Internal Assessment of Research and Monitoring Priorities for 2016

BRT Research Priority Subcommittee

Alan Bianchi, Michelle Duval, Laura Lee, Mike Loeffler, Trish Murphey, Kelly Price, Jason Rock

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Introduction

In early 2010, the deputy director of the Division of Marine Fisheries (DMF) requested the Management Review Team (MRT) to address problems and issues with the Fishery Management Plan (FMP) Process. The FMP Process Workgroup was established to evaluate and improve the process of producing DMF FMPs. This workgroup established a structured survey organized around the steps of the FMP process and sent it to all staff involved in the development of an FMP. Using results of the survey, the workgroup held 14 meetings to work through the steps in the FMP process and produced a report of recommendations.

One of many recommendations that came from the workgroup revolved around the planning of elements contained within the FMPs such as research needs. Specifically, the workgroup recommended to:

Task the Biological Review Team (BRT) and MRT to annually develop a subset of highest priority research needs within the DMF and recommend avenues for obtaining resources to address them. Suggestions from the FMP Process Workgroup for improving the research needed and implementation of FMPs included:

- Take more time in developing, presenting and prioritizing research needs. Most FMPs contain numerous research recommendations perhaps diluting their importance.
- Conduct planning meetings to make sure research recommendations do not become stagnant.
- Prioritize research needs into the DMF’s strategic plan for accountability.
- Complete a brochure at the end of a FMP that promotes better stewardship of the resource, gives information on the management recommendations from the FMP, and provides general education that is species specific.
- Prioritize research needs across multiple FMPs to be efficient in use of the resources to accomplish common tasks.
- Formalize DMF support for funding research recommendations at the state level.
- Advertise the FMP research recommendations to the university communities.

The BRT produces the annual stock status reports and FMP updates for all state and federally managed species. These document the implementation status of individual FMPs. However, these updates are discrete for each species plan and the suggestions above note the need for a holistic review that weighs the needs across all FMPs.

Each year, following annual review of the DMF Stock Status Report, the BRT Research Priority Subcommittee reviews high priority research needs, funding sources for each priority, and establishes two documents. The first document entitled “Internal Assessment of Research and Monitoring Needs” provides information on data gaps, monitoring, and research needs for state fisheries species and is for internal use. The second document, “Research Priorities for the North Carolina Division of Marine Fisheries” provides priority research needs from FMPs to distribute to researchers outside of the DMF.
Annual Review Process

During the development of the 2015 research document, it was determined that review of the methodology used to determine species ranks should be revisited. For this review, the committee discussed other ways to rank species and came to the conclusion that instead of ranking species against each other, a more intuitive approach of evaluating data needs instead of ranking species may be a better, less subjective approach.

Data needs were further refined, defined, and organized into two groups; assessment data needs and management data needs (Tables 1 and 2). The majority of the data needs are self-explanatory however Stock ID is further defined as any data used to identify the unit stock. Life History is divided into Age and Maturity while both Juvenile and Adult Indices are further defined as data adequate enough to characterize the abundance of each. Recreational and Commercial Discard Characterization and Discard/Bycatch Mortality are further defined to include data such as magnitude and lengths of fish species.

In the Management Data Needs group, it was determined that the category of Tagging/Modeling be removed because this represents a tool to gather data instead of a data need and can be addressed within other data needs categories (Life History, Stock ID). Habitat and Water Quality was further defined as data needs concerning anthropogenic impacts and impediments. Recreational Fishery Characterization was also added to this group of data needs.

Each data need was then assigned a score based on the data limitations for each species. Scores are defined as:

1 – Data do not exist or are limited or are not usable,
2 – Data exist but are limited temporally or spatially,
3 – Data exist and are applicable to research need.

Table 1 shows the relative importance of each data need required in stock assessments for each state managed species. These include information needs on stock identification, life history parameters, recreational harvest and discard, juvenile and adult indices, commercial discard, and discard/bycatch mortality data. Table 2 shows the relative importance of each data need required for management of each state managed species. These data needs include habitat information, recreational and commercial fishery characterization as well as gear impacts and development.

Although species were not ranked, the data needs scores were averaged to determine what data needs may be limited overall. These averages simplistically indicate that data are limited regarding recreational harvest, discard information from both the recreational and commercial fishing sectors, and bycatch and discard mortality (Table 1 and 2).

It was also decided to no longer include federally managed species in research priority analysis. However, it is understood that due to habitat and distribution overlap, federally managed
species are considered when developing recommendations (i.e. river herring, American and hickory shad, and Atlantic sturgeon).
Table 1. Assessment data needs for state-managed species including FMP start date and Stock Status

<table>
<thead>
<tr>
<th>DMF FMP Species</th>
<th>Stock ID</th>
<th>Age &amp; Growth</th>
<th>Maturity</th>
<th>Harvest</th>
<th>Discard Characterization</th>
<th>Juvenile/Recruitment</th>
<th>Adult</th>
<th>Commercial</th>
<th>Discard/Bycatch</th>
<th>Mortality</th>
<th>Next FMP Start Date</th>
<th>Stock Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kingfishes</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2020</td>
<td>Viable</td>
</tr>
<tr>
<td>Red Drum</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>1</td>
<td>2</td>
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<td>2</td>
<td>2</td>
<td>2016</td>
<td>Recovering</td>
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<tr>
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<td>3</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>1</td>
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<td>1</td>
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<td>2</td>
<td>1</td>
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<td>2</td>
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<td>Concern</td>
</tr>
<tr>
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<td>3</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2017</td>
<td>Viable</td>
</tr>
<tr>
<td>Striped Bass (AS/RR)</td>
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<td>3</td>
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<td>3</td>
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<td>2</td>
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<td>1</td>
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<td>Concern</td>
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<tr>
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<td>2</td>
<td>2018</td>
<td>Concern</td>
</tr>
<tr>
<td>Striped Mullet</td>
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<td>3</td>
<td>2</td>
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<td>1</td>
<td>1</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>2020</td>
<td>Viable</td>
</tr>
<tr>
<td>Bay Scallop</td>
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<td>2</td>
<td>1</td>
<td>1</td>
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<td>1</td>
<td>1</td>
<td>1</td>
<td>2020</td>
<td>Concern</td>
</tr>
<tr>
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<td>3</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2018</td>
<td>Concern</td>
</tr>
<tr>
<td>Hard Clam</td>
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<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
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<td>1</td>
<td>1</td>
<td>1</td>
<td>2022</td>
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</tr>
<tr>
<td>Shrimp</td>
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<td>3</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2020</td>
<td>Viable</td>
</tr>
</tbody>
</table>

AVERAGE | 2.36 | 2.36 | 2.36 | 1.79 | 1.21 | 2.00 | 2.21 | 1.64 | 1.43 |

1 – Data do not exist or are limited or are not usable
2 – Data exist but are limited temporally or spatially
3 – Data exist and are applicable to research need
Table 2. Management data needs for state-managed species

<table>
<thead>
<tr>
<th>DMF FMP Species</th>
<th>Anthropogenic Impacts</th>
<th>Commercial Fishery Characterization</th>
<th>Recreational Fishery Characterization</th>
<th>Gear Studies/Impacts</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Habitat and Water Quality</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Kingfishes</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Red Drum</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>River Herring</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Sheepshead</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Southern Flounder</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Spotted SeaTrout</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>AS/RR Striped Bass</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>CSMA Striped Bass</td>
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<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Striped Mullet</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>2</td>
</tr>
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<td>Bay Scallop</td>
<td>2</td>
<td>3</td>
<td>1</td>
<td>2</td>
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<tr>
<td>Blue Crab</td>
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<tr>
<td>Hard Clam</td>
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<td>Oyster</td>
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<td>Shrimp</td>
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<td>AVERAGE</td>
<td>1.71</td>
<td>2.57</td>
<td>1.86</td>
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</tbody>
</table>

1 – Data do not exist or are limited or are not usable,
2 – Data exist but are limited temporally or spatially,
3 – Data exist and are applicable to research need.

The group also took into account last year’s research and management recommendations and CHPP habitat needs. The top habitat research needs in no particular order are:

- A basic need of Strategic Habitat Area assessment continues to be the development of accurate and up-to-date distribution maps for habitats and threats, particularly subtidal oyster reefs in Pamlico Sound.
- Compile a prioritized list of physical impediments to diadromous spawning migration routes for removal or modification and develop specifications for and test culvert designs that would benefit the recovery of diadromous species, particularly river herring. Restoration efforts should remain a high priority to continue in North Carolina, focusing on the lowermost structures in rivers or streams, and advancing upstream. Removing unnecessary dams should be undertaken with consideration for both upstream and downstream impacts.
- Implement a comprehensive cumulative impacts study that compares changes in habitat coverage and condition to fish, shellfish, and crustacean abundance, particularly those with depleted or concern status. Investigate the cumulative impacts of various threats (e.g., marinas and multi-slip docking facilities, shoreline hardening, coastal development, animal operations, stormwater runoff, dams, dredging, endocrine disruptors, jetties and groins, bottom disturbing fishing gear, water withdrawals, etc.) to coastal fishery habitats.
- Conduct spawning area surveys to identify new and monitor existing areas (river herring, other diadromous finfish, red drum, and blue crab).
- Establish fish habitat indicator species for all six CHPP habitats.
Development of High Priority Research Needs

Based on Tables 1 and 2, the list of state-managed species current data needs, a priority list of research and monitoring needs are listed below.

The expansion of several monitoring programs already in place to collect better data both spatially and temporally would improve the juvenile indices of state managed fish such as CSMA striped bass, blue crabs, and striped mullet. These expansions will also benefit data needs of federally managed species such as American eel, sturgeons, shad and spot. Expansion of gill net monitoring programs into the central/southern areas (keeping in mind spatial and temporal distribution of sea turtles), as well as to the more saline waters of the ASMA, will improve sampling of all major finfish species. The seine programs also need expansion spatially throughout the state.

The expansion of the observer program statewide into trawl, beach seine, and pound net fisheries throughout the state will improve bycatch and discard estimates of important finfish, and therefore greatly improve data for future stock assessments.

Recreational fisheries data for shellfish are a huge data gap noted multiple times in the Oyster, Clam, and Bay Scallop FMPs and Amendments. Recreational fisheries catch data are also lacking for river herring, sheepshead, and striped mullet. Currently recreational discard size information is not available and is needed for all recreationally important species, particularly those where discards (releases) are a significant source of the overall fishing mortality.

Habitat research priorities concentrate on habitat needs of the diadromous species and center around physical impediments of culverts and restoration needs in culvert replacement. Little data document impediments of culverts within the central and southern regions of the state. Spawning areas continue to need evaluation within the ASMA and should be expanded to all areas of the state where diadromous species occur. Last, but not least, the habitat mapping programs must continue to map the various habitats (SAV, shell bottom, soft bottom) with focus on the deep water oyster reefs within Pamlico Sound.

Fishery Management Plan Development Teams (PDTs), during review of research needs for each plan include only those needs that are reasonable or attainable in order to not dilute the needs list. Once a list of research needs has been developed, these are prioritized at a minimum of high, medium and low priorities. There are several FMPs that continue to list the same research needs over time. Reasons for this are likely funding and staffing issues. Data collection that will improve stock assessments for all of our state-managed species are very high in priority (Table 1).

In addition to research needs listed in each FMP, the document, “Research Priorities for the North Carolina Division of Marine Fisheries” provides the top research needs from both state and federally-managed species FMPs and the CHPP. The goal of this document is to provide important and valid research needs to academia and the public to improve the DMF’s ability to
manage North Carolina fisheries. This document is available through the DMF website and is used as guidance for various research RFPs.

DMF High Priority Research and Monitoring Recommendations

Below are the 2015 research and monitoring priorities developed by the BRT Research Priority Subcommittee. These priorities are reviewed by the BRT after annual review of stock status (July 1). Potential funding sources for each recommendation are listed after each priority. Complete descriptions of available grant funding opportunities and most recent funding opportunity notices can be found at N:\FEDERAL GRANTS\Funding Opportunities.

Improve Species Indices (See Table 1)

- Expand Programs 120 (statewide juvenile trawl survey) and 195 (Pamlico Sound juvenile trawl survey) into fresh/brackish waters of the Pamlico Sound tributaries and southern area tributaries to collect better juvenile abundance indices for southern flounder, striped bass, and river herring. Evaluate the programs temporally and spatially to ensure target species are being sampled. For example, an expansion of Program 120 may include an increase in effort from May to October.
- Expand Programs 120 and 100 (juvenile anadromous fish survey) eastward in the ASMA to catch more blue crabs, striped mullet and spotted seatrout. Evaluate these programs temporally and spatially to ensure target species are being sampled.
- Expand Programs 123 (juvenile red drum survey) and 100 seine surveys to areas north and south.
- Expand Programs 915 (independent gill net surveys) into fresh/brackish waters of the Pamlico tributaries and southern area tributaries, as well as Core and Bogue Sound areas to cover all our major finfish. Evaluate the programs temporally and spatially to ensure target species are being sampled and interactions with sea turtles and other protected species are avoided.
- Expand Program 135 (striped bass independent gill net survey) eastward in the ASMA to catch more striped mullet and more saline-based species. Evaluate the program temporally and spatially to ensure target species are being sampled and interactions with sea turtles, sturgeon and other protected species are avoided. Evaluate finfish indices to determine if sampling intensity can be reduced from 48 hours per Quad to 24 hours per Quad. This will allow us to cover additional areas for the same amount of money. Analysis must be conducted for all finfish in which catch data are used in assessments (e.g., Atlantic menhaden, striped mullet, American shad, southern flounder, Atlantic sturgeon, and striped bass).
- Expand Program 146 (electro-fishing survey) outward from the Neuse River to areas north and south (limited by salinity) to collect better data for red drum, striped bass, southern flounder, spotted sea trout, spot, and American eel.

Potential Funding Sources:
- Coastal Recreational Fishing License Grant Program (CRFL) (For finfish only)
- Sport Fish Restoration Grant Program (SFR)
Improve Bycatch/Discard Data

- Expand observer programs to run-around nets, pound net, channel net, haul seine, hook and line, ocean gill nets, beach seine and other ocean fisheries, across all areas and seasons.
- Continue to characterize the shrimp and skimmer trawl fishery.
- Continue to characterize the large and small mesh gill net fisheries.

Potential Funding Sources:
- Atlantic Coastal Cooperative Statistics Program (ACCSP): For observations in fisheries not previously funded through the program. Grants are one year only.
- Marine Fisheries Initiative (MARFIN): For characterization of bycatch in shrimp trawl fisheries, mackerel fisheries, and of commercially/recreationally important reef fish.
- ACFCMA
- National Fish and Wildlife Foundation (NFWF) River Herring Conservation Initiative: To observe at-sea and portside non-herring small mesh fisheries to improve information on river herring bycatch.
- Cooperative Research Program (CRP)
- NFWF Fisheries Innovation Fund (FIF)

Gear Development

- Develop commercial bycatch/mortality reduction devices/methods in gill nets
- Develop commercial bycatch/mortality reduction devices/methods in crab pots
- Develop alternative methods (modified gillnets, fish pots, fyke nets, etc.) to traditional gill nets
- Develop and test alternative gill net configurations (i.e. illuminated gill nets, gill nets hung on square) to reduce sea turtle and sturgeon interactions
- Develop and implement methods to reduce hook-and-line release mortality (striped bass, spotted seatrout, sheephead, river herring, and southern flounder)
- Conduct comprehensive research on bycatch reduction devices in shrimp trawls
  - Test federally certified BRDs (i.e. Jones Davis, Modified Jones Davis) in North Carolina waters
  - Conduct industry testing of T90/square mesh tailbags in the shrimp trawl fishery to reduce finfish bycatch
  - Continue to test the Composite Panel, reduced bar spacing TEDs, and the skylight panels.

Potential Funding Sources:
- Bycatch Reduction Engineering Grant Program (BREP)
- ACFCMA
- Saltonstall-Kennedy (S-K)
- Cooperative Research Program (CRP)
NWF Fisheries Innovation Fund (FIF)

Improve Recreational Catch Statistics

- Continue to develop and expand recreational shellfishing and crabbing creel surveys to obtain better catch and participation data.
- Expand creel surveys to obtain catch and participation data for alosines.
- Collect data on summertime discards of striped bass.
- Continue to develop striped mullet creel surveys.
- Collect length composition of recreational releases of recreationally significant species

Potential Funding Sources:
- CRFL (For finfish only)
- ACCSP
- SFR: For finfish only.
- NWF Fisheries Innovation Fund (FIF)

Improve Habitat Mapping and Restoration Efforts

- Survey the Central and Southern districts of the state to document culvert locations and types and prioritize culvert restoration/removal. Only the ASMA has extensive culvert coverage.
- Continue to evaluate spawning areas in all tributaries of the ASMA and expand to all areas of the state for diadromous species.
- Expand all habitat mapping for NC estuarine waters. Focus on the deep water oyster reefs of Pamlico Sound, and consider sentinel sites for bottom mapping.

Potential Funding Sources:
- CRFL (For finfish only)
- SFR for spawning area surveys
- ACFMCA
- NWF Bring Back the Natives/More Fish
- NWF River Herring Program
- Atlantic Coastal Fish Habitat Partnership

Research Priority Progress

The research priorities listed above are long-term ongoing priorities that will take time to expand, and expansion of these priorities will be dependent on funding. While some components of research needs are being addressed, this does not necessitate their removal as research priorities.
The DMF has improved its ability to meet required observer coverage needs in the large mesh and small mesh gill net fisheries as mandated by both the sea turtle and Atlantic sturgeon incidental take permits, allowing for continued collection of commercial discard and at-net mortality information as well as protected resources interactions statewide. The DMF has completed three years of observations characterizing the otter trawl shrimp fishery and has completed one year of observations in a pilot study of the skimmer trawl fishery.

DMF staff investigated topless trawls in the brown shrimp fishery to reduce bycatch and protected species interactions during the 2015 brown shrimp season. The DMF in conjunction with the shrimping industry tested several BRDs (composite panel, reduced bar spacing TED, skylight panels, and the double fisheye) and has received an additional year of funding to continue testing these and other BRDs and plans to seek funding for a third year.

Recreational catch data continue to be collected through gigging, shellfish, and crabbing surveys with the shellfish and crabbing surveys being based off of CRFL license holders. However if a recreational shellfisherman or crabber does not have a CRFL they are missed in the potential survey. Recreational data collection has also expanded to night time sampling for specific fisheries as well (red drum night time fishing, flounder gigging, etc.).

Tributaries in the ASMA/CSMA are being evaluated for spawning areas for diadromous species. Other ongoing work includes tagging striped bass, American shad, and Atlantic and short-nose sturgeon to assess migration patterns and where they spawn. Estuarine striped bass aging methods have been standardized and validated between agencies (NCDMF and NCWRC) and between systems (Roanoke, Tar/Pamlico, Neuse, Cape Fear rivers).

Additional Recommendation

In its October 2013 research priority document, the BRT Research Priority Subcommittee recommended that the BRT Independent Subcommittee develop criteria for review of usefulness of the fisheries-independent sampling programs and to consider the pros and cons of evaluating these programs by either DMF staff, by academia, or an outside consultant.

The BRT Independent Subcommittee met with DMF species leads and stock assessment scientists to begin the evaluation of existing programs in 2014. Staff planned to look at CVs in random surveys, persistence in fixed station surveys, percent zero catches, and number of observations per strata/time period. Program 916 was evaluated and was determined that the program should be dropped because data were not useful. Program 915 and other similar independent surveys will also be reviewed with similar analysis to insure they are providing meaningful data and meeting objectives. The group completed and submitted a list (by species) of sampling programs to the director that provided information that goes into either state or federal stock assessments.