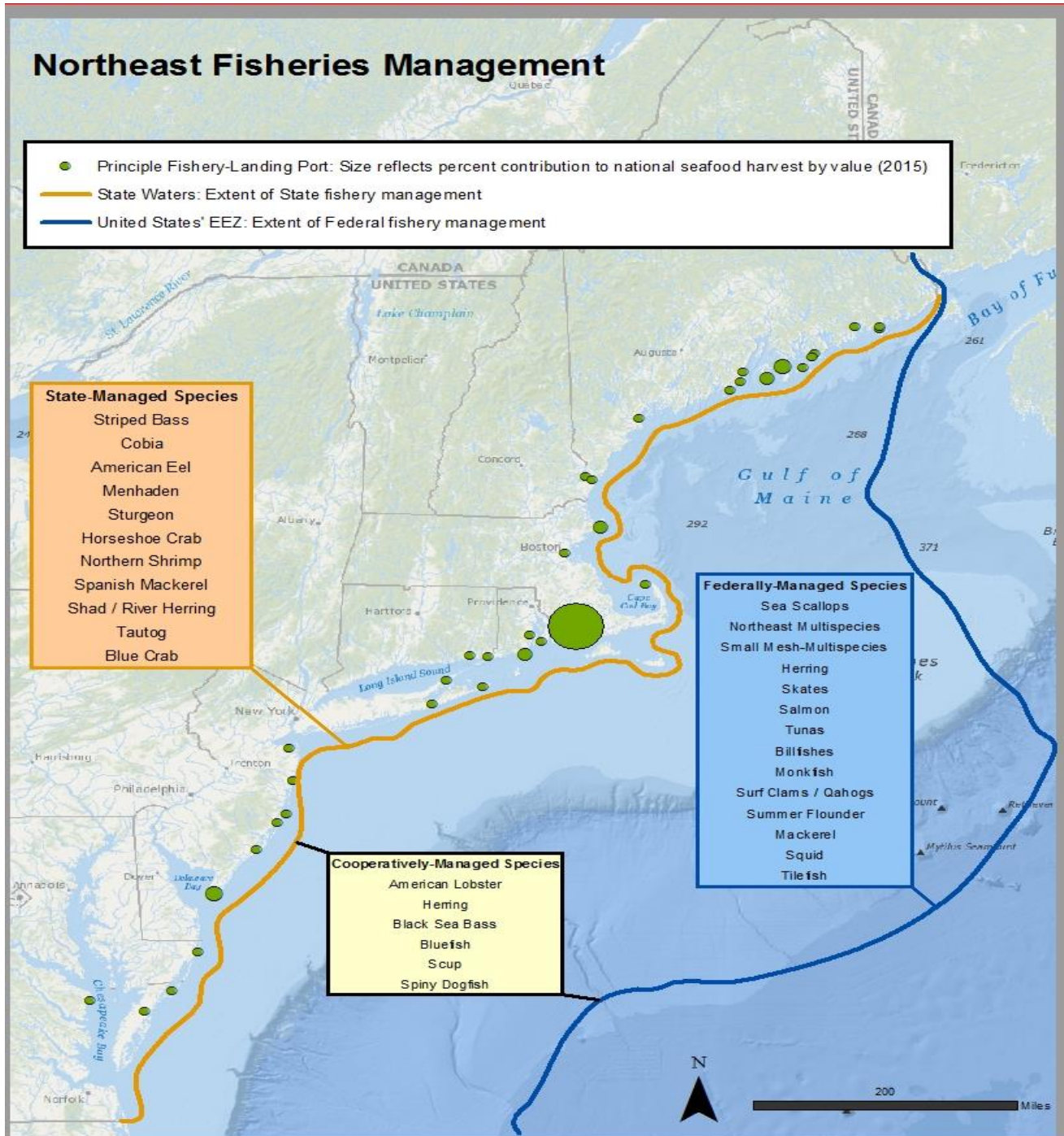
<sup>32</sup> Dukes, Amy. Personal Communication. 13 May 2017.

<sup>33</sup> Watts, Rob. Personal Communication. 10 May 2017.

<sup>34</sup> Interstate Marine Fisheries Management (Rep.). (n.d.). Retrieved [http://www.ct.gov/deep/lib/deep/fishing/performance\\_reports/interstate\\_marine\\_fisheries\\_management.pdf](http://www.ct.gov/deep/lib/deep/fishing/performance_reports/interstate_marine_fisheries_management.pdf)

from electronic logbook reporting.<sup>35</sup> Rhode-Island and Massachusetts implemented *eMobile* reporting to manage for-hire fisheries targeting Tautog.<sup>36</sup>

**Figure 1: Fisheries Management in the Northeast**



<sup>35</sup> Joule, Bruce. Personal Communication. 17 May 2017.

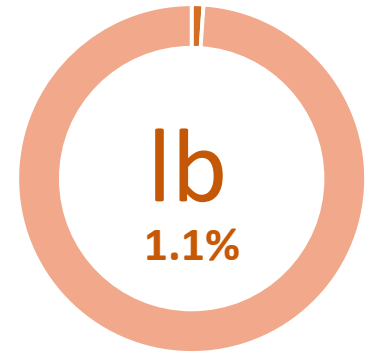
<sup>36</sup> Webb, Anna. Personal Communication. 22 May 2017.

## Southeast: Fishery Profile and Electronic Catch-Reporting Log Options



The Southeast lands a small percentage of the nation’s seafood by volume and value. For-hire fisheries are considered more important than harvest fisheries in the Southeast and have more urgent management concerns.

Key species targeted by for-hire fisheries in the Southeast include Cobia, Snappers, Billfish, Dolphin and Wahoo.



**Table 4: Electronic Catch-Reporting Log Options in the Southeast:** *Electronic-data collection programs have allowed dealers, harvesters and for-hire operations to satisfy paper-reporting requirements. Introduction of an electronic-reporting mechanism does not necessarily mean it has been adopted widely. Asterisks denote states where electronic reporting is mandatory.*

	Federal Dealers <i>Year Implemented</i>	Federal Harvesters <i>Year Implemented</i>	Federal For-Hire <i>Year Implemented</i>	State Dealers <i>Year Implemented</i>	State Harvesters <i>Year Implemented</i>	State For-Hire <i>Year Implemented</i>
North Carolina	2011	X	2010	2011	X	X
South Carolina	2004	2012	2010	2012	X	2015
Georgia	2004	2008	2010	2005	2010	X
Florida	2004	2012	2010	2008*	X	X

North Carolina, South Carolina, Georgia and Florida are members of the ACCSP, but fishermen and dealers do not use SAFIS as extensively as their counterparts in the Northeast. Fishing practices are different compared to the Northeast, and harvesters typically deliver fish directly to a dealer.<sup>37</sup> Given that harvesters and dealers interact in person, transactions are documented with SAFIS *e1ticket* application, enabling harvesters and dealers to complete different portions of the same document.<sup>38</sup> Fishermen find SAFIS convenient for small seafood entries with varied species, while high-volume entries with a single species are more easily logged on Bluefin Data software.<sup>39</sup> Federal dealers in the four states prefer to pay for Bluefin Data logbook software, finding it more user-friendly than free SAFIS software.<sup>40</sup>

It is possible that SAFIS is optimized for fishing practices in the Northeast, as all Southeastern states indicated low participation in the free program.<sup>41</sup> North Carolina’s dealers struggled with SAFIS, and in 2011, the state contracted Bluefin Data to build an electronic trip ticket platform for state and federal dealers.<sup>42</sup> Dealer logbooks for federal and state fisheries in North Carolina are produced on North Carolina Trip-Ticket software. Electronic catch reporting is

<sup>37</sup> Introduction to SAFIS. (n.d.). Retrieved from [https://www.accsp.org/sites/default/files/ACCSP\\_GettoKnowSAFIS.pdf](https://www.accsp.org/sites/default/files/ACCSP_GettoKnowSAFIS.pdf)

<sup>38</sup> Ibid

<sup>39</sup> Dukes, Amy. Personal Communication. 13 May 2017.

<sup>40</sup> Califf, Julie. Personal Communication. 13 June 2017.

<sup>41</sup> Ibid

<sup>42</sup> *North Carolina Trip Ticket Program Manual* (Rep.). (2013, June). Retrieved from [http://portal.ncdenr.org/c/document\\_library/get\\_file?uuid=37aabe73-e5cd-4948-a567-ec776ac50f5c&groupId=38337](http://portal.ncdenr.org/c/document_library/get_file?uuid=37aabe73-e5cd-4948-a567-ec776ac50f5c&groupId=38337)

considered successful in North Carolina, and other states have looked to its trip ticket program for guidance.<sup>43</sup> Geography undoubtedly creates an obstacle to successful electronic reporting in the Southeast. Data managers in Georgia, South Carolina and Georgia agreed that fish and shrimp are primarily landed in rural coastal areas and barrier islands with no broadband internet access.

While North Carolina has a strong electronic logbook program for dealers, no federal or state dealers in the Southeast are *required* to report electronically, and transitioning remote crab, clam, and oyster dealers to electronic reporting is proving to be a challenge for data managers.<sup>44</sup> Some seafood simply is not documented in the Southeast—dealers in Georgia have not been obligated register or submit any logbooks until 2017.

Until 2016, all for-hire commercial fishermen in the Southeast produced a paper VTR logbook documenting fishing effort in federal waters, and no document for activity in state waters. The closure of the Cobia for-hire fishery in federal waters may have acted as an impetus for electronic logbook development in South Carolina.<sup>45</sup> Cobia is an important target for charter anglers, and in 2015, for-hire harvest in the Southeast exceeded the allowable catch limit (ACL) by 145 percent.<sup>46</sup> NMFS closed the fishery, and South Carolina adopted similar restrictive measures in state waters, permitting a catch and release season.<sup>47</sup> South Carolina contracted Bluefin Data to develop and launch a web-application for the for-hire fishery. Currently, 60 percent of the for-hire charter boat fleet report electronically and produce timely and validated records of Cobia catch and release. While the South Atlantic Fishery Management Council (SAFMC) will employ both fishery independent and dependent data to evaluate, and ultimately re-open the Cobia fishery, the South Carolina for-hire fishermen are contributing to management by suppling data managers with improved data.

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<sup>43</sup> *Ibid*

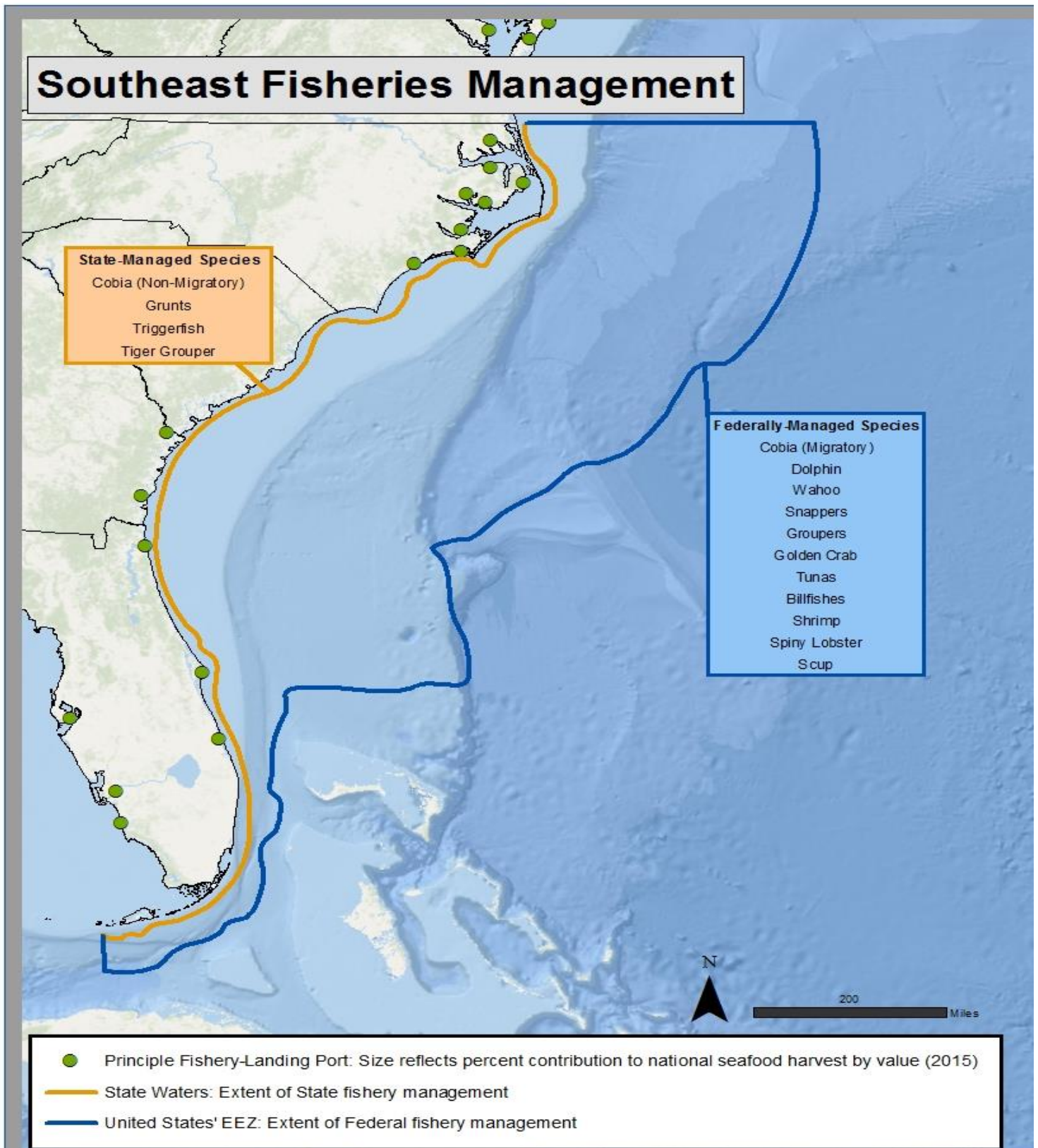
<sup>44</sup> Bianchi, Alan. Personal Communication. 13 May 2017.

<sup>45</sup> *Southeast Region Biannual Progress Review of Implementation of NOAA Fisheries Electronic Technologies* (Rep.). (2016, November). Retrieved [https://www.st.nmfs.noaa.gov/Assets/advanced-tech/electronic-monitoring/documents/Southeast\\_Regional\\_ET\\_Plan\\_Update\\_Fall\\_2016.pdf](https://www.st.nmfs.noaa.gov/Assets/advanced-tech/electronic-monitoring/documents/Southeast_Regional_ET_Plan_Update_Fall_2016.pdf)

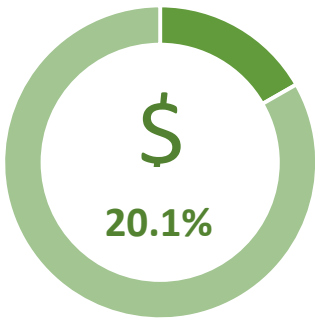
<sup>46</sup> Cobia Management: How the Atlantic States Marine Fisheries Commission could take part in the management of the cobia fishery

<sup>47</sup> Dukes, Amy. Personal Communication. 13 May 2017.

Figure 2: Southeast Fisheries Management

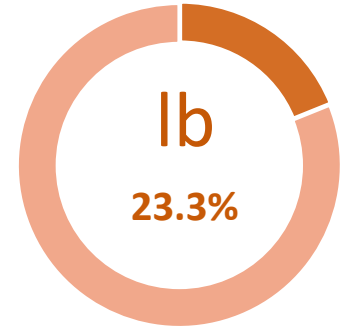


## Gulf Coast: Fishery Profile and Electronic Catch-Reporting Log Options



*Shrimp, Menhaden, Stone Crab, Oysters and Tuna are regionally important commercially-harvested species.*

*Red Drum, Sea Trout, Spanish Mackerel, Cobia and Red Snapper are targeted by the for-hire fishery.*



**Table 5: Electronic Catch-Reporting Log Options in the Gulf:** *Electronic-data collection programs have allowed dealers, harvesters and for-hire operations to satisfy paper-reporting requirements. Introduction of an electronic-reporting mechanism does not necessarily mean it has been adopted widely.*

	<b>Federal Dealers</b> <i>Year Implemented</i>	<b>Federal Harvesters</b> <i>Year Implemented</i>	<b>Federal For-Hire</b> <i>Year Implemented</i>	<b>State Dealers</b> <i>Year Implemented</i>	<b>State Harvesters</b> <i>Year Implemented</i>	<b>State For-Hire</b> <i>Year Implemented</i>
<b>Florida</b>	Introduced 2004. Mandatory in 2014 for selected spp.	Shrimp: 2007	Red Snapper & Gag Grouper: 2013	2004	X	X
<b>Alabama</b>	Introduced 2011. Mandatory in 2014 for selected spp.	Shrimp: 2007	Red Snapper & Gag Grouper: 2013	2011	X	X
<b>Mississippi</b>	Introduced 2011. Mandatory in 2014 for selected spp.	Shrimp: 2007	Red Snapper & Gag Grouper: 2013	2011	X	X
<b>Louisiana</b>	Introduced 2012. Mandatory in 2014 for selected spp.	Shrimp: 2007	Red Snapper & Gag Grouper: 2013	2012	X	X
<b>Texas</b>	Introduced 2007. Mandatory in 2014 for selected spp.	Shrimp: 2007	Red Snapper & Gag Grouper: 2013	2007	X	X

The Gulf of Mexico (GOM) led the nation in developing many electronic logbook projects for federal fish dealers and for-hire fisheries, but large sectors of the fishing community, especially harvesters and state fish dealers, continue to produce paper logs.

**Dealers:**

Since 2014, federal dealers in the (GOM) receiving Snappers, Groupers, Tilefish, Triggerfish, Amberjacks, Gulf Red Drum, Cobia, King Mackerel, Spanish Mackerel, Shrimp, Spiny Lobster, and Golden Crab have been required to submit electronic logbooks weekly.<sup>48</sup> All five states contract electronic logbook reporting to a third-party software provider, Bluefin Data.<sup>49</sup> Dealers receiving other federally-managed species—like Yellowfin Tuna—are not required to report electronically. Dealers receiving state-managed species have the option to submit reports electronically, using Bluefin Data, but many continue to submit paper logs.<sup>50</sup>

<sup>48</sup> *Modifications to Charter Vessel and Headboat Reporting Requirements* (Publication). (2016, August

<sup>49</sup> Topping, Darrin. Personal Communication. 21 May 2017.

<sup>50</sup> Ibid

### Harvesters

Commercial harvesters in Highly Migratory Species Fisheries (HMS) and Coastal Pelagic Fisheries are required to complete a Vessel Trip Report (VTR). Currently, VTRs cannot be submitted electronically in the GOM, and must be mailed to NMFS within one week of landing.<sup>51</sup> It is important to note that many-commonly caught fish in the HMS/Coastal Pelagic Fishery Complex, must be reported electronically when received by the dealer. Furthermore, VTR forms in the GOM are consistent with VTR forms and reporting deadlines in the Atlantic, where fishermen currently have five electronic options to submit them.<sup>52</sup> Red Snapper, Groupers, and Tilefish harvesting have all been tightly managed since 2009, with individual fishing quotas allocating specific catch to each harvester.<sup>53</sup> Participants in the Gulf Snapper/Grouper individual fishing quota (IFQ) fishery do not prepare electronic logbooks, but upon leaving port are required to “hail out” to NMFS.<sup>54</sup> At sea, vessels are tracked with VMS, and must “hail-in” notifying NMFS hours before returning to port.<sup>55</sup> The “hailing” procedure still produces a paper VTR, but is a more effective method to communicate vessel information to researchers and enforcement than an electronic logbook.

### For-Hire

Strong inroads have been made in the development of electronic logbooks for the GOM for-hire fishery. The fishery consists of vessels carrying more than six passengers called *headboats*, and *charter-boats*, vessels carrying six or fewer passengers. Both types of vessels target red snapper and gag grouper, and any fish retained count against the regional ACL. As of 2013, all 67 headboats operating in the GOM established accounts with NMFS and submit electronic logbooks on a *weekly* basis via web portal or mobile-application.<sup>56</sup> Bluefin Data designed the software and offers a web-application, iPhone-app, and a Samsung App.<sup>57</sup> In 2014, 17 headboats participated in a pilot program to increase reporting frequency, and now produce *daily* electronic logs, documenting snapper and gag grouper catch.<sup>58</sup> While electronic logbooks are mandatory for headboats, 1328 charter boats in the GOM harvest red snapper and gag grouper and do not produce a logbook.<sup>59</sup> Effort and catch and the charter boat fleet is approximated by portside sampling surveys and a monthly phone sample of 10 percent of the operators. It is questionable whether focused sampling can ever be as accurate as a census-style logbook, and in April 2017, the Gulf of Mexico Fishery Management Council (GMFMC) proposed legislation that would implement mandatory weekly electronic reporting for all charter vessels in the GOM.<sup>60</sup>

Perhaps recognizing that GMFMC would eventually implement a logbook for the charter fleet, two independent projects developed electronic logbooks to capture data from GOM charter vessels targeting red snapper and gag grouper. In 2014, *iSnapper* was developed by Elemental Methods, LLC, and distributed amongst charter operators in Texas, Louisiana, Alabama and Florida.<sup>61</sup> Optimized for iOS devices, *iSnapper* is used by charter fishermen to complete logs at

<sup>51</sup> Commercial Fishing Regulations for Gulf of Mexico Federal Waters, Gulf of Mexico Fishery Management Council *et seq.* (2017).

<sup>52</sup> Greater Atlantic Regional Fisheries Office: Fisheries Management Jurisdiction. (2012, July 26). Retrieved June 02, 2017, from <https://www.greateratlantic.fisheries.noaa.gov/sustainable/index.html>

<sup>53</sup> Implemented Fishery Management Plans. (n.d.). Retrieved June 02, 2017, from <https://gulfcouncil.org/fishery-management/implemented-plans/>

<sup>54</sup> *Ibid*

<sup>55</sup> National Marine Fisheries Service, Southeast Office of Law Enforcement. (n.d.). *National Marine Fisheries Service Announces Alternate Procedures to Address Reporting Problems with, VMS Units in Atlantic HMS Fisheries*. Retrieved from National Marine Fisheries Service Announces Alternate Procedures to Address Reporting Problems with, VMS Units in Atlantic HMS Fisheries

<sup>56</sup> *Modifications to Charter Vessel and Headboat Reporting Requirements* (Publication). (2016, August).

<sup>57</sup> *Ibid*

<sup>58</sup> *Ibid*

<sup>59</sup> *Ibid*

<sup>60</sup> *Ibid*

<sup>61</sup> Stunz, G. (n.d.). *iSnapper: Design, testing, and analysis of iPhone-based application as an electronic logbook in the for-hire GOM red snapper fishery* (Rep.). Retrieved [https://www.sefsc.noaa.gov/P\\_QryLDS/download/CR954\\_Stunz\\_2014.pdf?id=LDS](https://www.sefsc.noaa.gov/P_QryLDS/download/CR954_Stunz_2014.pdf?id=LDS)



sea, and data is submitted when cellular-service is reacquired.<sup>62</sup> Developers invested heavily in designing a simple, functional application that worked well in an offline environment. While *iSnapper* collects detailed information, and fishermen invest as much as 15 minutes to complete a report, it has been well-received, and recently expanded beyond the for-hire fleet as a voluntary reporting option for all recreational anglers in the Gulf.<sup>63</sup>

*SnapperCatch*, developed by the State of Alabama in 2015, is another effective tool to monitor snapper harvest, but operates on a different principle than *iSnapper*.<sup>64</sup> Instead of collecting detailed information, on an expensive customized mobile-app, *SnapperCatch* is a web-application simply documenting snapper harvest.<sup>65</sup> Operators are not legally required to complete the form at sea, so they can wait until cellular service is acquired, and submit snapper harvest and discards on a simple web-application.<sup>66</sup>

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<sup>62</sup>Ibid

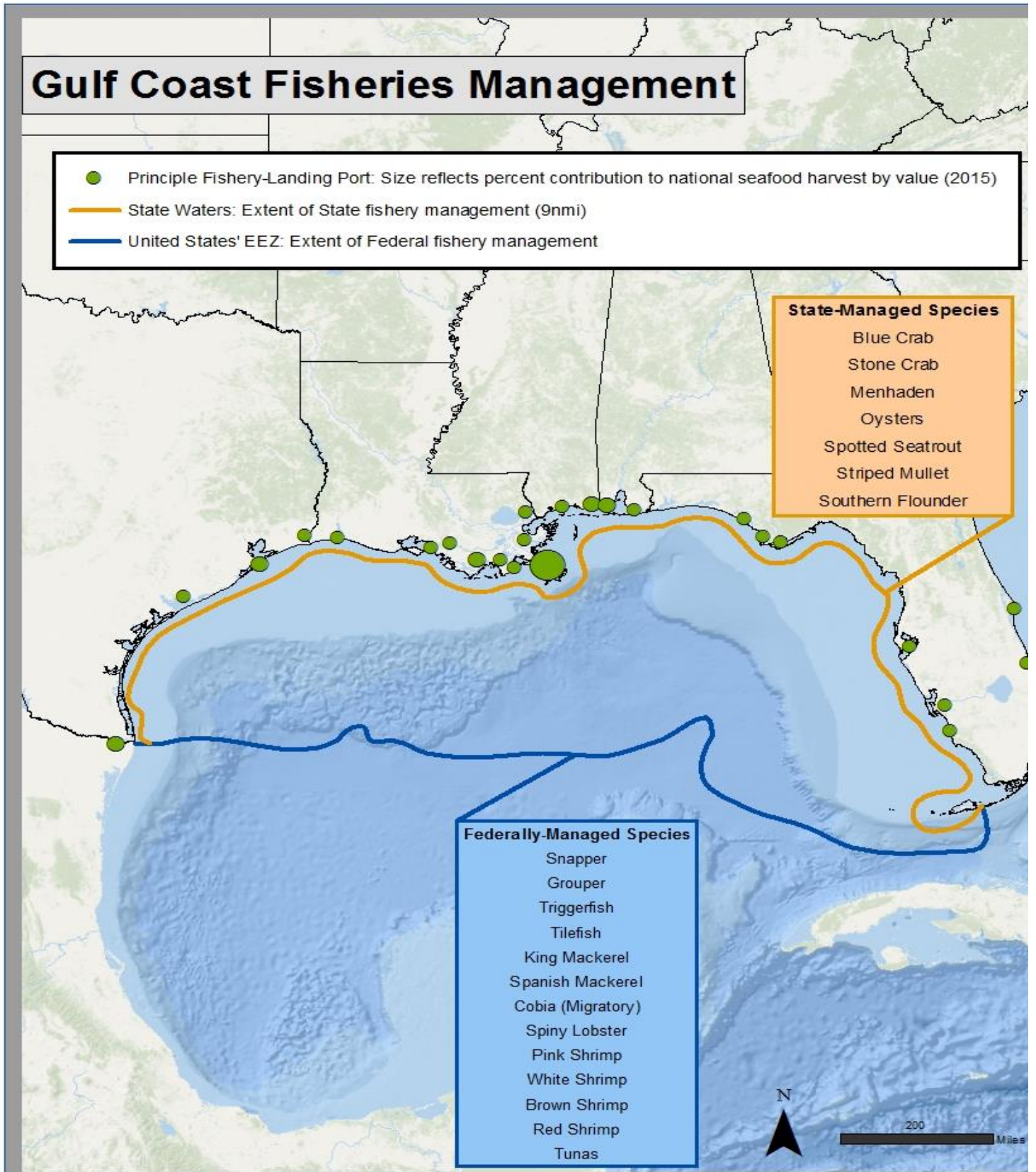
<sup>63</sup> Topping, Darrin. Personal Communication. 21 May 2017.

<sup>64</sup> Red Snapper Data and Mandatory Reporting FAQs. Retrieved June 02, 2017, from <http://www.outdooralabama.com/red-snapper-data-and-mandatory-reporting-faqs>

<sup>65</sup> Ibid

<sup>66</sup> Neese, Josh. Personal Communication. 26 May 2017.

Figure 3: Gulf Coast Fisheries Management

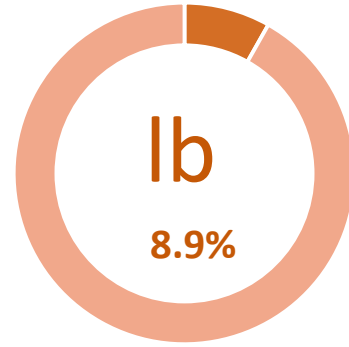


## West Coast: Fishery Profile & Electronic Catch-Reporting Log Options



The West Coast supports large fisheries for Dungeness Crab, Market Squid and Groundfish. Smaller fleets target HMS, Spiny Lobster, Pacific Halibut and Red Urchins.

In Washington and Oregon, the for-hire fleet targets Albacore, Salmon and Groundfish. In California, charter operations target State-managed species, Tunas and Groundfish.



**Table 6: Electronic Catch-Reporting Log Options on the West Coast:** *Electronic-data collection programs have allowed dealers, harvesters and for-hire operations to satisfy paper-reporting requirements. Introduction of an electronic-reporting mechanism does not necessarily mean it has been adopted widely. \*Mandatory electronic reporting applies to sablefish only.*

	Federal Dealers Year Implemented	Federal Harvesters Year Implemented	Federal For-Hire Year Implemented	State Dealers Year Implemented	State Harvesters Year Implemented	State For-Hire Year Implemented
Washington	2011*	2003	2003*	X	X	Pilot 2016
Oregon	2011*	2003	2003*	X	X	X
California	2011*	2003	2003*	X	X	2015

Currently, electronic logbook projects are limited on the West Coast for Federal and State fisheries. Sablefish is an exception, and harvest of the federally-managed species in all three states must be reported to NMFS within 24 hours of landing via the E-Tix application, built and maintained by Pacific States Marine Fisheries Commission.<sup>67</sup> Albacore Tuna, a federally-managed species, can also be reported, with information entered on fillable pdfs emailed monthly to federal offices.<sup>68</sup>

### California:

State dealers in California do not have an option to submit dealer logbooks electronically. However, California Department of Fish and Wildlife (CDFW) is developing the capacity for a system to accept e-Tickets in place of paper landing receipts. CDFW expects to transition from paper landing receipts to electronic logbooks in 2017 and is currently conducting a survey to assess the electronic capabilities of fish buyers.<sup>69</sup> California’s CPFV for-hire fishery has a web-application electronic logbook.<sup>70</sup> Currently 200 CPFV vessels, predominantly in Southern California, submit electronic

<sup>67</sup> Regional Electronic Technology Implementation Plans: West Coast Region (Rep.). (2017, January 1). Retrieved [https://www.st.nmfs.noaa.gov/Assets/advanced-tech/electronic-monitoring/documents/West\\_Coast\\_Regional\\_ET\\_Plan\\_Update\\_Fall\\_2016.pdf](https://www.st.nmfs.noaa.gov/Assets/advanced-tech/electronic-monitoring/documents/West_Coast_Regional_ET_Plan_Update_Fall_2016.pdf)

<sup>68</sup> Childers, John. Personal Communication. 17 February 2017

<sup>69</sup> Eres, Joann. Personal Communication. 11 May 2017.

<sup>70</sup> Commercial Passenger Fishing Vessel (CPFV) Logs. (n.d.). Retrieved June 02, 2017, from <https://apps.wildlife.ca.gov/marinelogs/cpfv/>

logbooks, while 250 CPFV vessels in Central and Northern California continue to produce paper logbooks.<sup>71</sup> CDFW suspended its efforts to create an electronic logbook for its lobster harvesters, and no other harvest of state-managed species is recorded with an electronic logbook.<sup>72</sup>

*Oregon:*

No electronic logbook programs exist for state seafood dealers, state harvesters, or state for-hire operators in Oregon.<sup>73</sup> Data managers invested considerable energy in developing an electronic logbook for Dungeness Crab, a state-managed species.<sup>74</sup> The Oregon Crab Commission funded the Ecotrust NGO to explore program development, but ultimately the project was suspended.<sup>75</sup> Oregon supports a small for-hire fishery for albacore and groundfish, but has not prioritized electronic logbook development.<sup>76</sup> Data managers feel confident the strong observer program, portside sampling, and research trawls provided adequate information about for-hire landings.<sup>77</sup>

*Washington:*

Like Oregon and California, Washington has not developed state harvester and dealer electronic logbooks. In 2016, Washington pursued a pilot logbook for its for-hire fishery, attempting to create an electronic logbook for the Albacore CPFV fleet (12 vessels) and CPFV groundfish boats (20 vessels). Currently, both projects have been suspended.<sup>78</sup>

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<sup>71</sup> Ibid

<sup>72</sup> Ibid

<sup>73</sup> Oregon's Ocean Commercial Fisheries. (2015, May). Retrieved from [http://www.dfw.state.or.us/mrp/docs/Backgrounder\\_Comm\\_Fishing.pdf](http://www.dfw.state.or.us/mrp/docs/Backgrounder_Comm_Fishing.pdf)

<sup>74</sup> Ainsworth, Justin. Personal Communication. 1 June 2017.

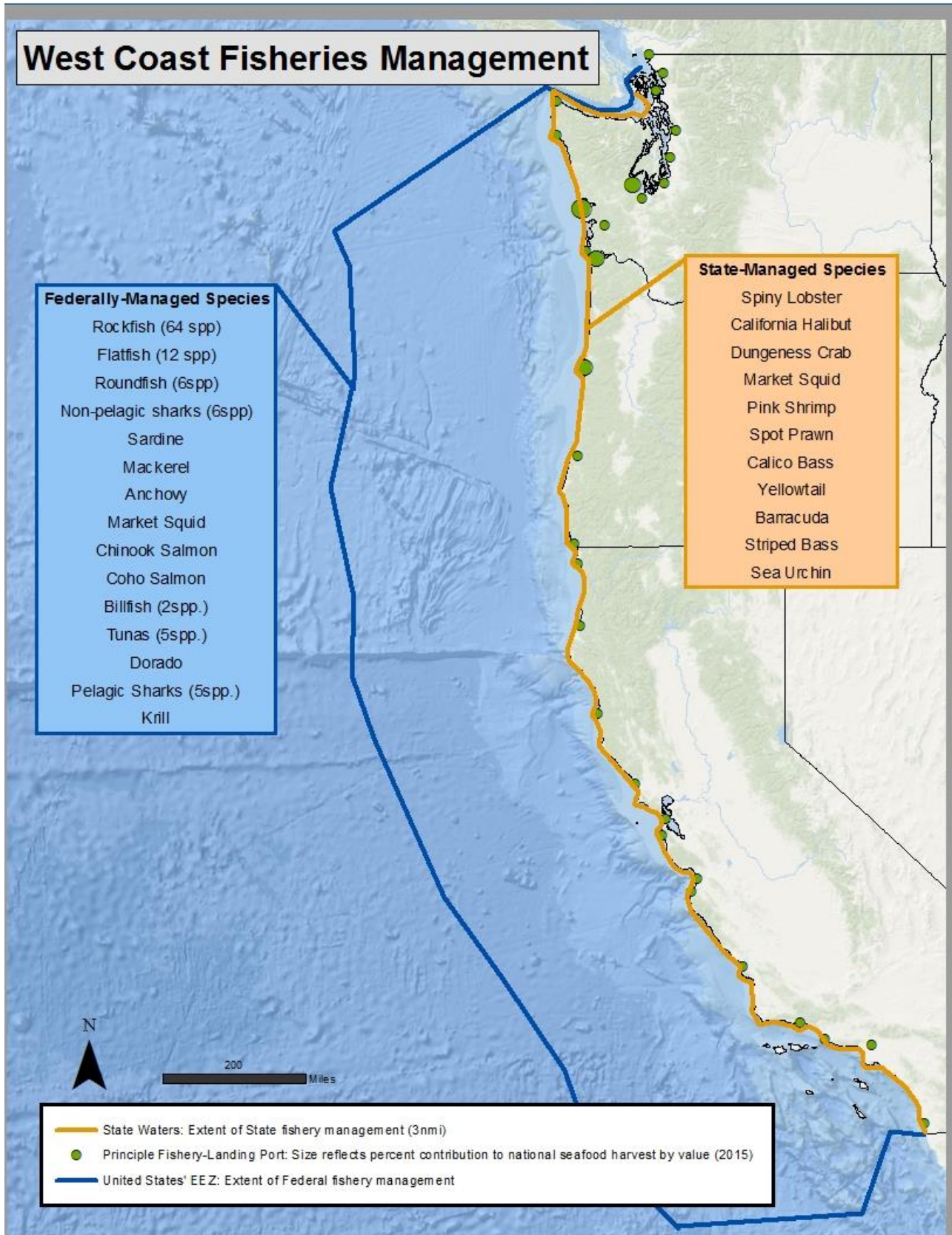
<sup>75</sup> Ibid

<sup>76</sup> Ibid

<sup>77</sup> Ibid

<sup>78</sup> Doerpinghaus, Jessi. Personal Communication. 11 May 2017.

Figure 4: West Coast Fisheries Management

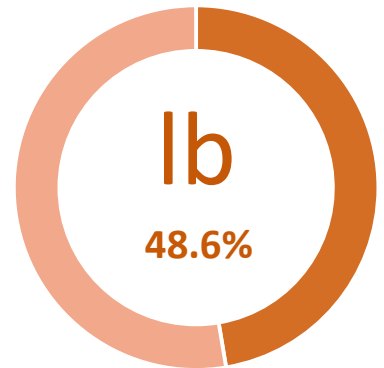


## Alaska: Fishery Profile and Electronic Catch-Reporting Log Options



The bulk of the Nation’s seafood harvest is from Alaska; Walleye Pollock, Salmon, Crab and Pacific Halibut are key targets for commercial harvesters.

The for-hire fleet focuses on Pacific Halibut, Salmon, Rockfish and Lingcod.



**Table 7: Electronic Catch-Reporting Log Options in Alaska:** *Electronic-data collection programs have allowed dealers, harvesters and for-hire operations to satisfy paper-reporting requirements. Introduction of an electronic-reporting mechanism does not necessarily mean it has been adopted widely. Asterisks denote mandatory electronic reporting.*

	Federal Dealers <i>Year Implemented</i>	Federal Harvesters <i>Year Implemented</i>	Federal For-Hire <i>Year Implemented</i>	State Dealers <i>Year Implemented</i>	State Harvesters <i>Year Implemented</i>	State For-Hire <i>Year Implemented</i>
Alaska	2005* Groundfish, IFQ halibut, IFQ sablefish	2005* Groundfish, IFQ halibut, IFQ sablefish	X	2005* Crab	2005* Crab	X

Alaska has invested heavily in electronic logbook programs. Developed in 2001, and launched in 2005, the Interagency Electronic Reporting System (IERS) is a fishery data collection system involving the three separate agencies that manage commercial fisheries in Alaska: Department of Fish and Game (ADFG), NMFS, and the International Pacific Halibut Commission.<sup>79</sup>

Developers built three types of software programs to accommodate disparate logbook reporting obligations amongst Alaskan fishermen.<sup>80</sup> Many Alaskan vessels are combination harvesters-processors, or harvesters transfer catch at sea to processing vessels or tenders.<sup>81</sup> Dual-purpose vessels have both harvester and dealer reporting obligations and require software capable of supporting remote logbook creation and submission.<sup>82</sup>

1. Processors use *eLandings*, a web-based application that is installed on land-based, internet-enabled PCs, allowing catch and production information to be submitted online to the repository database.<sup>83</sup>
2. Harvester-processors employ *Sealandings*, a locally-installed program, allowing fishermen at sea to produce a daily logbook. Information is saved as an XML file, and submitted via the boat satellite phone to the responsible agency.<sup>84</sup>

<sup>79</sup> Brannan, D. (2015, September 7). *A Review of the Alaska Interagency Electronic Reporting System (Rep.)*. Retrieved [http://www.adfg.alaska.gov/index.cfm?adfg=fishlicense.iers\\_review](http://www.adfg.alaska.gov/index.cfm?adfg=fishlicense.iers_review)

<sup>80</sup> Ibid

<sup>81</sup> Ibid

<sup>82</sup> Alaska Region Progress Report: Progress Review of Implementation of NOAA Fisheries Electronic Technologies Policy (Rep.). (2017, January 1). Retrieved

[https://www.st.nmfs.noaa.gov/Assets/advanced-tech/electronic-monitoring/documents/Alaska\\_Regional\\_ET\\_Plan\\_Update\\_Fall\\_2016.pdf](https://www.st.nmfs.noaa.gov/Assets/advanced-tech/electronic-monitoring/documents/Alaska_Regional_ET_Plan_Update_Fall_2016.pdf)

<sup>83</sup> Commercial Fishing Reporting, Alaska Department of Fish and Game. (n.d.). Retrieved June 02, 2017, from

<http://www.adfg.alaska.gov/index.cfm?adfg=fishlicense.reporting>

<sup>84</sup>Ibid

3. Tenders receive fish at sea from seiners and transport them to canneries. They are small vessels without satellite phones and *tLandings* is a reporting program installed on a USB that allows them to complete and store logs at sea.<sup>85</sup> Annually 250,000 individual trip tickets are generated by Alaskan harvesters, and 85 percent are landings in the salmon fishery, that transfer catch at sea to a tender.<sup>86</sup> Tenders typically accept small deliveries, and individual tenders can accept as many as 100 deliveries before returning to port. Each tender is outfitted with a laptop computer, laser printer, magnetic-strip reader, and the *tLandings* USB.<sup>87</sup> When salmon are transferred from fisherman to tender, all fishery permit information is transferred via magnetic strip and the paper receipt is created and printed at sea. Onshore, USB drives are collected from tenders, compiled at the processing plant and submitted to the IERS data repository.

Alaska maintains robust electronic logbook programs to support its diverse fisheries. Information collected in IERS provides a consolidated, electronic means of reporting landing of commercial harvest to multiple management agencies. This arrangement is unique to the United States, where typically agencies collect the data they require independently. Each agency has developed support and training materials for fishermen using *eLandings*, *Sealandings* and *tLandings*.<sup>88</sup> It should be noted that Alaska invested \$2.62 million in 2014 and hired 19 fulltime employees to support IERS reporting across ADFG, NMFS, and IPHC agencies.<sup>89</sup>

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<sup>85</sup> Ibid

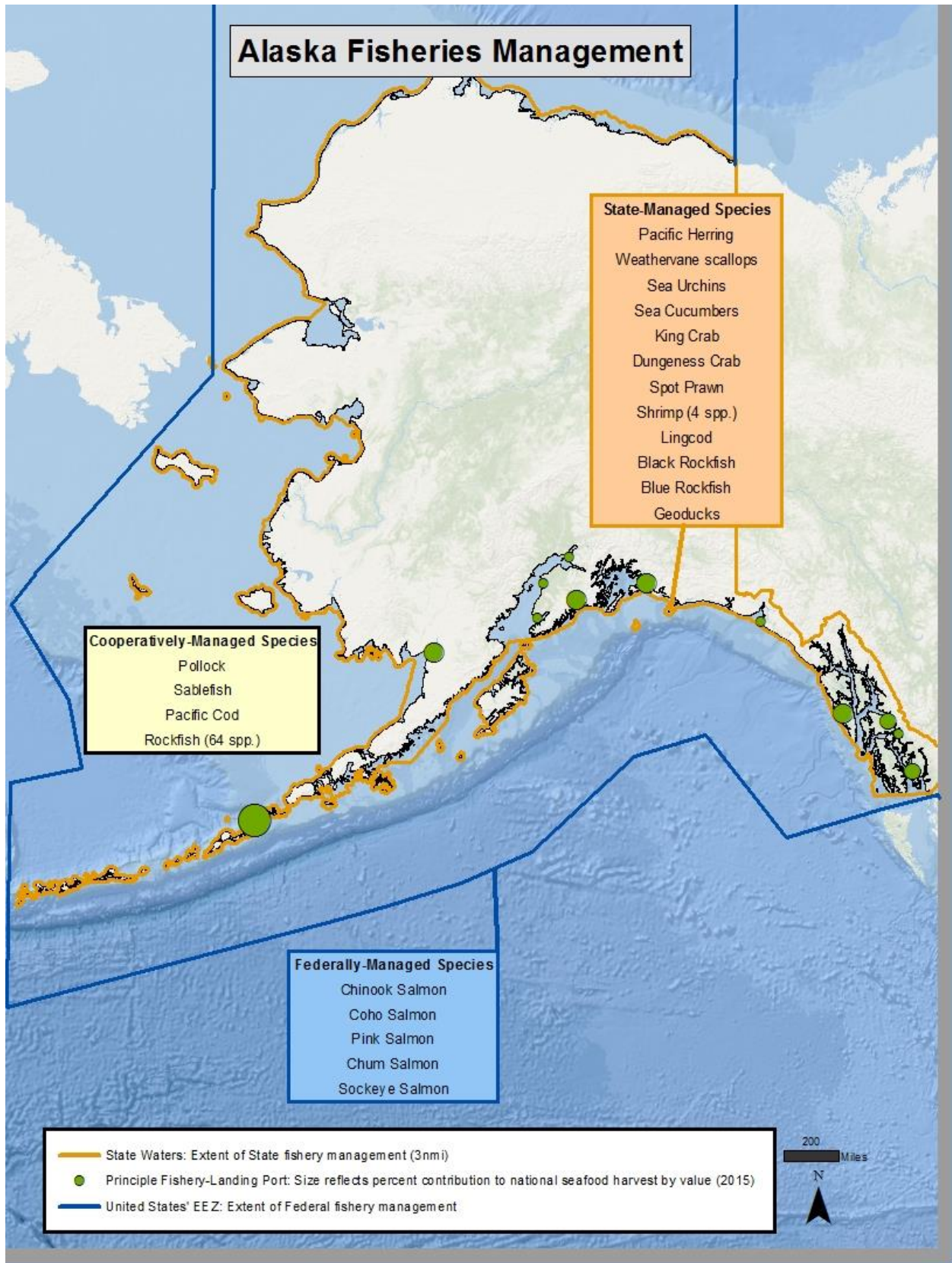
<sup>86</sup> Brannan, D. (2015, September 7). *A Review of the Alaska Interagency Electronic Reporting System*

<sup>87</sup> Ibid

<sup>88</sup> Ibid

<sup>89</sup> Ibid

Figure 5: Alaska Fisheries Management



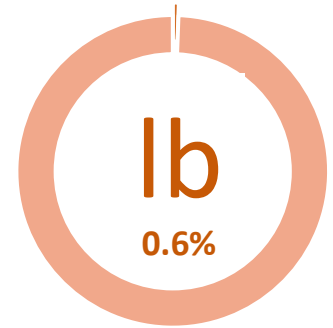


## Hawaii: Fishery Profile and Electronic Catch-Reporting Log Options



*Yellowfin, Skipjack and Bigeye tunas comprise the bulk of Hawaii’s commercial landings. Closure of the Northwest Hawaiian Islands and regulation of bottomfish harvest has shifted commercial harvest effort.*

*For-hire operations are concentrated in Oahu and target pelagic species.*



**Table 8: Electronic Catch-Reporting Log Options in Hawaii:** *Electronic-data collection programs have allowed dealers, harvesters and for-hire operations to satisfy paper-reporting requirements. Introduction of an electronic-reporting mechanism does not necessarily mean it has been adopted widely. No logbook is required in the for-hire fleet unless operators sell their catch. Asterisks indicate when reporting electronically became possible for the for-hire fleet.*

	Federal Harvesters Year Implemented	Federal For-Hire Year Implemented	State Harvesters Year Implemented	State For-Hire Year Implemented
Hawaii	2010	2010*	2010	2010*

Fisheries have a long history of economic and cultural importance in the Hawaiian Islands. However, in 2006, the creation of Papahānaumokuākea Marine National Monument suspended all commercial fishing activities in the Northwestern Hawaiian Islands, consolidating State fishing effort overall.<sup>90</sup> Federally, the Pacific Islands Regional Office of NMFS manages Hawaii’s HMS species. Bigeye, Yellowfin, and Skipjack tunas are important Hawaiian commercial species that are under federal oversight. The State’s Division of Aquatic Resources (DAR) is responsible for managing 29 inshore marine finfish species, slipper and spiny lobsters, three species of crab, shellfish and octopus.<sup>91</sup> Slipper and spiny lobster are measurable contributors to Hawaiian seafood landings, but other state-managed species are not significant targets for the for-hire fleet or commercial harvesters. NMFS and DAR cooperatively manage Hawaii’s bottomfish fishery which includes six eteline snappers and one grouper (Deep Seven Bottomfish Complex).<sup>92</sup> The bulk of Hawaii’s fishery harvest consists of HMS, lobsters and Deep Seven species landed in Honolulu.<sup>93</sup>

State and Federal harvesters acquire a Commercial Marine License (CML) from DAR and are obligated to report general harvest monthly.<sup>94</sup> Deep Seven harvest has a separate logbook which must be submitted within five days of landing. Logbooks were improved in 2002: new amendments accounted for effort and bycatch including discards and loss attributed to predators.<sup>95</sup> For-hire operations do not have logbook requirements in Hawaii unless they sell the catch.<sup>96</sup> Mainland tourists are the most frequent patrons of for-hire charter operations, and often do not keep fish. For-hire operators who retain passenger-catch must complete logbooks. In 2010, DAR implemented a web-application system to

<sup>90</sup> Historical Overview of Hawaiian Fisheries Management. (n.d.). Retrieved June 02, 2017, from <http://www.wpcouncil.org/managed-fishery-ecosystems/hawaii-archipelago/historical-overview-of-the-fisheries-hawaii/>

<sup>91</sup> Marine Fishes: State Regulated Species. (2014, December 29). Retrieved June 02, 2017, from <http://dlnr.hawaii.gov/dar/fishing/fishing-regulations/marine-fishes-and-vertebrates/>

<sup>92</sup> Hawaii Commercial Fishing Catch Report. Retrieved June 02, 2017, from <https://dlnr.ehawaii.gov/cmls-fr/app/licensee-login.html>

<sup>93</sup> Ibid

<sup>94</sup> Kokubun, Reginald. Personal Communication. 22 May 2017

<sup>95</sup> Ibid

<sup>96</sup> Ibid

enable commercial fishermen to file their reports online. Currently, 76 percent of Hawaii’s commercial fishermen report online and 82 percent of Deep Seven harvest is reported online.<sup>97</sup> Electronic logbook reporting is successful in Hawaii. Operators are not required to complete a logbook at sea—the logbook must be completed at the end of the day. Therefore, the DAR web-application can be installed on a home computer and does not need to function in an-offline mode or withstand a marine environment.<sup>98</sup>

A high-priority project is the effort to develop electronic logbook reporting for the Hawaii-permitted longline fleet. Longliners catch high-value HMS species including bigeye tuna, a species currently designated as “overfished”. In 2017, two longline logbook software options are undergoing beta-testing.<sup>99</sup> An issue affecting the implementation of the electronic logbook is that Hawaii-longline fishing vessels have operators from Korea and Vietnam, with varying levels of computer-proficiency and English competency.<sup>100</sup> Providing outreach and assistance in multiple languages will be a unique challenge to developing the Hawaii longline logbook, but management of Hawaiian HMS species could benefit from improved data validity associated with electronic logbooks.

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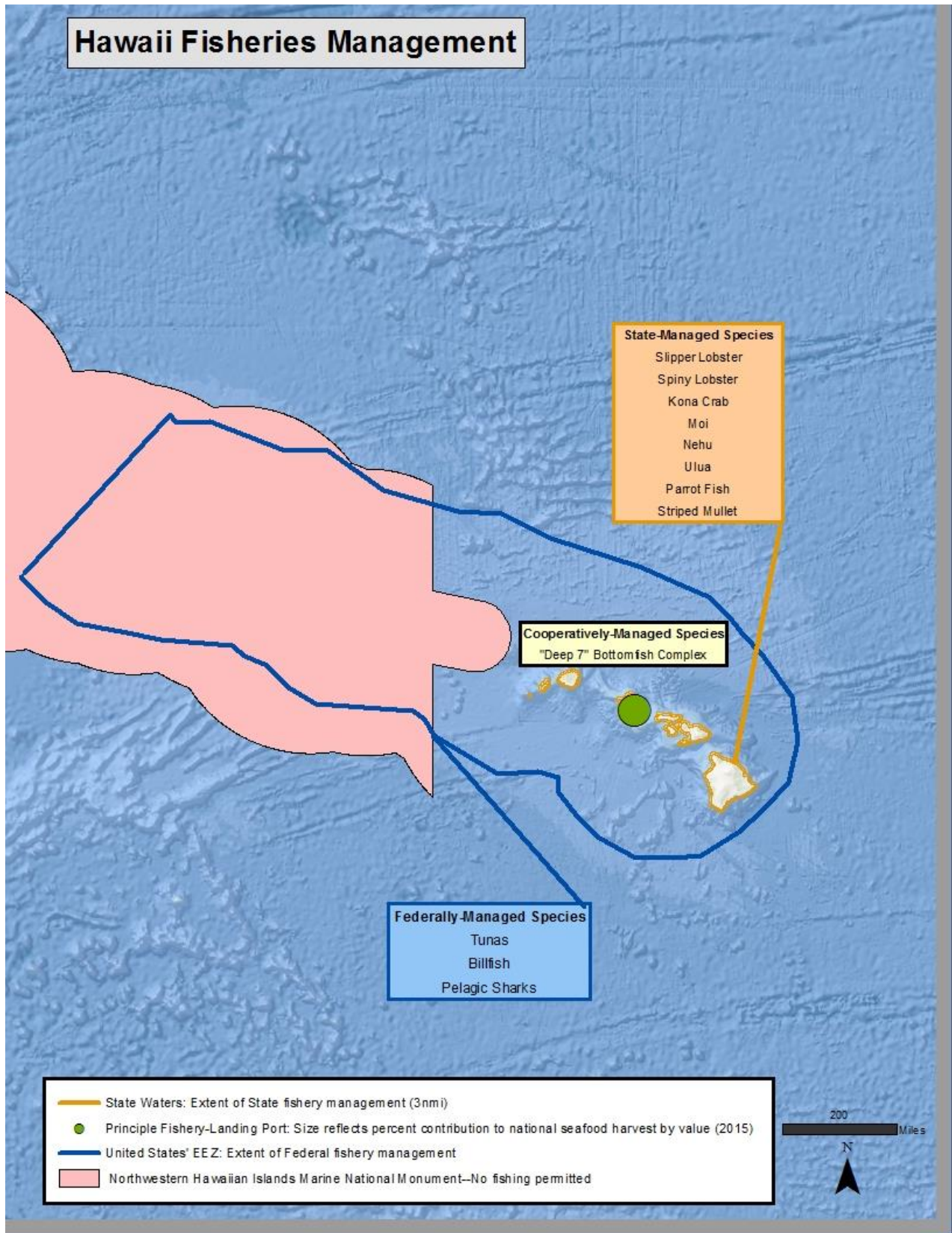
<sup>97</sup> Ibid

<sup>98</sup> Ibid

<sup>99</sup> *Pacific Islands Region: Electronic Technologies Implementation Plan Progress Review*

<sup>100</sup> Ibid

Figure 6: Hawaii Fishery Management



## Recommendations: Successful Electronic Logbooks have Six Core Components

Data managers consistently refer to six elements that make electronic logbooks successful. (Figure 7). Not every manager considered each particular ‘Core Component’ to be integral to successful electronic logbook reporting, but each component was mentioned multiple times in the nationwide interview process and therefore should be considered in the analysis. The ‘Six Core Components’ principle can be likened to a six-legged table, supporting an electronic logbook software program. (Figure 8). Individual ‘Core-Components’ are not obligatory for an electronic logbook to function, but if enough components are missing from the table, the program will not be stable, and likely unsuccessful.

Figure 7: Six Core Components in a successful electronic logbook

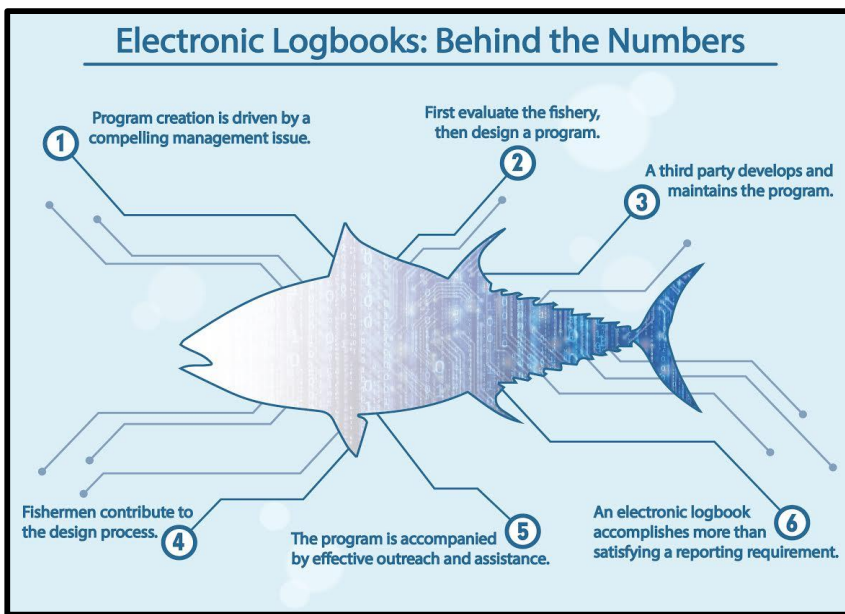
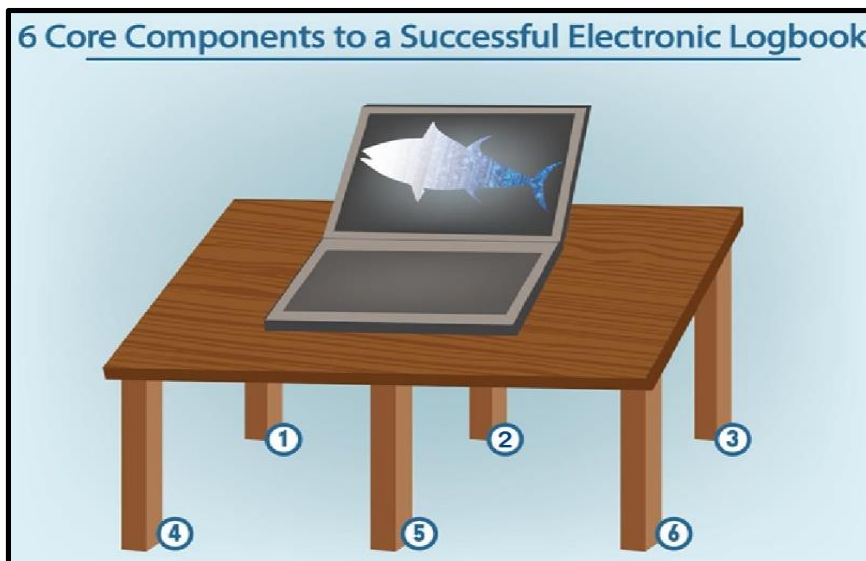


Figure 8: Six Core Components support a stable electronic logbook program



## **1. Program creation must be driven by a compelling fishery management issue**

When an electronic logbook project is under consideration by data managers, the fishery in question should be critically evaluated, and the electronic logbook pursued only if a compelling management reason exists to do so.

If the pursuit of the project is primarily justified because electronic logbooks will lighten administrative duties or reduce costs for the regulatory agency, it is unlikely to succeed. While the modern workplace subscribes to a “paperless” mentality where paper forms are eliminated or greatly reduced, similar logic does not apply to the commercial fishing community. It is important to note that many of the benefits associated with electronic reporting benefit data managers, and do not directly affect fishermen. If an electronic logbook program is voluntary, the data manager must identify a compelling reason why a fisherman should participate.

In a variety of electronic logbook efforts, data managers found fishermen unwilling to use software installed on vessel computers, and displaying a general uneasiness around data-reporting technology.<sup>101</sup> The benefits of “paperless” reporting are not necessarily embraced by commercial fishermen. Commercial fishermen constitute an older demographic compared to other sectors of the American labor force. The median age of commercial fishermen (47.5), is significantly greater than in the retail (39.3), information (41.6), or hospitality (31.3) sectors.<sup>102</sup> Second, while commercial fishing vessels are typically outfitted with sophisticated electronic instruments, a mastery of technology required for fishing activities does not mean that commercial fishermen use computers and access the internet as frequently as other sectors in the workforce. In 2009, A Bureau of Labor study polled workers and determined that 26.4 percent of commercial fishermen used a computer daily and 16.6 percent accessed the internet every day.<sup>103</sup> An evaluation of all other employment sectors revealed that in 2009, roughly 75 percent of workers used a computer and accessed the internet to perform daily tasks. Without question, the use of computers and the dependence on internet access has increased in the workforce in the last eight years, but it is fair to acknowledge that commercial fishermen are less likely to rely upon computers and internet access to perform their daily tasks. Paper-logs provide a convenient receipt, documenting the point-of-sale transaction between the commercial fishermen and the dealer, and until an equally convenient electronic system is developed, paper logs provide a useful tool for commercial fishermen.

Successful electronic logbook projects identify a compelling management issue, and communicate to fishermen that current paper logbook reporting may be contributing to inadequate fishery data collection. It is accepted that electronic reporting can improve data timeliness and validity, and if fishermen perceive they stand to benefit from improved data collection, they will be more willing participants in an electronic logbook effort.

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<sup>101</sup> *Greater Atlantic Regional Fisheries Office and Northeast Fisheries Science Center Electronic Technologies Progress Report*

<sup>102</sup> *Computer and Internet Use at Work in 2009* (Rep.). (n.d.). Retrieved <https://www.bls.gov/news.release/pdf/ciuaw.pdf>

<sup>103</sup> *Ibid*

**Table 9:** Successful electronic logbooks identify compelling management reasons to encourage active participation.

ELECTRONIC LOGBOOK	MANAGEMENT ISSUE	STATUS
Southern California CPFV For-Hire	Pacific Fisheries Management Council reduced Bluefin Tuna bag limit by 60% and CDFW implemented a Scorpionfish closure. <sup>104</sup>	155 vessels currently reporting electronically.
Maine Elver Swipe Card	Elver earned Endangered Species Act consideration; fishery was in jeopardy of being closed. <sup>105</sup>	Entire fishery reports with swipe cards.
iSnapper	Red Snapper is the most economically important reef fish in the Gulf. Classified as “overfished” since 1984, the fishery has been heavily restricted. <sup>106</sup>	Program expanded to accept voluntary recreational fishing data for entire Gulf of Mexico.
South Carolina Charter For-Hire	Cobia is an important target, and in South Carolina the fishery is currently closed due to overharvest. <sup>107</sup>	250 vessels currently reporting electronically.

**Table 10:** Unsuccessful electronic logbooks do not identify a compelling management reason for fishermen to participate.

ELECTRONIC LOGBOOK	MANAGEMENT ISSUE	STATUS
Washington CPFV Rockfish Logbook	Groundfish populations are healthy. Stock assessments are conducted by sonar survey and port samplers.	Project suspended in 2016.
NOAA Albacore Troll Logbook	Albacore harvest is sustainable, no total allowable catch.	Project suspended in 2017.

<sup>104</sup> Pacific Fisheries Management Council Highly Migratory Species: Background. (n.d.). Retrieved June 02, 2017, from <http://www.pcouncil.org/highly-migratory-species/background/>

<sup>105</sup> Watts, Rob. Personal Communication. 10 May 2017.

<sup>106</sup> Implemented Fishery Management Plans. (n.d.). Retrieved June 02, 2017, from <https://gulfcouncil.org/fishery-management/implemented-plans/>

<sup>107</sup> Cobia Management: How the Atlantic States Marine Fisheries Commission could take part in the management of the cobia fishery South Atlantic State/Federal Fisheries Management Board (Rep.). (n.d.). Retrieved <http://www.asmfc.org/files/Meetings/2016SummerMtg/SouthAtlanticBoardSupplemental.pdf>

## **2. First evaluate the fishery, then design the software**

Fishermen are similar across the nation, and the same user-friendly, practical measures built into software will benefit fishermen from Maine to Hawaii. While fishermen are similar, the dynamics of particular fisheries are very different. If a compelling reason to design an electronic log is identified, and a state or council opts to proceed with the project, some basic questions must first be answered about the fishery in question. Many of the following questions can be addressed by historically evaluating submissions of paper-logs and researching the specific characteristics of the fishery in question.

### **A. Are fishermen required to complete the paper log at sea?**

Generally, most logbooks must be filled out at sea “with all required information, except for information not yet ascertainable, prior to entering port. Information that may be considered unascertainable prior to entering port includes dealer name and permit number, and date sold. Log reports must be completed as soon as the information becomes available.”<sup>108</sup> For most fishing vessels, this necessitates that the electronic logbook program must be able to function in an offline environment. Data managers must decide whether a desktop application or mobile-application is more suitable for the fishery. (Table 2). Both desktop and mobile applications are optimized to work in an offline mode. Electronic logbooks designed on web-applications are not optimized for an offline environment, but web-applications have been favored by data managers for electronic logbook projects. While convenient for programmers, and cost-effective for administrators, web-applications experience problems if they are not connected to the internet and routinely updated. It is likely that low levels of participation in electronic reporting result from this trade-off: data managers develop a cost-effective program that is optimized for data management, but inconvenient for users at sea.

### **B. How many operators submit paper logs for a given vessel?**

Electronic logbook projects offer training sessions to inexperienced users, but data managers seldom consider how many fishermen will operate a unique vessel during a fishing season. Especially with the launch of a new program, it is important to consider if relief operators are common in the fishery and what training measures should be incorporated to familiarize all fishery participants with new electronic logbook software.

### **C. What type of vessels/dealers participate in the fishery?**

Certain fisheries lend themselves well to electronic reporting; Alaskan King Crab fishery vessels all have satellite phones, and PCs inside the wheelhouse. Other fisheries are characterized by different class vessels with varying infrastructure. It would be difficult to decide which software platform would be optimal for Oregon’s Dungeness Crab fishery as some vessels have no protection from the elements, while others could support desktop applications.<sup>109</sup> In Maine, there is some concern that Striped Bass harvest is not adequately captured by surveying for-hire fishermen. While an electronic logbook could collect more thorough information, it would be difficult to design a logbook for the for-hire Striped Bass fishery. Vessels are typically trailered from freshwater to saltwater and operate out of multiple ports.<sup>110</sup>

### **D. When paper logs are received for the fishery in question, is data entered carefully, or are logs characterized by information that is (a) omitted, (b) illegible, or (c) outside of possible parameters.**

Paper log submissions should provide data managers with insight as to how much care and attention fishermen and dealers are devoting to logbook completion. It is likely that errors in paper log reporting will appear in electronic logbook data entry.

<sup>108</sup> 50 C.F.R. § 648.7

<sup>109</sup> Ainsworth, Justin. Personal Communication. 1 June 2017.

<sup>110</sup> Joule, Bruce. Personal Communication. 17 May 2017.

### **3. Contract a third-party software firm to design and maintain software**

Upon identifying a compelling management reason to create an electronic logbook, and after evaluating the fishery to clearly understand how an effective program can be designed, managers must decide who will build and maintain the software. States have an option to build and maintain the program in-house, or announce a request for proposal (RFP) and locate a third-party software firm to build the platform. Electronic logbook design has three elements: programmers must have the *ability* to design the appropriate application, the *time* to design the program, and the *commitment to maintain* the program and identify improvements.<sup>111</sup>

Without question, the states with the highest participation in electronic logbooks utilized a third-party to design their software platform. Most states that outsourced their electronic logbook design to a third-party vendor contract the designer to maintain the program and constantly improve it.

There are inherent difficulties in comparing two catch-reporting programs and evaluating their effectiveness without quantitatively comparing log-submissions. Furthermore, given the high variability amongst fisheries, it may not be clear whether a fishery struggling to adopt electronic-reporting is having difficulty with the software program, or because of some inherent characteristic of the fishery complicating any form of electronic reporting.

It should be noted that California<sup>112</sup> and Oregon<sup>113</sup> explicitly prohibit a third-party from supplying the State with natural resource data. While intended to safeguard commercial fishing trade-secrets, this legislation effectively prevents third parties from creating electronic logbooks to manage state fisheries.

### **4. Fishermen contribute to software design process and the product is user-friendly**

In most jurisdictions, commercial fishermen have the option to continue to produce paper catch reports. Therefore, it is up to program-designers to create a user-friendly program that is more convenient than the paper log-book alternative. Because commercial fishermen are free to choose between paper and electronic reporting options, they are de-facto “consumers” and an electronic logbook project should follow standard business practices. Common business practice dictates that designers should research users’ needs and develop a product that is best suited to the specific task. Currently, Bluefin Data is developing predictive software to anticipate patterns in harvest, facilitating dealer seafood submissions.<sup>114</sup> SAFIS is undergoing a major functional re-design, and is developing intuitive software that can guide users who need help, check data entries to detect errors, and provide other kinds of data processing aids.<sup>115</sup>

While it is important to consult fishermen in the design-process, a true democratic process is not necessary. Identifying select fishermen that are representative of the larger community, and soliciting their feedback is an efficient strategy to involve the user in the design process.

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<sup>111</sup> Peterson, Andrew. Personal Communication. 20 May 2017.

<sup>112</sup> Perry, Katie. Personal Communication. 18 December 2016.

<sup>113</sup> Ainsworth, Justin. Personal Communication. 1 June 2017.

<sup>114</sup> Peterson, Andrew. Personal Communication. 20 May 2017.

<sup>115</sup> *Standard Atlantic Fisheries Information System Redesign Project: Functional Requirements* (Rep.). (n.d.). Retrieved [https://www.accsp.org/sites/default/files/ACCSP\\_FunctreqAFIS.pdf](https://www.accsp.org/sites/default/files/ACCSP_FunctreqAFIS.pdf)



## 5. *Catch-reporting program is accompanied by effective outreach and assistance*

Outreach to launch to a catch-reporting program and assistance for program users are key features to an electronic logbook program. Ultimately, their effectiveness can determine the success of the electronic software.

### Outreach:

When an electronic catch-reporting software program is launched, states adopt different strategies to introduce the program. States create instructional documents, training videos and hold workshops to familiarize operators with the new software.<sup>116</sup> Reviewing online outreach material available to fishermen reveals that states fall into three categories: Some states produce no training material, simply referring fishermen to federal agencies.<sup>117</sup> Other states produce electronic logbook simulations, videos and lengthy manuals.<sup>118</sup> While thorough, these are not good resources for fishermen. Effective outreach materials are the concise, picture-heavy, one-page fact sheets produced by Massachusetts, Maryland<sup>119</sup> and Rhode Island.<sup>120</sup> Data managers in New York, Massachusetts and Maryland update commercial fishing webpages regularly, posting information on remaining quotas<sup>121</sup> and a publishing a list of delinquent logbook reporters.<sup>122</sup> Identifying strategies to encourage fishermen to visit state websites is the best method to get fishermen more comfortable with electronic reporting.

### Assistance:

Once the software program has been implemented, states offer a range of assistance to operators. Assistance varies considerably by state, and in effectiveness. Understanding that states have limited staff and resources to help with electronic log-books, it is important that states provide effective support (Table 11). Simply put, program support equates with program utility and on-going successful implementation.

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<sup>116</sup> Ares, N. (n.d.). *SAFIS Online Help* (United States: Rhode Island, Rhode Island Department of Environmental Management, Division of Fish and Wildlife). Retrieved from <http://www.dem.ri.gov/programs/bnatres/fishwild/pdf/shelp.pdf>

<sup>117</sup> New Hampshire Commercial Saltwater Fishing. (n.d.). Retrieved June 02, 2017, from <http://www.wildlife.state.nh.us/marine/commercial.html>

<sup>118</sup> *Trip Ticket Procedures Manual* (Rep.). (2015, April 2). Retrieved <http://www.wlf.louisiana.gov/sites/default/files/pdf/page/38126-trip-ticket/tripticketmanualrevisionsfinal.pdf>

<sup>119</sup> E-Reporting with FACTS. (n.d.). Retrieved June 02, 2017, from <http://dnr.maryland.gov/fisheries/pages/e-reporting/index.aspx>

<sup>120</sup> Massachusetts E-Reporting Newsletter. (2014, August 5). *Welcome to E-Reporting*. Retrieved from <http://www.mass.gov/eea/docs/dfg/dmf/programsandprojects/newsletter-v1i2-final.pdf>

<sup>121</sup> Commercial Fishing Quota Usage Report. (n.d.). Retrieved June 02, 2017, from <http://www.dec.ny.gov/outdoor/109073.html>

<sup>122</sup> New York Commercial Marine Fishing. (n.d.). Retrieved June 02, 2017, from <http://www.dec.ny.gov/outdoor/26821.html>

**Table 11:** *Types of electronic-logbook assistance available to operators.*

TYPE OF SUPPORT	STRENGTHS	WEAKNESSES
<b>Email Only</b>	<ul style="list-style-type: none"> <li>• Provides record of assistance that could be useful for enforcement.</li> <li>• Allows state IT staff to manage time efficiently.</li> </ul>	<ul style="list-style-type: none"> <li>• Does not enable immediate assistance.</li> <li>• Fishermen struggling to use technology (including email) receive assistance by email.</li> </ul>
<b>Phone (Business Hours) + Email</b>	<ul style="list-style-type: none"> <li>• Provides voice assistance to fishermen not comfortable with email.</li> <li>• Enables fishermen to ask additional questions and obtain immediate clarification.</li> </ul>	<ul style="list-style-type: none"> <li>• Does not provide a written record for enforcement.</li> <li>• Business hours for state IT seldom correspond with commercial fishermen’s schedule.</li> </ul>
<b>Phone Hotline (24hr) + Email</b>  Maryland Alaska IERS SAFIS Re-Launch (2018)	<ul style="list-style-type: none"> <li>• Allows fishermen to receive real-time, personal assistance.</li> </ul>	<ul style="list-style-type: none"> <li>• Still requires operators to describe software issues over the phone—this is problematic.</li> <li>• 24-hour assistance may be unnecessary, peak times could be identified.</li> </ul>
<b>Remote-Mirroring</b>  Available for large-volume seafood dealers using Bluefin Data Software. Prototype currently tested for South Carolina for-hire fleet.	<ul style="list-style-type: none"> <li>• Remote mirroring is a software feature were a keyboard shortcut enables Bluefin Data IT access to seafood dealer’s desktop PC.</li> <li>• Allows an IT team of 3 to quickly resolve problems.</li> <li>• Eliminates confusion associated with describing a tech problem over the phone.</li> </ul>	<ul style="list-style-type: none"> <li>• Remote-mirroring has yet to be perfected for mobile applications.</li> <li>• IT staff may be overwhelmed by help requests when mobile device remote-mirroring is implemented for large-scale fisheries.</li> </ul>

Most states revealed that four to seven staff members are available to answer emails from fishermen or field support calls during business hours. Data managers in South Carolina, Washington, Massachusetts, Maryland and Maine demonstrated a tremendous commitment to help fishermen submit both paper and electronic catch reports. Staff in these states accepted pictures of paper-logs submitted by SMS and scanned pictures of paper-logs via email. They recognized that accommodating these submissions was time-consuming, and they were being especially flexible, but universally felt that collecting data was paramount. Data managers in these states knew many fishermen on a personal level and felt that they had established a strong working rapport. It is important to account for this type of accommodating assistance that is not captured by evaluating help videos or instructional pamphlets.

## 6. *The electronic logbook should accomplish more than satisfy a reporting requirement*

An electronic catch-reporting program can accomplish more than satisfying a reporting requirement. It can be a useful tool. In principle, as long as fishermen find electronic reporting to be more convenient than paper reporting, they will rapidly buy-in. Data managers must recognize that software is a flexible tool, and if extra features are incorporated into electronic logbook design, a logbook can satisfy much more than a reporting requirement.

Agencies desiring broad participation in electronic logbook reporting should first strive to make catch-reporting software more convenient than paper-reporting. Second, to encourage reluctant participants, managers should identify extra features that can be cost-effectively built into electronic logbook design.

In jurisdictions where electronic logbook reporting is not mandatory, this strategy will successfully convince reluctant participants to adopt electronic reporting measures (Table 12).

**Table 12:** *Extra features incorporated into electronic logbooks make them more useful than paper alternatives.*

LOGBOOK	EXTRA FEATURES INCENTIVIZE PARTICIPATION
California CPFV Logbook	PDF logbook receipts facilitate semi-annual application for Carl Moyer Air Emissions Engine Repower Grant. Digital records of days-at-sea are much easier to submit in an application than assembled paper logs. <sup>123</sup>
Bluefin Data Unified Trip Ticket	Software for dealer logbooks incorporates QuickBooks Accounting Software. Dealers simultaneously prepare and print invoices while completing harvest reporting. Financial information is not shared with the State or NMFS. <sup>124</sup>
Alaska tLandings	USB drive on tender vessels collect additional data elements that are useful only to the seafood industry including: chill type, fish temperatures, time of landing, and other quality assurance metrics. <sup>125</sup>

<sup>123</sup> Carl Moyer Memorial Air Quality Standards Attainment Program. (n.d.). Retrieved June 13, 2017, from <https://www.arb.ca.gov/msprog/moyer/moyer.htm>

<sup>124</sup> Bluefin Data Fisheries Reporting Software.

<sup>125</sup> Brannan, D. (2015, September 7). A Review of the Alaska Interagency Electronic Reporting System

## ***Future Work***

It is widely understood that US Fisheries are some of the best-managed fisheries in the world.<sup>126</sup> Managers at the local and federal level depend on timely, quality information to inform effective policy decisions. Logbooks, completed by commercial fishermen and seafood dealers, provide authorities with information critical to the decision-making process. Increasingly, there is a committed national effort to modernize logbooks by transitioning to electronic reporting technologies. A nationwide evaluation of electronic-logbook programs reveals that implementing electronic logbooks is a challenging process, with select successes.

It is fair to speculate whether US Fisheries are well-managed because of electronic reporting, or in spite of it.

In general, commercial fishermen are resistant to change, and data managers acquiesce to push-back from the fishing industry. As a consequence, in most jurisdictions, fishermen may still continue to produce paper reports.

Transitioning to electronic reporting requires effort from fishermen: “A fisherman must search out new regulatory requirements, read them and remember them. He must learn how to properly operate new software. Then he must take the time to make the necessary observations and report them. He must do all of this while carrying out daily responsibilities.”<sup>127</sup> Presently, the major benefits to electronic reporting—validated and timely data—benefit data managers, not fishermen. In many cases, it is most convenient for fishermen to continue to produce paper logs. If fishermen feel that policymakers do not have their best interests in mind, they will see no incentive to participate in electronic reporting.

Data managers understand that policymakers cannot be expected to make quality decisions without the best available information. This principle has driven the nationwide effort to build and launch electronic logbooks for fishermen and dealers. However, many electronic logbook projects produce software that is convenient for data managers, but cumbersome for fishermen.

Recognizing that the fishing industry can successfully resist electronic logbook reporting, data managers must re-evaluate how an electronic logbook should be designed. Successful electronic logbook projects are characterized by having up to six core components. Ensuring that an electronic logbook incorporate these components will increase participation by commercial fishermen and dealers, ultimately enabling more efficient fisheries management policy.

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<sup>126</sup> U.S. Fisheries Management Clears High Bar for Sustainability Based on New Assessment. (2016, January 04). Retrieved June 13, 2017, from [http://www.nmfs.noaa.gov/sfa/publications/feature\\_stories/2016/fisheries\\_assessment.html](http://www.nmfs.noaa.gov/sfa/publications/feature_stories/2016/fisheries_assessment.html)

<sup>127</sup> Brady, M. (2014, January 22). Integrated Reporting: Motivation, Definition, and Implementation (Rep.). Retrieved [http://eminformation.com/wp-content/uploads/2016/05/Principles-of-Fishery-Reporting-System-Design\\_M.-Brady.pdf](http://eminformation.com/wp-content/uploads/2016/05/Principles-of-Fishery-Reporting-System-Design_M.-Brady.pdf)

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