State of Maine
ONE HUNDRED AND TWENTY-SIXTH LEGISLATURE
COMMITTEE ON MARINE RESOURCES

MEMORANDUM

TO: Patrick Keliher, Commissioner
Department of Marine Resources

FROM: Christopher K. Johnson, Senate Chair
Walter A. Kumiega III, House Chair
Committee on Marine Resources

RE: Government Evaluation Act

DATE: April 29, 2013

We are writing to notify you that the Joint Standing Committee on Marine Resources intends to review the Maine Department of Marine Resources, pursuant to the Government Evaluation Act, Title 3 of the Maine Revised Statutes, chapter 35.

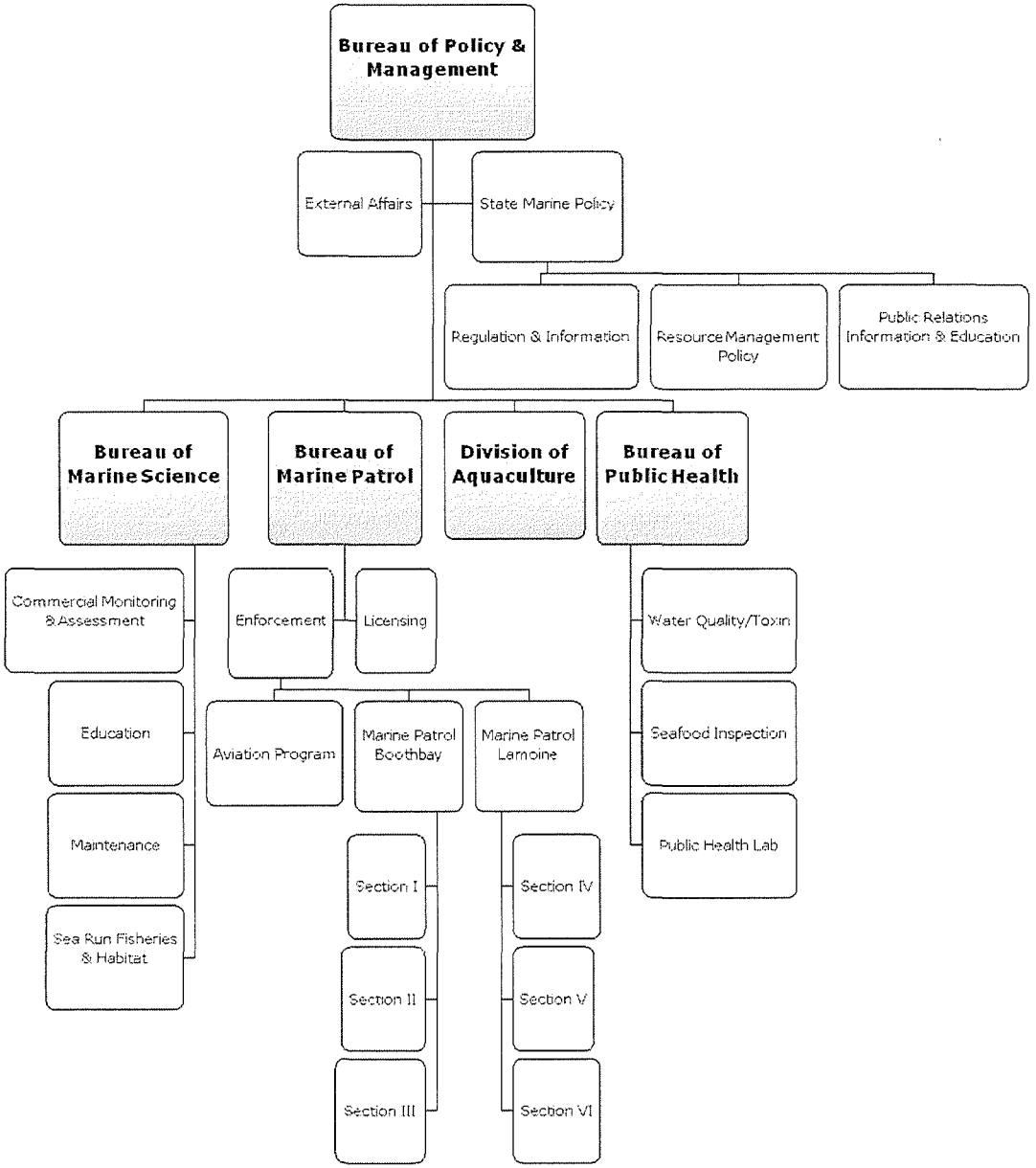
Pursuant to the law, the Committee respectfully requests that the Department prepare a program evaluation report and submit this report no later than November 1, 2013. Title 3, section 956 (attached) provides a list of information to be included in the evaluation report. We anticipate following up with specific areas of emphasis to make this process as efficient as possible.

We will begin our review of the Department of Marine Resources no later than February 1, 2014 as provided in law, and we anticipate submitting our findings no later than March 15, 2014. We look forward to working with you on this review process. Please feel free to contact one of us or our committee staff if you have questions about the process.

Enclosure
3 MRSA, Chapter 35, Section 956 – Program Evaluation Report

c: Members, Joint Standing Committee on Marine Resources

Department of Marine Resources
Major Bureaus and Divisions



B. Program Descriptions

As a result of the reorganization of the Department of Marine Resources (DMR) achieved through LD 1509, Department programs now consist of the following:

- Bureau of Policy and Management (BPM) – formerly the Office of the Commissioner
- Bureau of Marine Science (BMS) – formerly the Bureau of Resource Management
- Bureau of Public Health (BPH) – formerly a Division within Resource Management
- Bureau of Marine Patrol and Licensing (BMP) – formerly just Marine Patrol
- Division of Aquaculture – formerly located within the Bureau of Resource Management

The former Bureau of Sea Run Fisheries and Habitat is now a Division within the Bureau of Marine Science. Please see the attached organizational chart.

Program priorities are identified below, within the description of the Programs. Where available, metrics are included to indicate measurements of progress. In the future, the development of Fisheries Management Plans (FMPs) as provided for in LD 811 (2013 P.L. Chapter 287) will include goals and objectives for each fishery, along with assessment techniques that will aid in determining if those goals and objectives are being met. The FMP for Rockweed (*Ascophyllum nodosum*) will be submitted for Committee review in the winter of 2014. Work on the sea urchin and scallop FMPs has commenced. Work on the lobster FMP will likely begin in winter 2014.

The Bureau of Policy and Management (BPM)

The Bureau of Policy and Management is responsible for overall administration of the agency, and develops policy for the management of Maine's marine resources, both in state waters and in the interstate and federal management arenas. This Bureau is responsible for the development and adoption of regulations necessary to promote the conservation and propagation of marine organisms. Staff provide support to advisory councils during the development of fishery management measures, regulations and plans, conduct industry outreach, permit aquaculture leases, and issue special licenses. Staff from this Bureau also participate in the legislative process, by providing testimony, attending public hearings and work sessions, and submitting agency legislation. Finally, staff from this Bureau are responsible for information and outreach on behalf of the Department to the public, to keep both industry members and the general public informed with regard to Department initiatives and actions.

Under Commissioner Keliher's leadership, this Bureau has prioritized meaningful engagement of stakeholders in policy development. While the Department has long sought a balance between economic opportunity and long term ecological sustainability, the current administration places particular emphasis on ensuring that there is an open dialogue with industry members and other affected stakeholders, and an open door policy to the Commissioner's office. In the 2000 Strategic Plan, the Department developed an objective to maintain economic opportunities in marine harvesting, processing, and fisheries support industries at no less than 1997 levels. Across all fisheries and in terms of landed value that objective has been achieved, with the overall value nearly doubling over the course of the past 15 years, from $274 million in 1997 to $524 million in 2012.

This has not been the trend in all fisheries however, with consistent pressure on harvest levels in federally-managed fisheries, and with depleted resources in some state waters fisheries. With better management tools, we are working to increase opportunities for marine-resource-dependent businesses, while protecting marine resources for long term ecological and economic sustainability. Notable increases in landings have been seen in the lobster fishery over this time period, and in more recent years, indications of rebuilding in the scallop resource as a result of the implementation of a rotational management plan. Finally, the tremendous growth in the value of the elver fishery since 2010 has made a significant contribution to the state's overall landed value.

Bureau of Marine Science (BMS)

The Bureau of Marine Science (BMS) conducts the research and monitoring necessary to promote the sustainable use of Maine's marine resources. Toward that end, the Bureau engages in scientific research, monitoring, and assessment to manage and restore marine, estuarine, and diadromous resources; collects commercial landings and recreational harvest data; provides scientific advice to management plans for state, interstate, and federal fisheries; and operates the Maine State Aquarium and educational programs to educate Maine school children and the public about marine resources. Within the Bureau are three Divisions: Biological Monitoring and Assessment, Sea Run Fisheries and Habitat, and Marine Education.

Biological Monitoring and Assessment

Effective management of fisheries depends on an understanding of the biology of the organisms, including their life history, distribution, habitat, and population dynamics. It also requires an understanding of the associated fishery, including the impacts of gear, areas fished, and fishing effort. The Division of Biological Monitoring and Assessment conducts a variety of sampling programs to collect information on the species of commercial, recreational, and social importance in Maine waters and on the fisheries for those species. Several programs are targeted for a broad array of species while others are focused on individual species and fisheries. The information gathered from these programs is used in stock assessments that describe the condition or status of a stock and recommend management measures to regulate the fisheries. DMR's scientific research programs are focused on both long-term monitoring efforts to understand these factors and how they change over time, and some shorter-term projects to address specific questions.

Priority areas of assessment and monitoring work are determined in part through an evaluation of the importance of the fisheries in terms of participation and landed value. Resources are directed toward those fisheries upon which large numbers of fishermen have significant dependence, and which constitute the majority of the landed value. The state's obligations in the federal and interstate management arenas are also a factor in determining priority activities for this Division. Detailed catch, effort, and biological data are collected from fishermen along the entire coast of Maine for assessment and management of the American lobster, northern shrimp, green sea urchin, sea scallops and Atlantic herring. Samples are processed for length, weight, sex, state of maturity, gonad weight, and age composition. There are also fishery-independent surveys to assess juvenile lobsters, northern shrimp,

sea urchins and scallops. More limited data are collected for other species, including quahogs, crabs, and sea cucumbers.

Since the fall of 2000, DMR has conducted the Maine-New Hampshire Inshore Trawl Survey, a resource assessment survey performed biannually (spring and fall) in coastal waters out to 60 fathom, from the Massachusetts-New Hampshire border to Canadian waters. The survey is a successful collaborative effort with the commercial fishing industry, using a commercial fishing vessel as the platform. The boat owner, captain and crew have been actively involved in the design and implementation of this survey. Annual indices of abundance and biological data are collected for use in stock assessments and management of groundfish, lobsters, herring, and other valuable marine resources.

Another component of this Division that has emerged as a high priority for the Department is the Landings Program. One of the ways to monitor the health of Maine's fisheries and the seafood industry is through the collection of landings and catch statistics. The purpose of the data collection is twofold: first to obtain accurate information on the amount of marine organisms caught or landed in Maine for use in fisheries management; and second to demonstrate the social and economic importance of marine resources to Maine. All dealers who are licensed to buy from harvesters must report to DMR. In addition, 15 fisheries have mandatory harvester reporting: bait gillnet, dogfish, eel (yellow & silver stage), elver, green crab, halibut, herring, horseshoe crab, sea cucumber, seaweed, shellfish bait, shrimp, whiting, scallop (commercial and recreational license holders) and 10% of commercial and recreational lobster harvesters.

The Division has a directed program to collect recreational fishing data. The Marine Recreational Information Program (MRIP) is a confidential, voluntary survey implemented in 1979 by the National Marine Fisheries Service (NMFS) as a means to establish a reliable database for estimating the impact of recreational fishing on marine resources. This survey is conducted in all U. S. coastal states. The information is used by Fishery Management Councils, the Atlantic States Marine Fisheries Commission (ASMFC), as well as Federal and State resource agencies to formulate fishery management plans, to evaluate future demands on fish stocks and to predict and evaluate the impact of fishery regulations.

Estimates generated from this survey include: total number of fish caught, released and harvested; the weight of the harvest; total number of angler trips; and number of people participating in marine recreational fishing. Maine DMR assumed responsibility for the survey in 1996 giving the Department the ability to increase the number of angler interviews collected beyond the NMFS requirements for Maine. This in turn has provided a significantly improved database that generates more precise estimates. The most recent data available from the 2012 MRIP indicate that there are approximately 300,000 salt water anglers fishing in Maine who made nearly 650,000 individual fishing trips. This is down from an estimated million fishing trips when the striped bass fishery was at its peak.

Over the past decade, the Department has increased its role in the conservation and management of protected species, including pinnipeds (seals), endangered and threatened large whales and sea turtles that occur in Maine coastal waters. The Maine Whale Plan began in response to conservation and research needs that arose as a result of the federal Atlantic Large Whale Take Reduction Program

process, and has since grown to include a comprehensive Conservation Plan that was drafted and implemented by the state in accordance with its Section 6 agreement with the Federal government. DMR participates in the management of Atlantic large whales through participation in the Atlantic Large Whale Take Reduction Team and through the development of grant proposals to address critical issues such as near-shore seasonal abundance and distribution of Atlantic large whales and potential interactions with fixed gear fisheries. DMR has recently created a fully interpolated AIS (Automated Identification System) data product (years 2007-2011) in ArcGIS format that can be used by the Maine Coastal Program (MCP), DMR and other entities for planning, management and other research needs; characterize ship traffic and individual contributions to the overall noise budget of a habitat with high co-occurrence of endangered large whales; ground truth baseline ambient noise calculations made in inshore and offshore habitats using DMR's acoustic dataset with concurrent vessel track information; assessment unofficial shipping lanes through sighting hotspots of endangered whales in the Gulf of Maine; and compare vessel types, speed and port of origin as an assessment of risk to whales in inshore versus offshore habitats.

Finally, division staff respond to oil and hazardous waste spills in the marine and estuarine environment as needed to assist with assessment of damages to natural resources. These assessments are the basis for compensating the State for natural resource losses. Together with Marine Patrol, they determine what fisheries might be impacted, engage DMR's Bureau of Public Health as necessary to make shellfish closures, and recommend needed fishery closures to the Commissioner. On-site evaluations of impacts to marine resources are made as needed, and staff provides input to DEP on marine resources and habitat needing protection and cleanup, and on damage to the marine environment. Staff also interfaces with the Department of Agriculture to manage seafood safety beyond shellfish when warranted. DMR periodically reviews GIS data and maps used for natural resource and fisheries impacts, and provides annual updates to DEP as appropriate. Staff participates in state and regional committees, workshops, drills and trainings to ensure preparedness to respond to oil spills.

Marine Education

The Education Division provides educational services and materials to school children, teachers, and the general public. The objective of this Division is to develop a citizenry that has awareness and appreciation for the marine environment and its resources. The Maine State Aquarium, located in West Boothbay Harbor, invites visitors to learn about the ocean and the richness of life that it supports through its collection of regional fish and invertebrates on display. It provides educational opportunities on the importance of Maine's marine resources to over 35,000 school children and visitors annually. The restored Burnt Island Lighthouse station and the new Education Center there make Burnt Island another exceptionally fine educational facility. At Burnt Island, the Department provides teacher training through workshops and courses that offer recertification credits to its participants. Informational booklets and curriculum materials are also available.

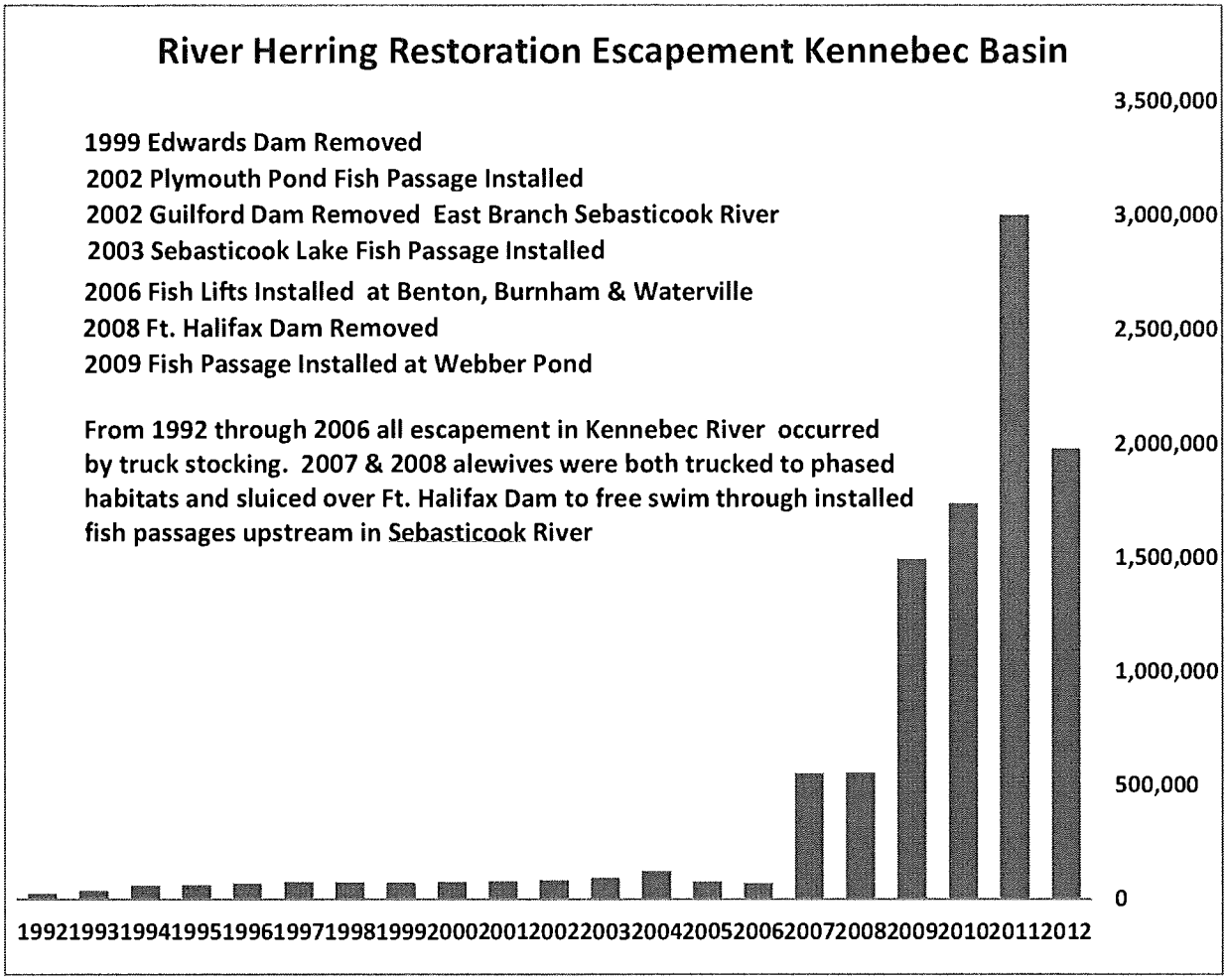
Sea Run Fisheries and Habitat

The mission of the Division of Sea Run Fisheries and Habitat is to protect, conserve, restore, manage and enhance diadromous fish populations and their habitat in all waters of the State; to secure a sustainable recreational fishery for diadromous species; and to conduct and coordinate projects involving research, planning, management, restoration or propagation of diadromous fishes.

Anadromous fishes (alewife, blueback herring, American shad, striped bass, rainbow smelt, Atlantic salmon, Atlantic tomcod, sea lamprey) and catadromous fish (American eel), collectively referred to as diadromous fishes, historically occurred in most major and minor coastal watersheds in the state. Declines in these populations were caused by the construction of dams and water pollution, which rendered many waters unsuitable for their migration into freshwater production areas. The successful water pollution abatement program of the 1970s re-established a clean environment that now enables the restoration of these species to their historic habitats. Atlantic salmon, shad, and alewives are stocked in waters that historically supported these species. Fish passage requirements at hydroelectric dams, a DMR fishway construction program, and other habitat connectivity projects over the past 30 years have significantly increased the amount of habitat available to diadromous fishes. DMR operates, maintains, and/or inspects 30 coastal fishways (18 owned by DMR and 12 owned by other public entities). Research on Atlantic salmon is directed at determining the causes of the precipitous decline in Atlantic salmon returning to Maine waters. Ongoing DMR research projects are aimed at determining survival among freshwater life stages and understanding the biological and environmental factors affecting survival.

The Department monitors the amount of habitat accessible by diadromous fishes and the number of these species returning to Maine rivers to spawn or grow. An additional 17 miles of habitat was opened to migratory fishes in the Kennebec River, and work is underway to open up 1000 miles of the Penobscot River and its tributaries to sea run fish. The Penobscot River Restoration Project (PRRP) began removal of Great Works Dam on June 11, 2012. The PRRP is an unprecedented collaboration between the Penobscot Indian Nation, seven conservation groups, hydropower companies PPL Corporation and Black Bear Hydro, LLC, and state and federal agencies, to restore 11 species of sea-run fish to the Penobscot River, while maintaining energy production.

The goal of the Kennebec River Diadromous Fish Restoration Project is to restore Maine's native diadromous fishes to their historic range and abundance in the watershed. The Kennebec Hydro Developers Group (KHDG) is comprised of several power companies including next Era Energy, Brookfield Power, Benton Falls Associates, Merimil Limited Partnership and Kruger Energy. All are dam owners on the lower Kennebec and Sebasticook Rivers. The KHDG, under a cooperative agreement with the State of Maine, has funded anadromous fish restoration in the Kennebec basin since 1987. The restoration effort is being carried out by DMR. Through this project, we have seen an increase in adult river herring spawning population from 68,990 adults in 2006 to over 3 million adults in 2011 (Figure below).



Adult river herring returns in the Kennebec River Basin (includes the Sebatiscook River drainage) from 1992 to 2012.

For American eels, DMR uses upstream passage at one site to quantify annual recruitment of young-of-year American eel. On the Kennebec River, DMR uses upstream passage at 1-3 sites to quantify annual recruitment, determine run timing, and obtain biological data. Finally, DMR facilitates downstream passage and emigration of adult American eels by assisting hydropower owners with design and evaluation of eel downstream passage. DMR uses DIDSON sonar at 3 hydropower sites in the Kennebec River watershed to quantify emigrants, and determine run timing.

The Sea Run Fisheries and Habitat Division conducts a striped bass assessment in the Kennebec River. They use an acoustic telemetry array, DIDSON sonar, PIT (passive integrated transponder) tagging, and ichthyoplankton sampling to determine habitat use, migratory behavior, abundance of the native Kennebec population and degree of mixing nonnative striped bass.

Atlantic sturgeon is listed as Threatened by the National Marine Fisheries Service (NMFS). Collaborative sturgeon work began in 2008 with the University of Maine and the University of New England and continued in 2013 with emphasis on estimating the size of the population and identifying important

habitat. Fish were implanted with uniquely coded PIT tags so individual fish can be identified when recaptured, allowing the size of the population to be estimated. Sonic tags have been implanted in fish in the lower Kennebec and fish movement monitored using an array of receivers that have been in place to monitor striped bass movement. Samples for genetics, toxic contaminants, and pathology will be collected to develop a baseline characterization on sturgeon. Shortnose sturgeon is listed as Endangered by NMFS. DMR has collaborated on a three-year research project with the University of Maine and the University of New England to estimate the population size of sturgeon in major river systems in Maine, characterize intersystem movements of sturgeon, determine feeding habitat and trophic position of sturgeon in each system, determine sex and stage of maturity, and investigate the possibility of scute elemental analysis as indicator of river of origin.

Finally, Division staff review applications for federal hydropower licenses; provide written recommendations for fish passage, flow management protocols, and minimum flow requirements; and engage in comprehensive settlement discussions that often involve multiple projects within a watershed. Once a federal license has been issued, typically for 30 to 50 years, DMR staff review and comment on study plans and reports, make site visits, draft all or portions of annual reports, and participate in annual meetings. DMR staff work with various federal, state, and local partners to obtain funding for dam removals, fish passage, and maintenance of fish passage at more than 20 locations on Maine rivers.

Division of Aquaculture

The Aquaculture Division is responsible for scientific oversight of all finfish, shellfish and seaweed farms in the State's marine waters. Responsibilities include scientific SCUBA investigations of potential lease sites to ensure proposed operations are ecologically acceptable and to develop information against which lease decision criteria are evaluated in the adjudicatory process. Public testimony and outreach is imperative.

The Division also monitors the ecological impacts of finfish aquaculture operations in the State in concert with DEP. This includes oversight of farm operations, inventory and feed inputs, any chemical therapeutants used in farm operations, and continued evaluation of the environmental response to farm inputs to ensure operations are not substantially injurious to marine organisms.

As part of aquaculture oversight and permitting, staff evaluate all requests for fish transfers and other marine organism introductions and importations in an effort to prevent or limit the spread of pathogens of concern. Additionally staff work in association with the Aquatic Animal Health Technical Committee to respond to any reports of pathogens in farm raised finfish and shellfish and to develop the appropriate regulatory response to disease concerns.

Bureau of Public Health

DMR's Public Health program operates under the guidelines of the National Shellfish Sanitation Program (NSSP). The NSSP is the federal/state cooperative program recognized by the U. S. Food and Drug Administration (FDA) and the Interstate Shellfish Sanitation Conference (ISSC) for the sanitary control of

shellfish produced and sold for human consumption. The purpose of the NSSP is to promote and improve the sanitation of shellfish (oysters, clams, mussels and scallops) moving in interstate commerce through federal/state cooperation and uniformity of state shellfish programs. Under these guidelines, the BPH administers the Growing Area Program (water quality and biotoxin monitoring), the Shellfish Dealer Certification and Inspection Program, the Shellfish Management Program and several Volunteer Programs.

The Growing Area Program includes the classification of shellfish growing areas using water quality and pollution source data as well as the monitoring of biotoxins. The growing area classification component of the program evaluates all shellfish growing areas in the state of Maine to determine their suitability for commercial and recreational harvest. Because molluscan shellfish (those that have a hinged shell, such as clams, mussels, oysters, quahogs, etc.) are filter feeders, the quality of the waters in which they grow is a key factor in determining whether they are safe to eat.

A growing area's classification is determined by conducting a "sanitary survey," which is a three-fold process consisting of:

- A shoreline survey, which identifies pollution sources that may impact water quality. The program evaluates sewage treatment plants, onsite sewage systems, animal farms, drainage ways, and wildlife;
- Marine water sampling to determine fecal coliform bacterial levels in the marine water; and
- Analysis of how weather conditions, tides, currents, and other factors may affect the distribution of pollutants in the area.

Each commercially harvested growing area is assigned a "classification" according to the results of its evaluation. A growing area may be classified as Approved, Conditionally Approved, Restricted, Conditionally Restricted, or Prohibited.

Once classified, all shellfish growing areas are regularly monitored. Marine water samples are collected throughout the year. Shoreline surveys are conducted less frequently, but each year some portion of the Maine coast (47 shellfish growing areas) are surveyed. During those surveys, all actual and potential pollution sources that may impact water quality are evaluated.

The purpose of continued water sampling and shoreline surveys is to ensure that growing areas continue to meet the standards associated with their classification, to modify classifications when needed, and to notify the responsible agencies about identified and potential pollution sources.

The marine biotoxin monitoring component of program monitors levels of PSP ("Red Tide") and other marine biotoxins in the shellfish of the State of Maine. When toxin is found at levels that pose a potential threat to public health, closures to the harvest of shellfish areas are implemented. Maine has historically had high levels of Paralytic Shellfish Poison (PSP), more commonly known as "Red Tide", during the warmer periods of the year. Shellfish samples are collected from approximately 100 primary

stations along the coast weekly and from offshore islands between March and October and evaluated at the two PSP laboratories (Boothbay Harbor, in the western portion of the state, and Lamoine, in the eastern portion). Data is then interpreted and appropriate closures are made when necessary.

The Biotoxin Program is currently upgrading testing techniques to a high performance liquid chromatography (HPLC) method for most species of bivalve shellfish (clams, mussels, oysters etc). The program is also implementing changes to its sampling strategy including creating regional mussel closures during the height of the biotoxin season and maintaining exception areas for wild, aquacultured and recreational mussel harvest.

The Maine Shellfish Dealer Certification and Inspection Program evaluates and certifies all wholesale shellfish dealers in Maine. These dealers must be certified under the NSSP to ship, or process shellfish for shipment, within and outside of the state of Maine. By making sure that wholesale shellfish dealers meet these standards, the safety and wholesomeness of the shellfish being purchased by consumers is ensured. DMR staff members from this program also investigate any incidents of food borne illness, when necessary.

The Growing Area and Dealer Inspection Programs are evaluated annually by the U.S. Food & Drug Administration and have performed well in these evaluations with generally only minor deficiencies that are rapidly addressed.

The Bureau administers the Shellfish Management Program. This Program ensures that municipalities assuming the responsibility of managing shellfish resources do so in a manner consistent with the state's goal of balancing use of the resource and conservation. Towns manage their shellfish resources to the lower tide line by adopting and enforcing a town shellfish conservation ordinance. Area Biologists are responsible for helping municipalities with resource assessment and management of their shellfish ordinances.

Also within the Bureau of Public Health is the Natural Resource Permit Review coordinator. This individual receives all environmental permits from the Army Corps of Engineers, the Department of Environmental Protection, Department of Transportation, and the National Marine Fisheries Service among others, and evaluates them for the proposed activity's impact on the marine resources and habitat. Permits applications are shared with appropriate staff within the Department and comments are compiled into a formal response. Ability to comment appropriately on these permits can include site visits and participation at local and regional meetings.

The Bureau of Marine Patrol (BMP)

The state of Maine has five thousand miles of coastline with thousands of commercial fishers that provide economic viability to our coastal communities. The Bureau of Marine Patrol's (BMP) primary responsibility is the enforcement of the State's marine commercial and recreational fishing laws, protecting both the resource and the industries that depend upon them. Toward this end, Patrol uses traditional law enforcement techniques, as well as the promotion of community compliance. BMP has statewide law enforcement authority. The importance of Marine Patrol cannot be overstated, as

without effective enforcement capabilities, the core mission of the agency - to conserve and develop Maine's marine resources - could not be met. In addition to their core function, BMP provides public safety and law enforcement services to mainland and coastal island residents, search and rescue services, and emergency maritime transport.

BMP partners with a number of state and federal agencies that benefit from their unique expertise. They assist the Maine Emergency Management Agency with homeland security needs and general emergency preparedness. They work with the Department of Environmental Protection to provide personnel and equipment for hazardous material spill containment. BMP enforces federal mandates by the Food and Drug Administration on reporting, monitoring and enforcing of shellfish closed areas, harvesting procedures, and dealer enforcement. BMP also enforces recreational boating laws, provides education and safety information and training.

The Bureau is divided into two field divisions with a Lieutenant manning a regional office in each division. Each division is divided into three sections with a field sergeant in charge of 7 officers in each section. Full complement, as this is written, is 46 sworn law enforcement personnel, of which 32 are officers. The Bureau has the use of the Marine Patrol Cessna, amphibian aircraft, which covers the entire coast. There is also a fleet of boats that the Marine Patrol uses to enforce marine resources laws, which include: 2-46' patrol vessels, 1 42' vessel, 4-35' patrol vessels, 3-25' patrol vessels, 14-21' patrol vessels, and 6-17' patrol vessels.

BMP tracks numerous metrics of its efforts in order to meet reporting requirement of various federal grants. As an indicator of their activity, the following statistics document the 6 month period from January 2013 – June 2013:

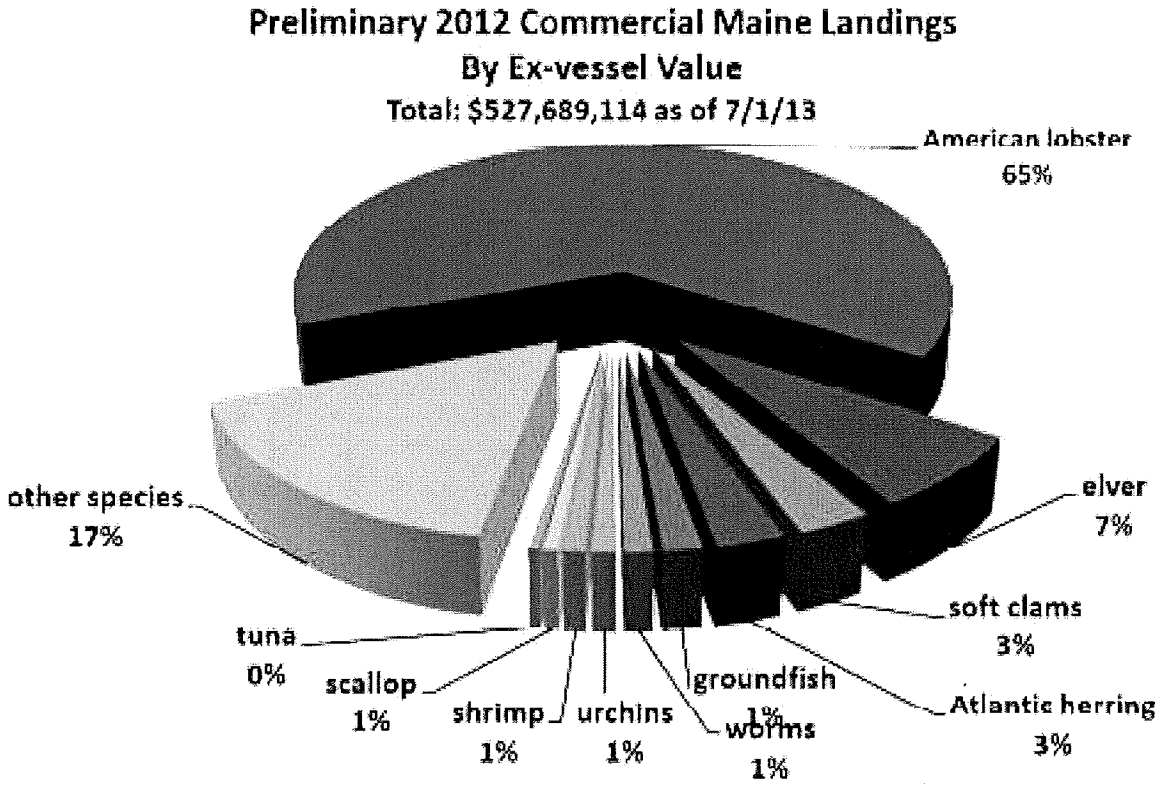
- 12,070 hours of harvester enforcement
- 2785.50 hours of public health enforcement (closed areas, etc.)
- 1892 boats checked
- 178 man and vessel hours in vessels under 26'
- 1376 man and vessel hours in vessels over 26'
- 25 hours in aircraft
- 7023 harvesters checked
- 139 summonses issued
- 1238 warnings issued

Through the reorganization, Licensing is now located within the Bureau of Marine Patrol. In its 2000 Strategic Plan, the Department developed an objective to improve the effectiveness and efficiency of delivering the Department's administrative services. Under current leadership the Department has placed renewed focus on increased efficiency through technology and improved accessibility, including a major initiative to increase online sales of marine resources licenses.

J. Emerging Issues

1. Fisheries licensing, challenges for diversification

The ability to control effort in a fishery is one of the cornerstones of fisheries management. In the absence of a hard Total Allowable Catch (TAC) that restricts the amount of fish removed from a system, controlling the amount of participation in the fishery is the primary mechanism to manage effort. An ongoing challenge for the Department as more and more fisheries have become limited entry is how to develop effective entry/exit systems that provide access to a diversity of fisheries. Failure to do so could impact the vitality of shoreside fishing communities for generations to come. As is clear from the most recent summary of commercial landings data, the state's current reliance on the lobster fishery is significant, making up 65% of our total landed value of nearly $528 million.



Far from a "one size fits all" approach, the situation in each fishery is different. In the lobster fishery, record landings and various abundance indices have shown a robust population over the past decade. However, plummeting boat prices have challenged the viability of many owner-operators, particularly in the western part of the state where the increase in landings has not kept pace with the increasing expenses. Therefore, while the biology of the fishery would seemingly support new entrants, some would argue that the economics do not. Based on the concerns raised about the long waiting lists for lobster licenses and an identified "generation gap" of license holders, there has been significant discussion over the past 2 years to find a better balance between the needs of current license holders, and future fishermen. Complicating this discussion is the significant amount of "latent effort" in this fishery, which was one of the topics discussed at a series of meetings held by Commissioner Keliher in

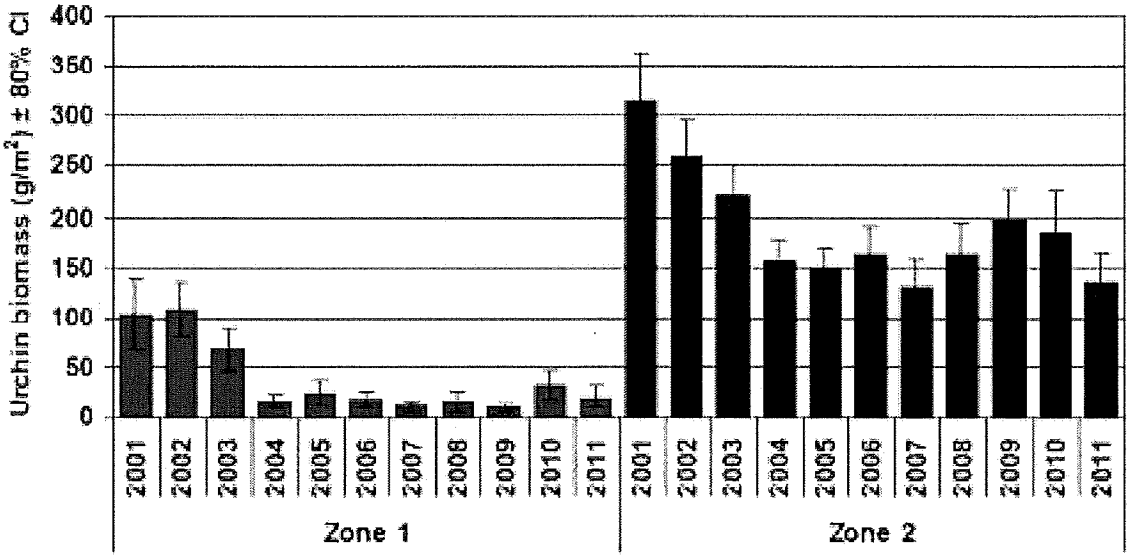
January 2013. The four years of landings data from 2008-2011 showed that 20% (1137) of license holders had no landings in any of those four years, and there are nearly 1 million latent trap tags. At this time there appears to be little will within the industry to address the issue of latent effort by limiting those inactive license holders to a lower trap limit. In part, the lack of support is based on concerns about replacing currently latent effort with new active effort. The Department intends to continue the conversations with the industry regarding the risks posed by latency and the deficiencies in the licensing structure, as part of the overarching goal of better preparing this fishery for any future changes in the status of the resource. The closer we are to knowing the actual effort in the fishery, the closer we are to managing effectively.

DMR tracks a number of indicators to gauge the status of the lobster resource. One of these is an annual settlement survey. While it is still early to draw any definitive conclusions, the information in the 2012 report bears close attention and consideration:

> "In 2012 lobster settlement was down from the previous year in virtually all areas from Lobster Bay, NS, to Rhode Island. The striking contrast between southern and northern regions evident a few years ago seems to be weakening. Barely detectable settlement seems now to be the norm for the area south of Cape Cod, with many sites reporting zero settlers and diminishing juvenile populations, and new sampling sites near Martha's Vineyard, MA, only reinforce this pattern.
>
> Encouragingly, in Rhode Island a few settlers reappeared in 2012 where none were found in 2011, a first in 22 years. Even in the northeast Gulf of Maine/Fundy region, from Lobster Bay, NS, to Jonesport, ME, settlement has been sliding off the highs of 4 to 7 years ago. Given that trend, this year's numbers may not have been too surprising, but it was a wake-up call to see zeros in Lobster Bay. Does this bode for a reversal in that region's historic surge in landings?
>
> In the broad midsection of the survey area, from Mt Desert, ME, to Cape Cod Bay, 2012 was decidedly a down year. In short, after a wave of widespread strong settlement years over the past decade, many locations are falling off the highs they've seen in the recent past. Given the impact of dwindling settlement on the fishery in southern New England, there now may be reason to wonder whether the days are numbered for the historic boom in lobster abundance in the Gulf of Maine."

In contrast to the lobster fishery, both the scallop and urchin fisheries have been recently at historic lows in terms of landings. The annual urchin assessment indicates a lack of recovery in biomass in both zones, despite reductions in the season and the implementation of tote limits in Zone 2. Scientific advice continues to recommend further reductions. As with lobster, there is still significant latent effort in this fishery as well. For these reasons, the lottery that previously existed to award sea urchin licenses for new entrants has been suspended since 2005.

Mean Sea Urchin Biomass by Zone and Year



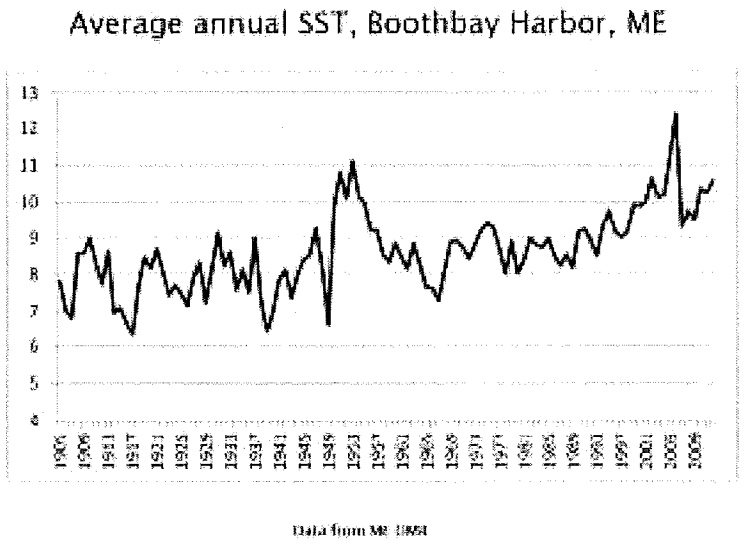
In the scallop fishery, some resource rebuilding has been achieved in specific areas through the implementation of closed areas and a new rotational management plan. However, with increased opportunity, previously latent licenses were reactivated in the 2012-2013 season. Current estimates are that historically, of the more than 600 licenses issued, 400 were latent. Approximately 25% or roughly 100 previously latent licenses, re-entered the fishery for the 2012-2013 season. The existing capacity within existing license holders is still more than the rebuilding resource can withstand, and the only option currently is to close areas through the emergency rule-making process when the Department becomes aware that removals from an area have exceeded the threshold identified through the assessment. In some instances these closures occurred in a timely fashion, in other instances the biomass removal was greater than was intended. As one way to limit the continued expansion of effort in this fishery and to encourage fishery participants to have a longer-term interest in the fishery, the Department has proposed creating an owner-operator requirement, instead of the current standard which simply requires the license holder to be on board the vessel.

Finally, the elver fishery has dramatically expanded in the past 3 years, increasing from a value of only $50,000 ($10/lb) in 2009, to nearly $40 million (nearly $2000/lb) in 2012. With only 432 state issued licenses in 2013, many have questioned whether this opportunity should be more broadly available. Historically the fishery has had at times upwards of 2000 license holders. However, this level of effort had significant social (fishing territory disputes) and environmental (riverbank destruction) consequences. Due to concerns about the American eel population, at the October 2013 ASMFC meeting, Maine committed to reducing elver landings 25-40% from the 2013 season. This winter, DMR will be meeting with elver fishermen and dealers to determine how to most fairly and enforceably implement additional management measures.

2. Changes in water temperature and environmental conditions

Recent changes in water temperature in the Gulf of Maine are one of the most significant emerging issues that the Department faces. From the *Ecosystem Status Report for the Northeast Shelf Large Marine Ecosystem, published by NOAA's Northeast Fisheries Science Center in April 2012, available online at: http://www.nefsc.noaa.gov/publications/crd/crd1207/crd1207.pdf):*

"Temperature is one of the most important governing environmental factors for marine organisms. Marine organisms have minimum and maximum temperatures beyond which they cannot survive. Additionally, they have preferred temperature ranges... Thus, changes in temperature will have far-reaching impacts on species in the ecosystem and on the ecosystem itself. Temperature in the [Northeast Shelf Large Marine Ecosystem] has varied substantially over the past 150 years. The late 1800s and early 1900s were the coolest in the 150 year record. This relatively cool period was followed by the warmest period in the record from 1945-1955. There was a rapid drop in temperatures through the 1960s followed by a steady increase to the present. Summer temperatures over the past 5 years are comparable to the warm period in the late-1940s/early 1950s and the summer 2011 surface temperature was the highest in the 157 year record. Winter temperatures in recent years, however, are near the long-term mean indicating that the seasonal range in temperature has increased."



Impacts here in Maine:

- Warming waters in the Gulf of Maine have thus far positively impacted lobster survival, growth and maturity and will continue to do so within reason. In southern New England, water temperatures have increased and contributed to a 75% decline in the fishery. After nearly 40 years of stability from 1950 through the late 1980s at 20 million pounds, landings have steadily increased over six times to a record 126 million pounds in 2012. Maine's fishing economy is heavily reliant on lobster, as 65% of the ex-vessel value of the state's fishery comes from lobster. Warming waters change faster than state and international lobster management. Shifting molting seasons and changing regional expansions have threatened the complementary balance between the US/Canadian lobster fisheries. A ~$35 million loss to the Maine fishery in 2012, can largely be explained by a six week early molting season. The fishery has scaled to follow the resource. A significant decline in the resource would cause a tremendous economic hardship on the fishery, well before a biological crisis would hit.

- While we often focus on overall trends, significant annual events can also trigger implications for management of marine resources. Unusually warm water in spring of 2012 led to higher than normal landings in early summer, resulting in a glut of lobster product entering the market when the Canadian processing sector was not anticipating, or ready to absorb it. This anomaly could have been anticipated by developing better seasonal indicators that could tell us more about the expected catch, as we have sought to do in 2013.

- Shell disease occurs when external bacteria invade the lobster's shell by eroding the chitin that composes the shell, resulting in pits or pock marks on the lobster's back or claw. The disease does not affect the lobster's tissue. The meat of a lobster with shell disease is safe to eat. Each time a lobster molts, it will shed the infected shell as it grows its new, uncontaminated shell. The DMR at sea sampling program has been scoring all lobsters encountered for the presence/absence of shell disease since 2003. The incidence was stable and low until 2008, since that time we have observed as increase from 0.5 to 4.0 lobsters per 1000 lobsters measured (0.05 to .4%) in 2012. Western Maine, in shallow waters during the months of May through July has the highest incidence. Shell disease appears to be higher in large reproductive females, likely as a result of a delayed molting schedule. However we have observed shell diseased lobsters in males and all size classes encountered by the fishery. The incidence has been greater in southern New England, where nearly thirty percent of lobsters have shown signs of shell disease. A National Oceanic and Atmospheric Administration (NOAA) funded a 2010 study that found there was no indication that temperature alone causes stress that could lead to infection. The study concluded that factors such as the lobsters' diet, damaged shells, or crowded bottom conditions, might play a role in causing the lobsters to become infected.

- The Gulf of Maine is the northernmost range of many warmer water species, and the southernmost range of many cold water species. NOAA's Northeast Fisheries Science Center reports that of the 36 fish stocks on the NE shelf, 24 have moved toward the pole or into deeper water. We are already seeing increased presence of southern stocks such as black sea bass and longfin squid in Maine waters, and decreased recruitment in stocks such as Northern shrimp. The shifting ranges of these stocks present both an opportunity and challenge for Maine fishermen who would like to target new species to diversify their business models as it becomes more difficult to access the fish stocks they have traditionally targeted (e.g. cod), due to both management and ecological changes. However, fishermen from the south who have targeted these stocks will be reluctant to allow increased access to Maine fishermen, as the fisheries are, in many cases, already allocated to the historical participants in those fisheries. NOAA, the New England, Mid-Atlantic and South Atlantic Fishery Management Councils, and the Atlantic States Marine Fisheries Commission, are currently analyzing and considering strategies for how water temperatures may impact shifting stocks and affect the prosecution of those fisheries in the future.

- During the warm period of the 1950s, northern shrimp catches declined to zero despite continued fishing effort (Dow 1964), suggesting a population collapse. Spring ocean temperatures during the larval period are particularly important for recruitment, with cooler temperatures favoring higher recruitment. Spawner abundance also influences recruitment strength, with more recruits resulting from higher spawner abundance. Timing of the larval hatch is influenced by temperature during late spring through early winter. The start of the

hatch period has become earlier as temperatures have increased, with the hatch now beginning more than a month earlier than the average before 2000.

- Green crabs are non-native species - organisms that have been transported via human activities and introduced to locations in which they previously did not occur. The green crab population in Maine has increased dramatically in recent years, and they have been feeding on bivalve shellfish resources like blue mussels and soft shell clams, threatening the state's third-largest wild fishery. The increase in the green crab population has coincided with an increase in ocean temperatures. A similar cycle occurred in the 1950s when the ocean temperatures rose and the green crab population increased, devastating the soft shell-calm resource in Maine.

- Increased carbon dioxide in the atmosphere also results in ocean acidification, a chemical reaction caused by the absorption of CO2 into seawater that results in lower pH. Ocean acidification has significant potential impacts for Maine's shellfish industry because it can cause shells to dissolve more quickly. Research conducted by Mark Green, a professor at St. Joseph's, indicates that juvenile clams resist burrowing into acidic mud, leaving them more vulnerable to predators.

- The relationship between marine phytoplankton abundance and species composition are not fully understood, but contributing factors are thought to include temperature, fresh water runoff and nutrient loading. The Gulf of Maine has experienced mild "red tide" or PSP (Paralytic Shellfish Poisoning) seasons caused by *Alexandrium* blooms in the past two years, but the presence and distribution of *Pseudo-nitzschia* has increased along the Maine coast. In both 2012 and 2013, DMR initiated proactive closures for ASP (Amnesic Shellfish Poisoning) caused by toxic forms of *Pseudo-nitzschia.* DMR is developing a monitoring program for ASP to begin in the 2014 season that builds on the phytoplankton volunteer network and expands state testing using new chemical analysis equipment (High Performance Liquid Chromatography).

- The increasing water temperatures have led to an expansion of Vibrio species in the northeast. Vibrios are naturally occurring marine bacteria that can cause serious and life threatening illnesses in humans. Exposure often occurs from the consumption of raw bivalve shellfish (e.g. oysters), but can also be from open wounds subjected to marine waters. Several northeast states experience *Vibrio parahaemolyticus* (Vp) illness outbreaks in 2013 resulting in massive recalls of contaminated product and prolonged closures of shellfish harvest areas. DMR is initiating a surveillance program for Vp in several important shellfish growing areas in 2014 in order to establish baseline information on the presence and virulence of Vp in Maine waters.

3. Declining federal funding

Loss of federal funding has impacted a number of DMR programs, requiring the Department to utilize dedicated accounts to supplement salaries and continue core monitoring and science programs. Many of these dedicated accounts will not be able to sustain the increased burden into the future. Additional federal cuts will only exacerbate an already tenuous situation.

- NMFS Cooperative Research program has been the primary source of funding for the Maine Inshore Trawl Survey since the end of the earmark era. DMR relies on the Surveys PPA line and the Northeast Cooperative Research Program to provide $300K/yr over a three-year grant to

fund the $400K/yr survey. Recent communications with NMFS indicate that long-term funding may only be available for $200K/yr beginning in FY 2014. This will require DMR to run the trawl survey only once per year instead of the current spring and fall surveys, reducing our understanding of stock status for certain groundfish stocks and Northern shrimp, as well as reducing our ability to understand the impacts of climate change on the lobster resource. The trawl survey is a key input into the lobster stock assessment. Reduced survey work will lead to greater uncertainty for purposes of scientific assessment and management decision-making, which often results in lower catch limits, as managers take a precautionary approach.

- NMFS Interjurisdictional Fisheries Grants are a formula-based grants program with a 10-25% state match. This seemingly insignificant line provided critical funding to support the baseline monitoring and management of fisheries occurring in multiple jurisdictions, including Maine's herring, lobster, and shrimp fisheries. DMR positions that were previously funded by this budget line are being moved to dedicated accounts and other special revenue accounts in the state budget, diverting resources intended to be used for innovative fisheries research and product/market development that could benefit the industry's economic growth to the more immediate need of collecting baseline assessment data. These accounts were designed to fund specific stand-alone research projects, and therefore are not funded at levels able to sustain staffing and budget needs over the long term. Use of these funds for this purpose is a temporary gap-fill, and when the funds are depleted, there will be no alternative source of funding to replace it.

- The "Regional Councils and Fisheries Commissions" line includes funding for the administration and operations of the regional Fishery Management Councils and interstate commissions. It also includes the critical Atlantic Coastal Cooperative Act and Atlantic Coastal Cooperative Statistics Program (ACCSP) competitive grants which fund dealer and harvester reporting and port sampling programs in Maine for commercial catch, as well as collection of recreational and party charter catch data. Dealer reports provide baseline economic information and ensure the state is compliant with Fishery Management Plans, but most importantly, this information is the baseline landings data needed to conduct stock assessments—without it we would not be able to assess critical stocks, including herring which is the keystone of the Gulf of Maine ecosystem as well as the primary bait source for the lobster industry. Seven DMR positions (and additional contractual needs) rely on these funds to collect this vital data for federal-state assessment and management needs of multi-jurisdictional fisheries. This work is integral to fisheries assessment and effective management, and as such, requires a stable funding stream rather than being reliant this type of competitive grant opportunity. Again, this data is critical to increasing certainty in science-based decision-making processes, which enables higher catch levels and increased economic opportunities for fishermen and related industries.

- The Atlantic Salmon line provides funding for species recovery and habitat restoration work that provides broader ecological benefit to a range of sea-run fisheries. DMR would see tremendous value in restoration of FY 11 funding levels through the salmon program, as well as broader authority for work that provides demonstrable benefit to species that are ecologically linked to salmon. Improved stock health for anadromous species such as river herring and eels would provide additional ecological benefit to groundfish populations throughout the Gulf of Maine, and particularly in the depleted downeast area; diversification opportunities for Maine fishermen; and possibly an increased bait supply for the lobster fishery.