Endangered Species Act
Supporting Biological Impact Assessment

For the

U.S. Environmental Protection Agency's reissuance of the
National Pollutant Discharge Elimination System (NPDES) Permit Authorizing
Dewatering Activity Discharges in Massachusetts and New Hampshire
(The Dewatering General Permit, DGP)
NPDES Permit No.s MAG070000 and NHG070000

June 2014

Prepared By:
United States Environmental Protection Agency, Region 1
5 Post Office Square, Suite 100
Boston, MA 02109-3912

Table of Contents

List of Acronyms and Abbreviations

ACE	Ashepoo, Combahee and Edisto Rivers
ACEC	Area of Critical Environmental Concern
ASMFC	Atlantic States Marine Fisheries Commission
BMPs	Best Management Practices
BPJ	Best Professional Judgment
CAFOs	Concentrated Animal Feeding Operations
CB	Chesapeake Bay
CCB	Cape Cod Bay
CCL	Curved Carapace Length (CCL)
CDGP	Construction Dewatering General Permit
CI	Confidence Interval
CSO	Combined Sewer Overflow
CWA	Clean Water Act
CWIS	Cooling water intake structure
DCA	Deerfield Concentration Area
DCIA	Directly Connected Impervious Area
DGP	Dewatering General Permit
DO	Dissolved Oxygen
DPSs	Distinct Population Segments
E.coli	Escherichia coli
EEZ	Exclusive Economic Zone
EFH	Essential Fish Habitat
EMCs	Event Mean Concentrations
ESA	Endangered Species Act
ESCA	Endangered Species Conservation Act
FR	Federal Register
FMPs	Fisheries Management Plans
GOM	Gulf of Maine
GPD	Gallons per Day
GSC	Great South Channel
INBS	Index Nesting Beach Survey
IWC	International Whaling Commission
LID	Low Impact Design
MassDEP	Massachusetts Department of Environmental Protection
mg	Milligram
ug	Microgram
MMPA	Marine Mammal Protection Act
mep	maximum extent practicable
MEP	Massachusetts Estuaries Program
MGD	Million gallons per day
MSFCMA	Magnuson-Stevens Fishery Conservation and Management Act
NCCR	National Coastal Condition Report
NH DES	New Hampshire Department of Environmental Services
NMFS	National Marine Fisheries Service

NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
NRC	National Research Council
NRDC	Natural Resources Defense Council
NWA	Northwest Atlantic
NYB	New York Blight
PAH	Polychlorinated aromatic hydrocarbons
PCB	Polychlorinated biphenyls
RGP	Remediation and Miscellaneous Contaminated Sites General Permit
rKm	River Kilometer
SEUS	Southeast US
SMAST	School of Marine Science and Technology
SNBS	Statewide Nesting Beach Survey
s.u.	Standard Unit
SWMP	Storm Water Management Program
SWQS	Surface Water Quality Standards
TMDL	Total Maximum Daily Load
TRC	Total Residual Chlorine
TSS	Total Suspended Solids
TEDs	Turtle Excluder Devices
U.S.C.	United States Code
USDOI	US Department of the Interior
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
WET	Whole Effluent Toxicity
WQS	Water Quality Standards
WWF	Warm Water Fishery

I. Background and History

As mandated by Section 7 of the Endangered Species Act (ESA) of 1973, Federal agencies must consult with the National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS) --- jointly known as "the Services" --- to ensure that any action authorized is not likely to jeopardize the continued existence of any ESA-listed species or result in the destruction or adverse modification of critical habitat required by a listed species (16 United States Code [U.S.C.] §1532 et seq.).

This biological impact document summarizes the results of an analysis of the potential effects to endangered, threatened, and proposed listed species and their critical habitats as a result of the U.S. Environmental Protection Agency, Region 1 (EPA)'s reissuance of the NPDES Permit no.s MAG070000 and NHG070000. The Dewatering General Permit (DGP) was last issued on October 7, 2008. It replaced the Construction Dewatering General Permit (CDGP) for Massachusetts and New Hampshire, which was last issued on September 23, 2002. The 2008 reissuance of the Dewatering General Permit (DGP) expired on September 20, 2013 (the "expired permit") but has been administratively continued for permittees until the permit is reissued.

In a letter dated August 29, 2008, NMFS concurred with EPA's determination that the issuance of the Dewatering General Permit in 2008 was not likely to adversely affect any threatened or endangered species or its critical habitat. The 2014 permit reissuance is not significantly different from the expired permit; changes from the expired permit may be found in Section 1.A of the Fact Sheet of the draft permit. Proposed changes include the upfront submittal of laboratory data with the Notice of Intent (NOI) instead of the submittal of laboratory data after the authorization was issued. This action will facilitate the issuance or denial of a permit application/ authorization. Another change includes incorporation of revised requirements for compliance with the Endangered Species Act and new listed species (i.e., Atlantic sturgeon) in Appendix IV.

This General Permit will be available for the discharge of non-processed dewatering and dewatering related activities to certain waters of the Commonwealth of Massachusetts and the State of New Hampshire. Specifically, the DGP authorizes discharges of *uncontaminated* water from construction dewatering intrusion and/or storm water accumulation which disturb less than one acre of land, and short and long term dewatering of foundation sumps. These discharges are all generated by substantially similar operations, which involve the *temporary* or infrequent removal or discharge of water (dewatering) that does not come into contact with any raw material or product. As discussed in more detail in Section II.D. of this document, the volume of discharge covered under the Dewatering General Permit is also typically much smaller (well below 1 MGD) than other general permits and the discharge is generally temporary and/or intermittent in nature.

For the purposes of this General Permit, "uncontaminated" discharges are those that contain only the pollutants regulated by this permit. The principal pollutant of concern associated with these discharges is total suspended solids (TSS). Exposure to soil, rock, and man-made material create the potential for TSS in each of these discharges. Oil and grease may also be present from the pumping systems used in these processes. In addition, total residual chlorine is typically present as a disinfectant in potable water prior to dechlorination and could be present in discharges originating from a municipal source.

Surface water, groundwater, and potable water are the sources of discharges from eligible dewatering activities. For facilities using groundwater as a source, an analysis of metal concentrations in the discharge must be provided *with* the NOI in order to determine whether the discharge is likely to cause water quality violations for metals in the receiving water. See Appendix 8 of the draft General Permit for a list of the inorganic parameters to be tested and the minimum limits. This upfront submittal of laboratory data with the NOI will facilitate the issuance or denial of a permit application/authorization under the DGP.

Excepting non-toxic chemicals used for pH neutralization and/or dechlorination, the Dewatering General Permit prohibits the addition of toxic materials or chemicals to the discharges and prohibits the discharge of pollutants in amounts that would be toxic to aquatic life. If EPA and/or the States suspect that a discharge has a reasonable potential to cause or contribute to an excursion above the State's narrative criterion for toxicity, they may request that one Whole Effluent Toxicity (WET) test result and/or priority pollutant test of the water to be discharged be required as authorized at 40 CFR Section 122.44(d)(1)(v). Exceedances will be handled on a case by case basis. For those discharges which are not granted coverage under the Dewatering General Permit because the discharge contains pollutants in quantities which represent reasonable potential to cause or contribute to violations of water quality standards, the discharger must either apply for an individual NPDES permit or for coverage under EPA's Remediation and Miscellaneous Contaminated Sites General Permit (RGP).

This general permit also includes numeric technology and water-quality based limits for all discharges authorized in this permit and non-numeric effluent limits (best management practices – BMPs) for construction dewatering discharges. The effluent limitations established in this permit ensure protection of aquatic life and maintenance of the receiving water as an aquatic habitat. Also, the proposed limits in this General Permit are sufficiently stringent to assure that state and federal water quality standards will be met. The DGP requires that applicants provide adequate treatment to discharges and specifically establishes:

- Discharge limits for TSS, oil and grease, pH, and total residual chlorine (See Parts 1.1 and 2.1 of the draft DGP);
- Monitoring/sampling requirements to ensure compliance with numerical limits (See Parts 1.1. and Part 2.1 (including Footnote #2) of the draft DGP and Part II.E. of the fact sheet); and
- The development and implementation of best management practices (BMPs), as deemed necessary, to control sediment and minimize environments (See Part III.F. of the fact sheet & Parts 1.1.5 and 1.2.5 of the draft DGP);

In addition, the Dewatering General Permit outlines fourteen categories of discharges that are specifically excluded from coverage or are only eligible if certain conditions are met. These excluded categories are listed in Section 1.D. of the Fact Sheet and are summarized in Section II.B below.

II. Description of the Action and Action Area

A. Federal Action and Legal Authority/Agency Discretion

Section 301(a) of the Clean Water Act (the Act) provides that the discharge of pollutants is unlawful except in accordance with a NPDES permit unless such a discharge is otherwise authorized by the Act. The NPDES permit program must regulate the discharge of point sources of pollutants to waters of the United States under 40 CFR § 122.1(b)(1). The Dewatering General Permit seeks to regulate the temporary and intermittent discharges of non-processed dewatering and dewatering related activities to certain waters of the Commonwealth of Massachusetts and the State of New Hampshire. The main pollutant of concern in these discharges is total suspended solids, which can result from exposure to soil, rock, and man-made material.

NPDES permits are often issued to individual discharges, however, EPA's regulations authorize the issuance of "general permits" to multiple similar discharges within a geographic area (see 40 CFR § 122.28). Violations of a condition of a general permit constitute a violation of the Clean Water Act and subject the discharger to the penalties in § 309 of the Act. EPA has determined that the draft Dewatering General Permit meets the criteria for issuing a general permit found in 40 CFR § 122.28 because these dewatering related discharges are located in the same geographic area, are generated by substantially similar operations, and the wastewater generated is similar in composition so it requires substantially similar effluent limitations and monitoring requirements. Further discussion can be found in Part I.B. of the permit Fact Sheet.

B. Activities to be Authorized by the Federal Action Agency

Under the Dewatering General Permit, owners and operators of dewatering systems in Massachusetts and New Hampshire may only be granted authorization to discharge into certain waters of their respective states if the discharge is *uncontaminated.* The discharges can only originate from 1) construction dewatering of groundwater intrusion and/or storm water accumulation (of less than one acre) or 2) dewatering of foundation sumps. Discharges authorized under the DGP are *not* from an industrial process nor do they come in contact with any raw material, intermediate product, waste product or finished product.

Discharges to certain receiving waters, such as Class A waters in New Hampshire; Areas of Critical Environmental Concern (ACEC) and Ocean Sanctuaries in Massachusetts; Outstanding Resource Waters in MA and NH; and Wild and Scenic Rivers in both Massachusetts and New Hampshire, are not authorized under the permit. Neither discharges of stormwater from construction sites greater than one acre of land nor discharges of water supply/development waste waters from contaminated sites are eligible under this Dewatering General Permit. See Section I.D. of the Fact Sheet for a complete listing of eligibility requirements and coverage exclusions. Discharges to Class A and Class SA waters in the Commonwealth of Massachusetts are only authorized upon review and approval by the MassDEP.

Monitoring and reporting are required under the permit for all discharges in order to ensure compliance with state (MA: 314 CMR 4.00; NH: Env-Wq 1700) and federal surface water quality standards to ensure that the water quality of the receiving water is protected. The TSS, pH, oil and grease (if applicable), and TRC (if applicable) of the discharge must be monitored and reported in accordance with the permit. Total residual chlorine (TRC) is typically present as a disinfectant in potable water prior to dechlorination and could be present in discharges originating from a municipal source. Therefore, sampling for TRC is only required if the discharge contains water from a municipal source.

Parts 1.1 and 2.1 of the draft Dewatering General Permit present the Discharge Limits and Monitoring Requirements for the Commonwealth of Massachusetts and State of New Hampshire, respectively. Initially, monitoring is required to be conducted once per week and the duration of monitoring depends upon whether the dewatering activity is short term (i.e., lasting less than one week) or long term (i.e., lasting greater than a week). Parts 1.1 and 2.1 also indicate the type of sampling and other sampling requirements. Sections III. A- E of the Fact Sheet provide an explanation of the effluent limitations under this General Permit.

C. Geographical Action Area Defined

The entire universe of facilities that will apply for and obtain coverage under the Dewatering General Permit is unknown at the time the draft permit is published for public comment. The Project Area of the permit could include any surface water in Massachusetts and New Hampshire, excluding those waterbodies to which discharges are not authorized (see Section 1.D of the Fact Sheet). As previously stated, permittees are not authorized to discharge to: Class A waters in New Hampshire; Areas of Critical Environmental Concern (ACEC) and Ocean Sanctuaries in Massachusetts; and Outstanding Resource Waters and Wild and Scenic River reaches in both states.

Although the project area could encompass all surface waters in Massachusetts and New Hampshire, for the purposes of this biological impact assessment, the Action Area of the permit will be restricted to those waters where there is a known presence of ESA species or designated critical habitat. Currently, there are several waterbodies where ESA species could be impacted by permitted discharges: 1) the Connecticut River downstream of Turner's Falls; 2) the Merrimack River below the Essex Dam (Merrimack River Dam) in Lawrence; 3) coastal embayments and marine waters of Massachusetts including Cape Cod Bay and Massachusetts Bay, 4) the Piscataqua River/Great Bay Estuary in New Hampshire, and 5) coastal embayments and marine waters of New Hampshire. Although Atlantic Sturgeon have historically been found in the Taunton River, this river is designated a Wild and Scenic River in Massachusetts. Waters with such a designation are excluded from coverage under the Dewatering General Permit.

D. Ongoing Project Activities in the Action Area

The Dewatering General Permit (DGP) was last issued on October 7, 2008. Although the permit expired on September 20, 2013, it has been administratively continued until this final permit is authorized. Since 2008, over 70 dewatering activities have been granted coverage under the DGP; seven (7) of these permitted activities occurred in New Hampshire while the remainder occurred in Massachusetts. As previously mentioned, the discharges from these activities covered under the Dewatering General Permit are either temporary, short-termed, or intermittent in nature. The DGP authorizes discharges of uncontaminated water from construction dewatering intrusion and/or storm water accumulation which disturb less than one acre of land, and short and long term dewatering of foundation sumps. Once these projects are completed, the discharges are expected to stop. Therefore unlike other general permits in which existing permittees (i.e., established facilities) are likely to reapply for coverage in the future, the DGP differs.

Therefore in this biological impact analysis for the Dewatering General Permit, EPA does *not* believe it is appropriate to use site specific parameter data from current and/or recently covered permittees to predict the effect of future discharges on ESA species and critical habitat. However EPA does believe it is reasonable to use the aggregate data regarding the overall volume and duration of discharges from past dewatering activities to demonstrate that discharges covered under this Dewatering General Permit are small in size (well below 1 MGD) and temporary, short termed and/or intermittent in nature.

Table 1, below, summarizes the number of permittees covered under the DGP, in both Massachusetts and New Hampshire, since 2011. Based upon EPA's knowledge of this general permit, only discharges authorized from 2011 and beyond were reviewed; earlier discharges (i.e., those approved from 2008 – 2010) should no longer be occurring. As previously noted, more applicants typically apply for coverage under the DGP in Massachusetts than in the state of New Hampshire. Based upon EPA's review of documentation of the DGP, Twenty one (21) approved dewatering discharges are still in effect in Massachusetts and two (2) are still discharging in New Hampshire.

Table 1: Permittees Covered Under Dewatering General Permit: 2011 – 2013

	# of Permittees in MA		**# of Permittees in NH**	
	Authorized - No longer Effective	**Authorized – Still Effective**	**Authorized - No longer Effective**	**Authorized – Still Effective**
Issued in CY2011	**5**	**5**	**1**	**1**
Issued in CY2012	**0**	**9**	**1**	**1**
Issued in CY2013	**0**	**7**	**0**	**0**
Totals	**5**	**21**	**2**	**2**

CY = Calendar Year

Based upon the 30 authorized dewatering discharges (26 in MA and 4 in NH) between 2011-2013, **Table 2** was prepared to summarize the volume of past discharges. Specifically, the range of volume for both the Maximum Daily Flow (in GPD) and the Average Monthly Flow (in GPD) are presented. The Maximum Daily Flow for dewatering discharges authorized from 2011-2013 in MA ranged from a low of 228 GPD to a high of 504,000 GPD, while the respective Maximum Daily Flow for NH discharges ranged from 1,000 GPD to 200,000 GPD. The Average Monthly Flow for dewatering discharges in MA range from 100 GPD to 480,000 GPD, while the Average

Monthly Flow for NH discharges ranged from 50 GPD to 100,000 GPD. **Table 2** demonstrates the approximate discharge volume observed by dewatering activities under the DGP. These values are significantly smaller than 1 MGD.

Table 2: Volume of Dewatering Discharges Covered Under DGP: 2011 – 2013

	Permittees in MA		**Permittees in NH**	
	Maximum Daily Flow (GPD)	**Average Monthly Flow (GPD)**	**Maximum Daily Flow (GPD)**	**Average Monthly Flow (GPD)**
Issued in CY2011	Ranges from: 228 GPD to 150,000 GPD	Ranges from: 250 GPD to 45,000 GPD	Ranges from: 3,000 GPD to 9,000 GPD	***
Issued in CY2012	Ranges from: 20,000 GPD to 504,000 GPD	Ranges from: 12,000 GPD to 480,000 GPD	Ranges from: 1,000 GPD to 200,000 GPD	Ranges from: 50 GPD to 100,000 GPD
Issued in CY2013	Ranges from: 300 GPD to 264,000 GPD	Ranges from: 100 GPD to 43,200 GPD	N/A	N/A

*** Data not valid

Table 3, below, was prepared to summarize the duration of discharges. For the approved dewatering activities in Massachusetts, the length of time for discharges ranged from 7 days to 2 years. For the approved dewatering activities in New Hampshire, the length of time for discharges ranged from 5 days to 5 months. However, it must be noted that these *temporary* discharges are typically categorized as "continuous," "periodic," or "intermittent." A periodic discharge is one that occurs regularly (i.e., monthly or seasonally) but is not continuous all year. An intermittent discharge is one that occurs sometimes but not regularly. A discharge can also be categorized as *both* periodic and intermittent. These definitions must be taken into account when reviewing the durations summarized in **Table 3**.

Table 3: Duration of Dewatering Discharges Covered Under DGP: 2011 – 2013

	Permittees in MA		**Permittees in NH**	
	Minimum Length of Time	**Maximum Length of Time**	**Minimum Length of Time**	**Maximum Length of Time**
Issued in CY2011	**7 days**	**1 year (*Periodic and Intermittent)**	**2 months**	**5 months (*Intermittent: Only 10 discharges during that timeframe)**
Issued in CY2012	**1 month* (*Intermittent: Only 20 days during that month)**	**4 months**	**5 days**	**4 months (*Intermittent: Only 60 days during that timeframe)**
Issued in CY2013	**Less than 30 days**	**2 Years (* Intermittent: Not Continuous)**	**N/A**	**N/A**

III. Status of Species and Critical Habitat

A. Species List from Services

According to information obtained from the NMFS website, as well as information provided via a September 3, 2013 electronic correspondence between NMFS and EPA regarding this MS4 and other general permits, nine ESA listed species are present within the Action Area, namely Massachusetts and New Hampshire state waters.

These include two species of listed fish: the endangered shortnose sturgeon (*Acipenser brevirostrum*) and Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus).* NOAA's Fisheries Service announced a final decision to list five Distinct Population Segments (DPSs) of Atlantic sturgeon in 2012. Only three DPSs fall under the jurisdiction of the Northeast Region of NOAA Fisheries; these are the Gulf of Maine DPS (threatened) and the New York Bight and Chesapeake Bay DPSs which are both listed as endangered ((77 FR 5880, 2012). However since the range of all five DPSs overlaps and extends from Canada through Cape Canaveral, FL, the other two DPS of Atlantic sturgeon, namely the endangered Carolina and South Atlantic DPSs , have also been included in this document (77 FR 5914, 2012).

Three species of federally endangered whales and four species of ESA listed sea turtles are found seasonally in New England waters, including those off the coast of Massachusetts. These include the North Atlantic right whale (*Eubalaena glacialis*), the humpback whale (*Megaptera novaeangliae*), the fin whale (*Balaenoptera physalus)*, the endangered Kemp's ridley sea turtle *(Lepidochelys kempii)*, the threatened Northwest Atlantic Distinct Population Segment (DPS) of the Loggerhead sea turtle (*Caretta caretta*), the endangered Leatherback sea turtle (*Dermochelys* coriacea), and the Green Turtle *(Chelonia mydas).*

The Cape Cod Bay Critical Habitat Area for North Atlantic Right Whales (*Eubalaena glacialis*) does fall within a portion of the Action Area. The aforementioned critical habitat is part of the broader Northeast Atlantic critical habitat, which was designated in 1994. This critical habitat will be discussed in more detail in Section III.D.3.b. of this document.

The endangered Blue Whale (*Balaenoptera musculus musculus*), the endangered Sei Whale (*Balaenoptera borealis)*, and the endangered Sperm Whale (*Physeter macrocephalus*) are also ESA-listed marine mammals. However, these whales are typically located in deeper waters which are farther offshore. The distribution of the Western North Atlantic Stock of the blue whale extends from the Arctic to at least mid-latitude waters, with sightings most frequently observed off eastern Canada and only an occasional sighting in US Atlantic Exclusive Economic Zone (EEZ) waters (Sears, 1987); (NMFS, 2010). The Nova Scotia (formerly the Western North Atlantic) stock of the sei whale is generally found in the deeper waters of the continental shelf edge region of the northeastern U.S, up to Cape Breton, Nova Scotia, and then east to longitude 42°W (Hain, Human, Kenney, & H.E.Winn, 1985); (NMFS, 2013c) . Sperm whales are located throughout the world's oceans in deep waters (water depths of 600 meter or more) between approximately 60°N and 60°S latitudes, and are uncommon in waters less than 300 meters deep (NMFS, 2013b)

Based upon the above information regarding these whales' distributions and EPA's aforementioned determination that small MS4 stormwater outfalls will not extend a distance greater than 50 feet from the shoreline, these whales will not be present in the Action Area. Therefore any effects to these three endangered whales are extremely unlikely to occur.

B. Shortnose Sturgeon (*Acipenser brevirostrum*) – Endangered

1. Life History

Shortnose sturgeons are large benthic fish that mainly occupy the deep channel sections of large coastal rivers in eastern North America (Shortnose Sturgeon Status Review Team, 2010). Throughout their lifecycle, they feed on a variety of benthic insects, crustaceans, mollusks, and polychaetes (Dadswell, Taubert, Squiers, Marchette, & Buckley, 1984).

Like other sturgeon, the shortnose sturgeon is relatively slow going, late maturing and long-lived (Shortnose Sturgeon Status Review Team, 2010). Shortnose sturgeon have similar lengths at maturity (45-55 cm fork length) throughout their range, but, because sturgeon in southern rivers grow faster than those in northern rivers, southern sturgeon mature at younger ages (Dadswell, Taubert, Squiers, Marchette, & Buckley, 1984) . In the north, males reach maturity at 5 to 10 years, while females mature between 7 and 13 years (Shortnose Sturgeon Status Review Team, 2010).

Spawning is not typically a yearly event for shortnose sturgeon in northern rivers. Based on limited data, females spawn every three to five years while males spawn approximately every two years (Dadswell, Taubert, Squiers, Marchette, & Buckley, 1984). The spawning period is estimated to last from a few days to several weeks. According to the 2010 Biological Assessment, shortnose sturgeon in northern rivers are known to migrate from overwintering locations upstream to spawning grounds during the spring when the freshwater temperatures increase to 7-9^{o}C (Shortnose Sturgeon Status Review Team, 2010). Sturgeon spawn in upper, freshwater areas and feed and overwinter in both fresh and saline habitats. As noted in the 2010 Biological Assessment, shortnose sturgeon is often considered "anadromous," however a more accurate term is "amphidromous." This means that the fish move between fresh and salt water during some part of their lifecycle, but not for breeding purposes (Shortnose Sturgeon Status Review Team, 2010).

2. Status

Shortnose sturgeon were originally listed as an endangered species by the USFWS on March 11, 1967 under the Endangered Species Preservation Act (32 FR 4001, 1967). After a government reorganization plan was implemented in the early 1970's, NMFS assumed jurisdiction for shortnose sturgeon from the USFWS. Although the original listing notice did not document specific reasons for listing the shortnose sturgeon as endangered, a 1973 Resource Publication, issued by the US Department of the Interior, indicated that shortnose sturgeon were in peril in most of the rivers of its former range but probably not as yet extinct (United States Department of Interior, 1973) The U.S. Fish and Wildlife Service also identified pollution and overharvest in commercial fisheries as principal reasons for the species decline (United States Department of Interior, 1973) . Shortnose sturgeon remains listed as an endangered species throughout all of its range along the U.S. East Coast. NOAA Fisheries is currently conducting a status review for shortnose sturgeon to ensure that the original classification as an endangered species is still appropriate.

3. Distribution and population trends

The Shortnose Sturgeon Recovery Plan, which was finalized in 1998, identified 19 distinct populations based on the fish's strong ties to their natal river systems (Shortnose Sturgeon Status Review Team, 2010). These river systems range from the Saint John River in New Brunswick, Canada to the St. Johns River in Florida. Two populations of Shortnose Sturgeon have been documented in Massachusetts waters, specifically in the following areas:

- Merrimack River (main stem) below the Essex Dam in Lawrence, MA to the Merrimack River's mouth (Essex County);
- Connecticut River (main stem) downstream of Turner's Falls, MA (Franklin, Hampshire, and Hampden Counties) to the Connecticut River's mouth in the state of CT (Hartford Middlesex and New London Counties).

The state of Massachusetts encompasses 27 watersheds (MassDEP, 2013) . However the Action Area for the permit, as it relates to shortnose sturgeon, consists of the two watersheds within Massachusetts where the species is actually located. This includes portions of the Merrimack River Watershed and the Connecticut River Watershed. The Action Area has been narrowed further to include only the mainstems of the Merrimack and Connecticut River.

a. Shortnose Sturgeon in the Merrimack River

According to a letter dated November 4, 2013 in which NMFS responded to EPA's request for ESA section 7 consultation regarding NPDES discharges from Lawrence Hydroelectric Project (NMFS, 2013f) ,

> There is a small population of the federally endangered shortnose sturgeon (*Acipenser brevirostrum*) in the Merrimack River. The size of this population has been estimated by tag and release studies (conducted in 1988-1990) to be 33 adults with an unknown number of juveniles and sub-adults…. Shortnose sturgeon in the Merrimack River are not known to exist upstream of the Essex Dam (Lawrence), which represents the first significant impediment to the upstream migration of shortnose sturgeon in this system. Sexually mature fish begin to move upriver from freshwater overwintering areas (located in the Amesbury reach) to the spawning site near Haverill…Spawning is concentrated within a 2-km reach at river kilometers 30-32 (measured from the mouth) near Haverhill…Following spawning in late April-early May, fish move downriver. Some fish remain in a freshwater reach near Amesbury (Rocks Village to Artichoke River) for the remainder of the year while others move into a saline reach near the lower islands for about 6 weeks prior to returning to the freshwater reach.

Since those earlier tag and release studies, more recent sampling efforts have occurred. NMFS' 2010 Shortnose Sturgeon Biological Assessment indicated that a gill net-sampling took place in the winter of 2009 in which researchers captured a total of 170 adults (Shortnose Sturgeon Status Review Team, 2010).

b. Shortnose Sturgeon in the Connecticut River

Shortnose sturgeons inhabit the Connecticut River from the Turners Falls Dam, at rkm 198 in Turners Falls, MA, down to Long Island Sound. The Connecticut River population is separated by the Holyoke Dam, at the South Hadley Falls near rkm 140, into an upriver group (above Holyoke Dam) and a lower river group (below Holyoke Dam). Although earlier reports indicated that the shortnose sturgeon were separated with the construction of the Holyoke Dam, the 2010 Shortnose Sturgeon Biological Assessment reported that more recent "behavioral and genetic information indicates shortnose sturgeon in the Connecticut River are of a single population impeded, but not isolated, by the dam" (Shortnose Sturgeon Status Review Team, 2010).

Several areas of the Connecticut River have been identified as concentration areas for the shortnose sturgeon. In the downriver segment, there is a 9 km stretch near Agawam, MA (rkm 120-112) which is thought to provide summer feeding and over wintering habitat. A concentration of shortnose sturgeon may also be found in a 2 km segment immediately below the Holyoke Dam during the spring, summer, and fall. Above the dam, there is the Deerfield Concentration Area (DCA), a 49km stretch near Deerfield, MA, where shortnose sturgeon can forage and overwinter (Shortnose Sturgeon Status Review Team, 2010). A 2-km spawning site has been identified near Montague, MA and this is thought to be the primary spawning site for shortnose sturgeon in the Connecticut River (Kynard, Bronzi, & Rosenthal, 2012) .

Population estimates have been completed for shortnose sturgeon in the Connecticut River, occurring both above and below the Holyoke Dam. According to the 2010 Biological Assessment, Taubert (1980) conducted the earliest population estimate for the sturgeon upstream of the dam which resulted in an estimate of 370-714 adults. More recent studies, including a 1994 mark-recapture estimate during the summer-fall foraging period of 1994 and an annual spring study of pre-spawning adults near Montague between 1994-2001 yielded estimates of 328 adults (CI of 188-1,264 adults) and a mean of 142.5 spawning adults (CI of 14-360 adults), respectively (Shortnose Sturgeon Status Review Team, 2010) . Downstream of the Holyoke Dam, researchers conducted annual estimates of foraging and wintering adults during 1989-2002. Savoy (2004) estimated that the lower river population may be as high as 1000 individuals, based on his studies that used mark-recapture techniques.

4. Population Risks & Stressors

According to a Shortnose Sturgeon Recovery plan that was published in December 1998 to promote the conservation and recovery of the species, principal threats to the species' survival included habitat degradation or loss (resulting from dams, bridge construction, channel dredging, and pollutant discharges) and mortality (from impingement on cooling water intake screens, dredging, and bycatch from other fisheries) (NMFS, 1998) . Several natural and human-induced factors, including those originally highlighted in the recovery plan, continue to threaten the recovery of shortnose sturgeon. As described in the 2010 Shortnose Sturgeon Biological Assessment, these stressors include:

- **Dams & Diversions**: These structures can fragment populations, eliminate or impede access to spawning habitat, and alter downstream flows and water temperatures; Physical injury or mortality can occur to fish that attempt to migrate through turbines of hydropower facilities or during attempts to move upstream using fish passages;

- **Dredging, Blasting and Pile Driving**: Such activities can result in noise/disturbance; the removal/burial of organisms; increased turbidity/siltation effects which can severely damage spawning habitat; and destruction of actual habitat of the sturgeon

- **Water Quality and Contaminants:** Non-point source pollution and/or point-source discharges from municipal wastewater, industrial activities, power plant cooling water or wastewater, and agricultural practices can discharge pollutants (including nutrients, chemicals and/or metals) and lead to poor water quality (NMFS, 1998) ; Coastal and riparian areas can be particularly impacted by development and urbanization which can lead to erosion, stormwater discharges, and non-point source pollution (Shortnose Sturgeon Status Review Team, 2010) ; Compounds associated with point-source discharges, which can include metals, dioxin, dissolved solids, phenols, and hydrocarbons, lead to changes in fish behavior, deformations, reduced egg production and survival, or mortality (Health, 1987) ; Such chemicals can also alter the physical properties of the receiving waterbody by reducing DO or changing the water's temperature and/or pH (Shortnose Sturgeon Status Review Team, 2010)

- **Climate Change**: An increase in temperature, reduction in water availability, and altered frequency of extreme events and severe storms could severely stress ecosystems (and hence sturgeons), in part by altering the salinity, oxygen levels, and circulation of water bodies (Intergovernmental Panel on Climate Change, 2007a) ;

- **Bycatch**: Although the direct harvest of shortnose sturgeon has been prohibited since 1967, commercial gillnet and recreational shad fisheries still remain a source of bycatch

According to the most recent Biological Assessment for the shortnose sturgeon, the viability of sturgeon populations were most negatively influenced by dams, dredging, poor water quality, and bycatch (Shortnose Sturgeon Status Review Team, 2010). As a whole, the greatest single threat to shortnose sturgeon was habitat degradation (Shortnose Sturgeon Status Review Team, 2010). There is no reliable estimate exists for the shortnose sturgeon population in the Northeastern U.S, nor is there an estimate for the total species population as a whole (NMFS, 2013e). However the population size is obviously lower than what could be supported because of the aforementioned threats (NMFS, 2013e).

C. Atlantic Sturgeon (*Acipenser oxyrinchus oxyrinchus*) : Gulf of Maine DPS: Threatened

New York Bight DPS: Endangered
Chesapeake Bay DPS: Endangered
Carolina DPS: Endangered
South Atlantic DPS: Endangered

1. Life History

Atlantic sturgeon are a long-lived, late maturing, estuarine-dependent, anadromous species, feeding primarily on benthic invertebrates such as crustaceans, worms, and mollusks. Although adults spend most of their lives in marine environments, they migrate upriver to spawn in freshwater in the spring and early summer (Atlantic Sturgeon Status Review Team, 2007). According to NMFS's website, Atlantic sturgeon spawn in moderately flowing water in deep parts of large rivers. The spawning interval for males ranges from 1 to 5 years and 2 to 5 years for females. Sturgeon eggs are highly adhesive and are deposited on hard benthic substrate, such as cobble. Once eggs hatch, the larvae eventually migrate downstream using structures, like gravel matrices, as refuges. Juvenile Atlantic sturgeon continue to move further downstream into brackish waters. Adults live in coastal waters and estuaries, particularly in shallow areas with sand and gravel substrates (NMFS, 19 Nov 2013).

2. Status

All five DPSs of Atlantic sturgeon, including the GOM, New York Bight, and Chesapeake Bay DPSs in the Northeast Region of the United States and the South Atlantic and Carolina DPSs in the Southeast Region, received a final listing under the ESA on February 6, 2012 (77 FR 5880, 2012); (77 FR 5914, 2012). The GOM distinct population segment is listed as threatened while the other four DPSs are listed as endangered. Although an earlier petition to list the Atlantic sturgeon was submitted in 1997, the status review determined that the species did not meet the requirements under the ESA at that time. However in 1998, the Atlantic States Marine Fisheries Commission (ASMFC) did amend the 1990 Atlantic Sturgeon Fishery management Plan to impose a 20-40 year moratorium on Atlantic sturgeon fisheries (Atlantic Sturgeon Status Review Team, 2007). NMFS completed a second status review in 2007 and the Natural Resources Defense Council (NRDC) petitioned NMFS to list the Atlantic sturgeon under ESA in 2009. This led to the current listing (NMFS, 19 Nov 2013).

3. Distribution and Population Trends

    a. Distribution Trends

Distinct Population Segment (DPS)	**Range** (According to 77 FR 5580 & 77 FR 5914; Includes watersheds (rivers and tributaries) "as well as wherever these fish occur in coastal bays and estuaries and the marine environment")	**Current Spawning Location(s) –** (NMFS, 2013b)
Gulf of Maine DPS	Those spawned in watersheds from Maine/Canadian border –	Kennebec River; possibly Penobscot River

	extending southward to all watersheds draining into Gulf of Maine as far south as Chatham, MA	
New York Bight DPS	Those spawned in the watersheds that drain into coastal waters, including Long Island Sound, the New York Bight, and Delaware Bay, from Chatham, MA to the Delaware-Maryland border of Fenwick Island.	Hudson River & Delaware River
Chesapeake Bay DPS	Spawned in watersheds that drain into the Chesapeake Bay and into coastal waters from the Delaware-Maryland border on Fenwick Island to Cape Henry, VA	James River; possibly York River (NMFS, n.d.)(NMFS CB Fact Sheet)
Carolina DPS	Spawned in watersheds from Albemarle Sound southward along the southern Virginia, North Carolina, and South Carolina coastal areas to Charleston Harbor	Roanoke, Tar-Pamlico, Cape Fear, Waccamaw, and Pee Dee Rivers**;** Possibly in Neuse, Santee and Cooper Rivers
South Atlantic DPS	Spawned in watersheds of the ACE (Ashepoo, Combahee, and Edisto) Basin southward along the South Carolina, Georgia, and Florida coastal areas to the St. Johns River, Florida	ACE (Ashepoo, Combahee and Edisto Rivers) Basin, Savannah River, Ogeechee River, Altamaha River, and Satilla River

Atlantic sturgeon were historically present in approximately 38 rivers in the United States ranging from St. Croix, ME to Saint Johns River, FL; a historical spawning population was confirmed for 35 of those rivers. Currently, Atlantic sturgeon are present in 35 rivers, and spawning occurs in at least 20 of these rivers (Atlantic Sturgeon Status Review Team, 2007). The species has been documented in several New England rivers, including the Penobscot, Kennebec, Androscoggin, and Sheepscot Rivers in Maine; the Piscataqua River in New Hampshire; the Merrimack River in NH and MA; the Taunton River in MA & RI; and the Connecticut River in MA and CT (ASSRT 2007). Of these, a spawning population has only been identified in the Kennebec River, although there is possible spawning in the Penobscot. Atlantic sturgeon from all of those rivers, with the exception of the Taunton River and Connecticut River, fall under the Gulf of Maine (GOM) DPS. Sturgeon from the Taunton and Connecticut River would fall under the New York Blight (NYB) DPS.

As previously mentioned, the action area for this permit includes all Massachusetts waters. The action area, as it relates to Atlantic sturgeon, can been further narrowed to the waterways where the sturgeon exists. These include the following Massachusetts' rivers:

- **Merrimack River** (part of the Merrimack River Watershed – same communities as listed in **Table 1**); According to the most recent status review, there was no evidence of a spawning population of Atlantic sturgeon in the Merrimack River, although it seems that the estuary is used as a nursery area (Atlantic Sturgeon Status Review Team, 2007).

- **Connecticut River** (part of the Connecticut River Watershed - same communities as listed in **Table 2**); Research efforts have not specifically investigated the occurrence of Atlantic sturgeon in the upper Connecticut River, which would include the MA-portion of the river (Atlantic Sturgeon Status Review Team, 2007). According to Savoy (1996), occasional reports, sightings, and capture of large Atlantic Sturgeon (150-300 cm) are made, but most are captured within tidal waters or freshwater in the lower part of the Connecticut (Savoy, 1996).

- **Taunton River** – According to the ASSRT, Atlantic sturgeon did spawn in the Taunton River at the turn of the century (1900's); A gill net survey was conducted in the River during 1991 and 1992 to document the use of the system by sturgeon. Burkett and Kynard (1993) determined that the system is used as a nursery area for Atlantic sturgeon (Burkett & Kynard, 1993).

- **Piscataqua River/Great Bay Estuary System (NH) -** According to the ASSRT, few Atlantic sturgeon have been captured in the Piscataqua River. In June of 1981, one subadult Atlantic sturgeon was captured by New Hampshire Fish and Game (NHFG) at the mouth of the Oyster River in Great Bay (NH Fish and Game, 1981). Since 1990, the NHFG has not observed or received reports of Atlantic sturgeon of any age-class being captured in the Great Bay Estuary and its tributaries (Grout, 2006). It is unknown if the Piscataqua River is still used by Atlantic sturgeon (Atlantic Sturgeon Status Review Team, 2007).

Subadults are known to travel widely and enter estuaries of non-natal rivers (77 FR 5880, 2012). Therefore there is substantial mixing throughout the marine range of Atlantic sturgeon and coastal migration is common. Nonetheless according to 77 FR 5880, mixed stock analysis of Atlantic sturgeon collected along the U.S. coast indicates that Atlantic sturgeon occur most prominently in the vicinity of their natal river(s). Fish from the Gulf of Maine DPS are not commonly taken as bycatch in areas south of Chatham, MA. Additional tagging results also indicate that GOM DPS fish tend to remain within the waters of the Gulf of Maine and only occasionally venture to points south. Based on this information, EPA believes that Atlantic sturgeon from the Gulf of Maine (GOM) and the New York Bight (NYB) DPSs would most frequently fall within the Action Area of this permit. However EPA cannot exclude the possibility that Atlantic sturgeon from any of the five DPSs may be present in MA waters. Therefore, all DPSs will be considered. This reasoning follows a similar conclusion reached by NMFS as stated in a March 22, 2013 letter from NMFS Assistant Regional Administrator Mary Colligan to EPA Water Permits Branch Chief Dave Webster regarding the New Hampshire MS4 NPDES permit (NMFS, 2013a).

b. Population trends

As discussed in the status review, a number of studies throughout the years have consistently found Atlantic sturgeon populations to be genetically diverse (Atlantic Sturgeon Status Review Team, 2007). Results indicate that there are between 7 and 10 populations that can be statistically differentiated. However, there is some disagreement among the studies and samples for the studies were not taken in all rivers that are inhabited by Atlantic sturgeon.

Historically, each of the DPSs likely supported more than 10,000 spawning adults (Atlantic Sturgeon Status Review Team, 2007). However according to the most recent status review, the best available data support that current numbers of spawning adults for each DPS are one to two orders of magnitude smaller than historical levels (Atlantic Sturgeon Status Review Team, 2007); 77 FR 5880). As only two abundance estimates are presently available for Atlantic sturgeon riverine populations (Atlantic Sturgeon Status Review Team, 2007). The Hudson River population in New York, which is part of the NYB DPS, was estimated to have 870 spawning adult Atlantic sturgeon per year (Kahnle, Hattala, & McKown, 2007). The Altamaha River population in Georgia, which falls under the South Atlantic DPS, has 343 spawning adults per year (Schuller & Peterson, 2006). Other spawning populations within the U.S are likely to have less than 300 adults spawning per year (Atlantic Sturgeon Status Review Team, 2007).

According to 77 FR 5880, the Hudson is presumably the largest reproducing Atlantic sturgeon population. However the final ruling indicated that all riverine populations of Atlantic sturgeon, including those in the Northeast Region, are at reduced levels from those reported historically, and are being exposed to significant threats that are ongoing and not being adequately addressed. This is why the DPSs are listed under ESA. It should be highlighted that the GOM DPS is listed as threatened (and not endangered). The final ruling by NMFS stated that there *are* indications of increasing abundance of Atlantic sturgeon belonging to the GOM DPS, particularly in the following rivers in Maine: the Kennebec River, Penobscot River, and more recently the Saco and Presumpscot Rivers (77 FR 5880, 2012). This indicates that recolonization to rivers historically suitable for spawning may be occurring (78 FR 69310, 2013). Also, as will be described in Section 3.3.4, threats to the GOM DPS are lower than those of the other DPSs of Atlantic sturgeon.

4. Population Risks & Stressors

Historically, commercial fishing and overharvesting of Atlantic sturgeon was the primary factor that led to a wide-spread decline of their numbers. The Atlantic sturgeon is now managed under a Fishery Management Plan, which is implemented by the Atlantic States Marine Fisheries Commission (Atlantic States Marine Fisheries Commission, 1990). In 1998, the ASFMC also instituted a coast-wide 20-40 year moratorium on the harvest of Atlantic sturgeon. This will remain in effect until there are at least 20 protected age classes in each spawning stock of Atlantic sturgeon (Atlantic Sturgeon Status Review Team, 2007).

According to the final rulings for the Atlantic sturgeon, the following threats continue to adversely impact their abundance:

- **Continued bycatch in state and federally-managed fisheries:** Commercial fishing which utilizes sink gillnet gear have a much higher mortality rate for Atlantic sturgeon than other methods, like using trawl gear (77 FR 5880, 2012).

- **Vessel strikes:** These can either cause physical harm or kill Atlantic sturgeon

- **Persistent, degraded water quality**

- **Habitat impacts from dredging**

- **Habitat impediments including Dams**

- **Global climate change**

Several of these threats for the Atlantic sturgeon coincide with those listed for the shortnose sturgeon. Therefore, the explanations previously provided for each of the stressors are still applicable. However since the Atlantic sturgeon is listed as five distinct population segments, not all of the threats are necessarily present in the same area at the same time. The section below highlights some of the difference in stressors or risks to each of the five DPSs.

Gulf of Maine DPS

All of the threats apply to the GOM DPS. According to status review, poor water quality, dredging and dams, and commercial bycatch were identified as some of the key risks (Atlantic Sturgeon Status Review Team, 2007) .

- Many rivers in the Gulf of Maine, including the Kennebec, have navigation channels that are maintained by dredging (NMFS, 2013b). Dredging can either displace sturgeon or adversely impact its habitat.

- Access to historical habitat has been restricted by dams within the Northeast. According to the status review, this is most acutely observed at the Essex Dam (at river kilometer 49) on the Merrimac River which blocks access to 58% of the historically available habitat for Atlantic sturgeon (Atlantic Sturgeon Status Review Team, 2007). As previously mentioned, the accessible portions of the Merrimack are still deemed suitable as nursery habitat. Dams are also present on the Saco and Piscataqua Rivers, as well as the Veazie Dam on the Penosbscot River.

- Many rivers in Maine, including the Androscoggin River, were heavily polluted in the past from industrial discharges from pulp and paper mills (NMFS, 2013b). However as stated in 77 FR 5880, water quality improvements have been made in the range of the GOM DPS since the passage of the Clean Water Act. According to the most recent (fourth) edition of the National Coastal Condition Report, the water quality index was listed as good to fair for waters in the Arcadian province of the Northeast; these are the waters north of Cape Cod, MA (EPA, 2012).

- Although bycatch is a threat for the GOM DPS, it is not as significant as for the other DPSs. The reason is that a significant amount of fishing in the Gulf of Maine is conducted using trawl gear, which has a much lower mortality rate for Atlantic sturgeon. Nonetheless, about 15-19% of observed Atlantic sturgeon bycatch in sink gillnet and otter trawl gear from 2001 – 2006 occurred in coastal marine waters north of Chatham, MA (77 FR 5880, 2012). However, there is the concern that sink gillnet fishing efforts will increase in the Gulf of Maine as fish stocks are rebuilt (77 FR 5880, 2012).

New York Bight DPS

Persistent, degraded water quality, habitat impacts from dredging, continued bycatch, and vessel strikes continue to pose risks to the NYB DPS (77 FR 5880, 2012).

- Although the Clean Water Act has led to improvements in water quality, rivers in the NYB region, including the Hudson and Delaware rivers, were heavily polluted from past industrial discharges and sanitary sewer discharges (77 FR 5880, 2012).
  The most recent (fourth) edition of the National Coastal Condition Report identified that water quality was fair overall for waters in the Virginian province of the Northeast; this consists of waters south of Cape Cod through the Chesapeake Bay (EPA, 2012). These waters are quite vulnerable to the impacts of a highly populated and industrialized region. There are pockets of poor water, particularly in areas including Great Bay, NH; Narragansett Bay, RI; Long Island Sound; NY/NJ Harbor; the Delaware Estuary; and the western tributaries of Chesapeake Bay (EPA, 2012). Various issues exist including reports of low DO concentration in the summer and high ammonia-nitrogen levels in the Taunton River, impacts from coal tar leachate in the Connecticut River, and lasting PCB pollution in the Hudson River (77 FR 5880, 2012).

- Dredging occurs throughout the NYB DPS range, including the southern portion of the Connecticut River and the Delaware River.

- About 39% - 55% of observed Atantic sturgeon bycatch in sink gillnet and otter trawl gear from 2001-2006 occurred in the NYB DPS range, which includes the coastal marine waters south of Chatham, MA and north of the Delaware-Maryland border (77 FR 5880, 2012).

- Vessel strikes, especially in the Delaware River, have been reported. Between 2004-2008 alone, 29 Atlantic sturgeon (including 13 large adults) in the Delaware River were killed from suspected vessel strikes (NMFS, n.d).

Chesapeake Bay DPS

Similar to the NYB DPS, degraded water quality, habitat impacts from dredging, continued bycatch, and vessel strikes continue to be key threats to the Chesapeake Bay DPS of Atlantic sturgeon (77 FR 5880, 2012).

- Decreased water quality is a significant threat because the Chesapeake Bay system is particularly vulnerable to the effects of nutrient enrichment and sedimentation from point and non-point sources. A Total Maximum Daily Load for Nitrogen, Phosphorus, and Sediments has been established, and a number of other efforts including NOAA's 2010 Chesapeake Bay Protection and Restoration Final Strategy have also been initiated (77 FR 5880, 2012). According to the final listing for the CB DPS, water quality concerns include especially low dissolved oxygen (as a result of the nutrient loadings) and a decrease in the availability of clean, hard substrate for Atlantic sturgeon spawning habitat (77 FR 5880, 2012).

- Past removal of granite outcroppings and dredging of the James River are believed to have adversely impacted the spawning habitat of the CB DPS (Atlantic Sturgeon Status Review Team, 2007). Continued dredging, which is done to maintain the navigation channel, is likely to further such impact.

- ASMFC reported that coastal waters south of the Chesapeake Bay to Cape Hatteras, NC had the second highest number of observed Atlantic sturgeon captures in sink gillnet gear from 2001- 2006 (Atlantic States Marine Fisheries Commission, 2007).

Vessel strikes are known to take place in the James River. From 2005 – 2007, 11 Atlantic sturgeon have been struck by vessels (NMFS, n.d.)

Carolina DPS

Threats to the Carolina DPS include a combination of habitat modification impacts (including degraded water quality, dams and dredging), as well as the adverse impacts of climate change and bycatch (NMFS, 2013b).

- The presence of dams has prevented the Atlantic sturgeon from spawning and developing in historical sturgeon habitat. According to NMFS' factsheet for the Carolina DPS of Atlantic sturgeon, dams in the Cape Fear and Santee-Cooper River systems have blocked over 60% of the historical habitat upstream of the dams (NMFS, n.d.). Also, the accessible habitat is of a lower quality than the historical areas.

- Throughout the range of this DPS, both water quality and water quantity issues exist. Excessive nutrient loading exists in the Pamlico and Cape Fear systems, partly because of concentrated animal feeding operations (CAFOs) (77 FR 5914, 2012). This leads to low dissolved oxygen levels to which sturgeon are quite sensitive. Heavy industrial development in the Cape Fear River has also led to degraded water quality (NMFS, 2013b). According to 77 FR 5914, the third edition of the National Coastal Condition Report downgraded water quality in the Southeast from a 4 to a 3, ranking it as "fair" rather than "good to fair." The most recent (fourth) edition of the NCCR maintained the water quality ranking as fair (EPA, 2012).

- Interbasin water transfers and climate change can exacerbate the water quality problems that already exist in the Carolina DPS range by altering water flow, water temperature, and DO levels (NMFS, 2013b).

- Dredging occurs throughout the DPS range, particularly in the lower Cape Fear River and the Cooper River, which once again can adversely impact Atlantic sturgeon habitat (NMFS, n.d.).

- Continued overutilization of Atlantic sturgeon as bycatch in commercial fisheries is an ongoing impact to the Carolina DPS (77 FR 5914, 2012).

South Atlantic DPS

Many of the key threats to the South Atlantic DPS are similar to those of the Carolina DPS. These include a combination of habitat modification impacts (including degraded water quality, dams and dredging), overutilization (i.e, being taken as bycatch) and climate change (NMFS, n.d.).

- As previously mentioned for the Carolina DPS, the water quality in the Southeast was only ranked as "fair" under EPA's NCCR III and this ranking was maintained under the fourth edition of the NCCR (EPA, 2012). Runoff from agricultural activities, silviculture, and industry (including paper mills) have all negatively impacted the water quality, as has the transfer of water between river basins for commercial or municipal use (NMFS, n.d.). This has led to nutrient loading, pollution inputs, and low DO in multiple rivers within the South Atlantic DPS range.

- The construction of Kirkpatrick Dam (originally known as Rodman Dam) at rkm 153 of the St. Johns River has restricted migration to potential spawning habitat. According to the status review, about 63% of historical sturgeon habitat is believed to be blocked due to this dam (Atlantic Sturgeon Status Review Team, 2007). As a result, there is no longer a spawning population in the St. Johns River (Atlantic Sturgeon Status Review Team, 2007).

- Dredging occurs throughout the range of the South Atlantic DPS, including in the Savannah River and the St. Johns River. This has impacted the quality and availability of Atlantic sturgeon nursing and/or foraging habitat (NMFS, n.d.); (NMFS, 2013b)..

- According to 77 FR 5914 (or the final ruling that listed this DPS as endangered), bycatch is known to occur in several fisheries in the Southeast although it is widely accepted that such bycatch is underreported in that region. As a result, NFMS stated in the final ruling that there is great uncertainty regarding the implementation and effectiveness of the ASMFC's Fish Management Plan conservation effort for the Carolina and South Atlantic DPSs of Atlantic sturgeon (77 FR 5914, 2012).

- Once again, climate change is expected to exacerbate the water quality and quantity issues that already occur within the Southeast region.

D. North Atlantic Right Whales (*Eubalaena glacialis*), Western Stock – Endangered

Right whales are known to be the rarest of all large whale species, as well as the rarest of all marine mammal species. As such, North Atlantic right whales have a species' recovery priority number of One (1) based on the criteria in the Recovery Priority Guidelines (NOAA Fisheries, 2012). Three species of right whales exist: The North Atlantic right whale (*Eubalaena glacialis),* the North Pacific right whale (*Eubalaena japonica),* and the southern right whale (*Eubalaena australis)* (NMFS, n.d.). The North Atlantic right whale is the only species applicable to this permit.

1. Life History

North Atlantic Right whales are large baleen whales which feed on zooplankton, especially copepods. Unlike other baleen whales, right whales are skimmers. This means that they feed by continuously filtering prey through their baleen as they move through a patch of zooplankton with their mouth open (NMFS, 2005). In the western North Atlantic, calving occurs between December and March in the shallow, coastal waters of southeastern U.S. Females, in both the northern and southern hemisphere, give birth to their first calf at the average age of nine years; gestation lasts approximately 12 – 13 months (NMFS, 2005).

Feeding and nursery grounds, where nursing females feed and suckle, occur in New England waters and north to the Bay of Fundy and Scotian Shelf (NMFS, 2005). Right whales are most abundant in the coastal waters off Massachusetts, particularly Cape Cod Bay, between February and April where they have been observed feeding predominantly on dense patches of copepods (NMFS, n.d.); (NMFS, 2012).Much of the population is found in the Canadian waters in the summer through fall (NMFS, 2005)**.**

The location of some portion of the population during the winter months remains unknown, as does any breeding area(s) for the whales (NMFS, 2005). Also although there is little data on the longevity of these whales, it is believed that they live for at least 50 years (NMFS, n.d.).

2. Status

In June of 1970, the "northern right whale" (*Eubalaena spp.*) was originally listed under the Endangered Species Conservation Act, the precursor to the ESA (35 FR 18319, 1970). Since the Endangered Species Act was established in 1973, it has remained listed. In 2008, after NMFS conducted a comprehensive review of the status of right whales in the North Atlantic and North Pacific Oceans, they concluded that the right whales in the northern hemisphere were actually two species: North Atlantic right whale *(Eubalaena glacialis)* and North Pacific right whale *(Eubalaena japonica*) (73 FR 12021, 2008). The species is also designate as depleted under the Marine Mammal Protection Act (MMPA).

NMFS approved a Final Recovery Plan for the Northern Right Whale, which included both the North Atlantic and North Pacific right whales) in December of 1991. This identified actual and potential factors that were impacting the northern right whale and provided recommendations to reduce and/or eliminate threats to the species' recovery. A revised recovery plan for the North Atlantic Right Whale (*Eubalaena glacialis*) was published in 2005 (NMFS, 2005).

Critical Habitat was originally designated for the Northern Right Whale in 1994 (59 FR 28805, 1994).

3. Distribution and Population Trends

    a. Distribution

As previously mentioned, Western North Atlantic right whales generally range from their calving grounds in the coastal waters of southeastern United States to their feeding and nursery grounds in New England waters and the Canadian Bay of Fundy. According to the 2005 Recovery Plan, the distribution of whales seems to be tied to the distribution of their prey (NMFS, 2005). In addition to the coastal waters of the southeast, research indicates that there five other major habitats, or congregations, where Western North Atlantic right whales frequently exist. These include: the Great South Channel; Georges Bank/Gulf of Maine; Cape Cod and Massachusetts Bays; The Bay of Fundy; and the Scotian Shelf (NMFS, 2012).

    b. Designated Critical Habitat

Designated habitat for the Northern Right Whale includes two defined areas, namely Cape Cod/Massachusetts Bays and The Great South Channel (GSC) in the Northeast and waters adjacent to the coasts of George and the east coast of Florida in the Southeast US (SEUS) (59 FR 28805, 1994). The two designated areas in the Northeast serve as foraging habitats for the whales while the designated area in the Southeast is known as a winter calving ground and nursery.

The following excerpt from the final rule of Designated Habitat describes the Great South Channel (GSC):

> The GSC is a large funnel-shaped bathymetric feature at the southern extreme of the Gulf of Maine between Georges Bank and Cape Cod, MA. The GSC is one of the most used cetacean habitats off the northeastern United States (Kenney and Winn, 1986)…The channel is generally deeper to the north and shallower to the south, where it narrows and rises to the continental shelf edge. To the north, the channel opens into several deepwater basins of the Gulf of Maine. The V-shaped 100m isobath effectively delineates the steep drop-off from Nantucket Shoals and Georges Bank to the deeper basins…It is likely that a significant proportion of the western North Atlantic right whale population uses the GSC as a feeding area each spring, aggregating to exploit exceptionally dense copepod patches (59 FR 28805, 1994).

Although the Great South Channel is off of the coast of Massachusetts, its significant distance from any coastal facilities eligible under this permit precludes any impact from DGW discharges.

However, the Action Area for this general permit (as it relates to the North Atlantic Right Whale) can be narrowed to the Massachusetts waters of Cape Cod Bay. Stellwagen Bank, is also a designated critical habitat, which is located at the mouth of Massachusetts Bay, between Cape Cod and Cape Ann. Yet since Stellwagen Bank is located approximately 5 miles east of Gloucester, MA and 5 miles north of Provincetown, MA, EPA believes that this distance would also preclude any potential impact from discharges under this permit.

In 59 FR 28805, Cape Cod Bay (CCB) is described as:

> a large embayment on the U.S. Atlantic Ocean off of the state of Massachusetts that is bounded on three sides by Cape Cod and the Massachusetts coastline from Plymouth, MA, south. To the north, CCB opens to Massachusetts Bay and the Gulf of Maine…The general water flow is counter-clockwise, running from the Gulf of Maine south into the western half of CCB, over to eastern CCB, and back into the Gulf of Maine through the channel between the north end of Cape Cod (Race Point) and the southeast end of Stellwagen Bank, a submarine bank that lies just north of Cape Cod…The late-winter/early spring zooplantkton fauna of CCB consists primarily of copepods….The CCB may occasionally serve as a calving area, but it is more recognized for being a nursery habitat for calves that enter into the area after being born most likely in, or near, the SEUS.

A wide range of human activities may impact the designated critical habitat including vessel activities, fisheries, and possible habitat degradation through pollution, sea bed mining, and oil and gas exploration (59 FR 28805, 1994).

c. Population

According to NMFS' 2012 stock assessment of the western North Atlantic Right, the population was estimated to be at least 444 individuals in 2009 (NMFS, 2012)**.** This was based on the 1990-2009 census of individual whales, identified using photo-identification techniques. The stock assessment report emphasized that this was the minimum value of the population. Various studies indicated there was a decline in the whales' survival in the early 1980s and 1990s (NMFS, 2012). However according to an analysis of the current minimum alive population index, the geometric mean growth rate for the 1990-2009 period was 2.6% and there appears to be a positive, albeit slowly, accelerating trend in population size (NMFS, 2012).

4. Population Risks & Stressors

Historically, the right whale population was brought to extremely low levels by commercial whaling (59 FR 28805, 1994). According to the most recent recovery plan, other anthropological activities, particularly ship collisions and entanglements in fishing gear are now the most common causes of mortality in North Atlantic right whales (NMFS, 2005). From 2005 to 2009, reports indicate that right whales had the greatest number of ship strike mortalities and serious injuries compared other large whales in the Northwest Atlantic (NMFS, 2013b)**.** Other potential threats include habitat degradation, contaminants, climate/ecosystem change, and noise/disturbance from industrial activities and whale-watching activities (NMFS, 2005).

a. Ship Collisions

Vessel strikes can either kill or cause serious physical injury to North Atlantic Right Whales. According to NMFS' five year review of this species, vessel speed is considered a principal factor in both the occurrence and the severity of vessel-whale collisions (NOAA Fisheries, 2012). In an attempt to decrease such incidences, NMFS did establish regulations in December of 2008 to limit the speed of vessel, measuring 65 feet or greater, to 10 knots or less in Seasonal Management Areas where whales are known to occur at particular times (73 FR 60173, 2008). In the Northeast, this regulation applies to the following four distinct areas January through July: Cape Cod Bay; the area off Race Point at the northern end of Cape Cod; the Great South Channel; and the northern Gulf of Maine (73 FR 60173, 2008). NMFS has proposed a ruling to eliminate the expiration date for this regulation (78 FR 34024, 2013).

b. Entanglement in Fishing Gear

According to 59 FR 28805, more than one-half of all of the right whales cataloged (at that time) had scars indicative of entanglements with fishing gear which results in scars, injury, and/or death. From 1990 to 2009, NMFS' entanglement records documented 94 confirmed right whale entanglements events (Waring, Josephson, Maze-Folew, & Rosel, 2012). NMFS implemented the Atlantic Large Whale Take Reduction Team to reduce such injuries and deaths of all large whales due to the incidental entanglement in fishing gear (NMFS, 2012). Although disentanglement in not always possible or successful, at least three whales were believed to have avoided serious injury or mortality by being freed from fishing gear by disentanglement teams (Waring, Josephson, Maze-Folew, & Rosel, 2012). Yet according to NMFS' five year review, the agency plans to develop a vertical line reduction rule in 2013 because they did not believe that the current regulations were effective enough in protecting the population from entanglements (NOAA Fisheries, 2012).

c. Additional Threats

Habitat degradation, contaminants, and climate change are among additional threats.

- **Habitat Degradation:** As previously discussed, dredging, undersea exploration and development of mineral deposits, and pollution from human activities could possibly lead to habitat degradation.

- **Contaminants in Whales:** According to the 2005 recovery plan, contaminant data on right whales have only been obtained from biopsy-derived samples (NMFS, 2005). Data from only two studies are available and the data indicated a total PCB range of 80 to 1000 ng/g wet weights (in the parts per billion range) for right whales (Woodley, Brown, Kraus, & Gaskin, 1991); (Moore, et al., 1998). Organic chemical contaminants are not considered to be the primary factors in slowing the recovery of any stocks of large whale species (O'Shea & Brownell, 1994).

- **Climate Change:** According to the 2005 recovery plan, the effects of climate-induced shifts in productivity and biomass of zooplankton on the foraging success of right whales has not been well studied (NMFS, 2005). It is an area of interest, especially considering the reliance the whales have on that food source.

E. Humpback Whale (*Megaptera novaengliae)* - Endangered

1. Life History

Humpback whales are large, baleen whales that feed on small fish, including herring (*clupea harengus*), sand lance (*Ammodytes americanus*), and capelin (*Mallotus villosus*), and large zooplankton, particularly krill (NMFS, 1991). These whales carry out the most diverse array of feeding behaviors known for any of the baleen whales (NMFS, 1991). Some of these hunting techniques include the use of air bubbles to herd, corral, or disorient fish. In the summer, humpbacks are found in high latitude feeding grounds, such as the Gulf of Maine in the northwestern Atlantic. Such feeding is critical to enable the whales to build up fat (blubber) which they'll live off of during the winter months. Humpbacks prefer shallow water when feeding and calving (NMFS, 2013g)

Humpback whales are known to travel long distances during their seasonal migration from their spring, summer, and fall feeding locations to their winter mating/calving locations in subtropical or tropical waters (NMFS, 1991). During winter, the whales from most of the North Atlantic feeding areas, including the Gulf of Maine, mate and calve in the West Indies (NMFS, 2012b). Gestation lasts for approximately 11 months and breeding occurs generally once every two years (NMFS, 2013g)According to the 2012 Stock Assessment for the Gulf of Maine population of humpbacks, not all whales migrate to the West Indies every winter; a significant number of the whales have been found in mid- and high-latitude regions (NMFS, 2012b). It has been suggested that the mid-Atlantic region of the U.S. might represent a supplemental winter feeding ground for humpback whales (NMFS, 2012b).

2. Status

Humpback whales were designated as "endangered" under the Endangered Species Conservation Act (ESCA) in June of 1970 (35 FR 18319, 1970). When the Endangered Species Act (ESA) was established in 1973 and replaced the ESCA, humpback whales continued to be listed as "endangered." Also, the species is designated as depleted under the Marine Mammal Protection Act (MMPA). The North Pacific population of the humpback whale is currently under review by NMFS for delisting (78 FR 53391, 2013).

3. Distribution and Population Trends

Humpback whales are known to live in all of the major oceans from the equator to sub-polar latitudes. In general, humpback whales (with the exception of those in the northern Indian Ocean population) follow a predictable migratory pattern in both hemispheres in which they feed during the summer in the higher near-polar latitudes and then migrate to lower latitudes in the winter for calving and breeding (NMFS, 2013b).

There are distinct populations of the species. According to the 1991 Recovery Plan, there was disagreement regarding the exact number and definition of existing stocks of humpback whales (NMFS, 1991). The plan highlighted the following stocks for U.S. waters: western North Atlantic; central North Pacific; and eastern North Pacific (NMFS, 1991). More recent resources now identify the following stocks for U.S. waters: Gulf of Maine (formerly Western North Atlantic) and three populations in the North Pacific (California/Oregon/Washington; Central North Pacific; Western North Pacific) (Waring, Quintal, & Swartz, 2000). Humpback whales from the western North Atlantic also inhabit and feed in the Gulf of St. Lawrence, Newfoundland/Labrador, and western Greenland, however they are now considered separate/discrete subpopulations (NMFS, 2012b). The International Whaling Commission (IWC) has designated seven major breeding stocks in the Southern Hemisphere which are linked to seven major feeding areas. The stock structure of humpback whales is defined based on feeding areas because there appears to be more fidelity to feeding areas than breeding areas (Carretta, et al., 2011).

From mid-April to mid-November a large number of humpback whales along the U.S. East Coast occur in the western section of the Gulf of Maine, particularly the Great South Channel, Stellwagen Bank, and Jeffrey's Ledge, which is a 33-mile, relatively shallow area that stretches from the coast of Rockport, MA to almost the southeast of Cape Elizabeth, Maine (NMFS, 1991). Most of the humpbacks that forage in the Gulf of Maine visit Stellwagen Bank and the waters of Massachusetts and Cape Cod Bay because those sites typically have an abundance of the whales' prey (NMFS, 2013b).

During an intensive multi-year research study of humpback whales, known as the Years of the North Atlantic Humpback (YONAH) program, photographs for individual identification and biopsy samples for genetic analysis were taken of humpback whales throughout most of their North Atlantic range (Smith, et al., 1991). This led to an estimate of 11, 570 individuals which is regarded as the best available estimate for the entire North Atlantic population (Waring, Josephson, Maze-Folew, & Rosel, 2012). According to the 2012 NMFS Stock Assessment, the minimum population estimate for the Gulf of Maine stock is 823 whales. This was based on a photographic mark-recapture analysis conducted in 2008 (Robbins & Mattila, 2001). Also based on current data, the 2012 Stock Assessment concluded that the Gulf of Maine humpback whale stock is steadily increasing in size (NMFS, 2012b).

4. Population Risks & Stressors

According to the 1991 Recovery Plan, commercial whale hunting caused a major decline in the number of humpback whales. However, such activities ended in the North Atlantic in 1955 (NMFS, 1991). As with the North Atlantic Right Whale, the current major known sources of anthropogenic mortality and injury of humpback whales occur from ship strikes and fishing gear entanglements (NMFS, 2012b). For the period 2006 through 2010, the minimum annual rate of human-caused mortality and serious injury to the Gulf of Maine humpback whale stock averaged 7.8 animals per year (U.S. waters, 7.2; Canadian waters, 0.6) (Henry, et al., Mortality and serious injury determinations for baleen whale stocks along the Gulf of Mexico, United States East

Coast and Atlantic Canadian Provinces, 2006-2010, 2012). Additional threats to humpback whales include:

- **Whale watch harassment:** From late spring to early fall, the Gulf of Maine stock is the focus of whale watching in New England, particularly within the Stellwagen Bank National Marine Sanctuary. These whale watching vessels could either stress the whales or inadvertently strike them.

- **Acoustic Trauma from ship engines or industrial activity**: Such noise could potentially adversely affect humpback whales by disrupting their natural activities including resting, feeding, courtship, calving, and nursing (NMFS, 1991).

- **Habitat Degradation or Habitat Impacts (Including Reduction in Available Prey):** Contaminants from ocean dumping, offshore oil/gas development, or coastal development could negatively impact the feeding grounds of these whales. This could occur either directly or indirectly by impacting the small fish or zooplankton upon which the whales feed. For example, a mass mortality of humpback whales occurred in 1987-1988 when the whales consumed mackerel whose livers contained high levels of saxitoxin, a naturally occurring red tide toxin (Geraci, et al., 1989) Some believe that the occurrence of a red tide event may be related to an increase in freshwater runoff from coastal development (Clapham & Mead, 1999).

Although there is currently no direct evidence that the above activities are adversely affecting humpback whales, there is concern that they might (NMFS, 2013b).

F. Fin Whale (*Balaenoptera physalus*) - Endangered

1. Life History

The fin whale, another type of baleen whale, is larger and faster swimming than the humpback and right whale (NMFS, 2010b); (NMFS, 2013b). They feed intensely in the summer and fast in the winter while they migrate to warmer waters (NMFS, 2010b). The overall distribution and movements of the fin whale may be based on the availability of its prey, which itself varies depending upon the geographical location (International Whaling Commission, 1992); (NMFS, 2010b). The fin whale of the western North Atlantic preys on crustaceans (mainly euphausiids or krill) and small schooling fish, including capelin, herring, and sand lance (Wynne & Schwartz, 1999); (Overholtz & Nicolas, 1979).

Little is known about the social and mating systems of fin whales (NMFS, 2013). Male fins whales achieve sexual maturity at 6-10 years of age while females become sexually mature at 7-12 years (Jefferson, Webber, & Pitman, 2008). However physical maturity is not attained for either sex until approximately 25 years of age (NMFS, 2013).Conception is believed to occur in tropical and subtropical areas during the winter months, and females give birth to a single calf after approximately 11-12 months of gestation (Jefferson, Webber, & Pitman, 2008). It has been estimated that the average calving interval is about 2 years (Christensen, Haug, & Oien, 1992).

2. Status

The finback whale was originally listed under the Endangered Species Conservation Act of 1970 (35 FR 18319, 1970). It has maintained its listing as an endangered species when the Endangered Species Act (ESA) went into effect in 1973.

3. Distribution and Population Trends

Fin whales have a wide distribution throughout the world and can be found in the Atlantic, Pacific, and Southern Hemisphere (NMFS, 2010b). Although they inhabit a range of latitudes between 20-75ºN and 20-75 ºS (Perry, DeMaster, & Silber, 1999), they are most commonly found in the deep, offshore waters in temperate to polar latitudes (NMFS, 2013). As previously mentioned in Section 3.6.1, fin whales do migrate seasonally. Unlike the more evident north-south migration patterns of the humpback and right whales, the overall migratory pattern of fin whales is more complex and not currently well defined (NMFS, 2013).

According to the recent Recovery Plan, the population structure of fin whales has not been adequately defined and populations are often divided on an ocean basin level instead of strict biological evidence (NMFS, 2010b). Two named subspecies of the fin whale exist: *B. physalus physalus* (Linnaeus 1758) in the North Atlantic and *B. physalus quoyi* (Fischer 1829) in the Southern Hemisphere (NMFS, 2010b). It is generally believed that the populations in the North Atlantic, North Pacific, and Southern Hemisphere rarely mix, if ever (NMFS, 2010b). Within the aforementioned ocean basins, there are geographical populations of fin whales. In U.S. waters, NMFS recognizes four MMA stocks: 1) the Western North Atlantic and the 2) Hawaii, 3) California/Oregon/ Washington, and 4) Alaska (Northeast Pacific) stocks of U.S. Pacific waters (NMFS, 2010b).

The fin whale is ubiquitous in the North Atlantic and occurs from the Gulf of Mexico and Mediterranean Sea northward to the edges of the Arctic ice pack (Reeves, Silber, & Payne, 1998b). They are common in waters of the U.S. Atlantic Exclusive Economic Zone, mainly from Cape Hatteras northward, up to Nova Scotia and the southeastern coast of Newfoundland (NMFS, 2013c). During aerial surveys that were conducted from 1978-1982, fin whales accounted for 46% of all large whales sighted over the continental shelf between Cape Hatteras and Nova Scotia (Waring, Josephson, Maze-Folew, & Rosel, 2012).

Although fin whales in the central and eastern North Atlantic are most abundant over the continental slope and on the shelf seaward of the 200 m isobaths (Rorvik, Jonsson, Mathisen, & Jonsgard, 1976), those off the eastern United States are generally centered along the 100-m isobaths with additional sighting spread out over shallower and deeper water (Kenney & Winn, 1986); (Hain, Ratnaswamy, Kenney, & Winn, 1992). An important feeding area for this species was identified from the Great South Channel, along the 50 meter isobaths past Cape Cod, Massachusetts, over Stellwagen Bank, and past Cape Ann to Jeffrey's Ledge (Hain, Ratnaswamy, Kenney, & Winn, 1992). Photo-identification studies in western North Atlantic feeding areas, especially in Massachusetts Bay, have indicated a high rate of annual return by fin whales to this feeding area (Seipt, Clapham, Mayo, & Hawvermale, 1990).

Reliable and recent estimates of fin whale abundance are available for significant portions of the North Atlantic Ocean, but neither for the North Pacific Ocean nor the Southern Ocean (NMFS, 2010b). There is insufficient data to determine population trends for the fin whale (Waring, Josephson, Maze-Folew, & Rosel, 2012). Various estimates have been provided to describe the current status of fin whales in western North Atlantic waters. However, the final 2012 stock assessment report provided the best population estimate of 3,522 (CV=0.27) for the western North Atlantic stock. This is considered the best estimate because the number is derived from the Canadian Trans-North Atlantic Sighting Survey (TNASS) which covered more of the fin whale range than other surveys (NMFS, 2013c).

Although reliable estimates of current abundance for the entire Northeast Pacific (Alaska) are not available, the final 2012 stock assessment report does provide a *minimum* estimate of 5,700 (Allen & Angliss, 2011). The best available estimate for the California/Oregon/Washington stock is 3,044, which is likely to be an underestimate (Carretta, et al., 2011). Based on a 2002 line-transect survey, the best available estimate for the Hawaii stock is 174 (Carretta, et al., 2011).

4. Population Risks & Stressors

Historically, commercial whaling was the most significant threat to fin whales (NMFS, 2010b). Although commercial whaling of the fin whale ceased in the North Pacific Ocean in 1976, in the Southern Ocean in 1976, and in the North Atlantic Ocean in 1987 fin whales are still hunted today in Greenland under the IWC's "aboriginal subsistence whaling" scheme (NMFS, 2010b). Therefore whaling is no longer the most significant threat, but the potential that illegal whaling and/or resumed legal whaling could adversely impact the fin whale population still exists today.

As with North Atlantic right and humpback whales, the most significant, known anthropologic threats to fin whales include collisions with vessels and entanglement in fishing gear (NMFS, 2010b). Out of all species of large whales, it is believed that fin whales are most commonly struck by large vessels (Laist, Knowlton, Mead, Collet, & Podesta, 2001). From 2005 – 2009, a study documented 12 ship strikes (9 fatal) of North Atlantic fin whales and 14 confirmed entanglements (2 fatal and 2 serious injuries) (Henry, Cole, Garron, & Hall, Mortality and Serious Injury Determinations for Baleen Whale Stocks along the Gulf of Mexico, United States and Canadian Eastern Seaboards, 2005-2009, 2011).

Other threats to the fin whale include:

- **Potential reduction in prey abundance due to overfishing or climate change:** According to the recovery plan for the fin whale, this threat was listed as unknown, but potentially high (NMFS, 2010b);
- **Acoustic trauma:** Many marine mammals, including fin whales, use sound to communicate, navigate, locate prey, and sense their environment (NMFS, 2010b); Baleen whale calls, especially fin whale calls, are predominantly at low frequencies (NMFS, 2010b); The recovery plan listed this threat as an unknown threat;

- **Habitat Degradation:** According to the Recovery Plan for the fin whale, contaminants and pollutants were listed as a low threat (NMFS, 2010b). In a study by O'Shea and Brownell (1995), concentrations of organochlorine and metal contaminants in the tissues of baleen whales were low, and lower in fact that other marine mammal species.

G. Kemp's Ridley Sea Turtle (*Lepidochelys kempi)* - Endangered

1. Life History

The general life history pattern for Kemp's ridleys is similar to that of other sea turtles, including the loggerhead (Bolten, 2003). As summarized in the Kemp's ridley's revised recovery plan, its life history can be categorized by three overall ecosystems: 1) *Terrestrial zone* – the nesting beach where females lay eggs & eggs hatch; 2) *Neritic zone* – the nearshore marine environment that includes the water surface to ocean floor, with water depths no greater than 200 meters; and 3) *Oceanic zone* – the open ocean environment, where water depths exceed 200 meters (NMFS et al., 2011). This life history is also highlighted in **Table 4** below:

Table 4: Life Stages of Sea Turtles

Life Stage	Zone
Adult/Egg/Hatchling	Terrestrial
Early Transitional for Hatchling/Post-Hatchling	Neritic
Juvenile	Oceanic
Juvenile	Neritic
Adult	Neritic

Female Kemp's ridleys lay their nests on ocean beaches, primarily along a stretch of beach in Rancho Nuevo, Mexico, from April through July each year (NMFS et al., 2011). The Kemp's ridleys tend to nest in large, synchronized aggregations, called *arribadas*, which may be triggered by high wind speeds, especially north winds, and changes in barometric pressure (Jimenez, Filonov, Tereshchenko, & Marquex, 2005). Females lay an average of 2-3 clutches per season (Turtle Expert Working Group, 2000) and eggs typically take 45-58 days to hatch, depending on temperatures (NMFS & USFWS, 2007)..

Once hatchlings leave the nesting beaches, they quickly enter the surf and swim offshore. According to the revised recovery plan, not much is known about this 'early transitional neritic' phase in which the hatchling swims offshore and are associated with boundary currents, but *before* they are transported into the open ocean. The juveniles then feed, presumably on *Sargassum* seaweed or associated infauna, and develop in the ocean (NMFS et al., 2011).

After approximately 2 years of age, Kemp's ridleys will transition to benthic coastal habitats of the entire Gulf of Mexico and U.S. Atlantic coast and forage on benthic fauna, including a variety of crabs (NMFS & USFWS, 2007; Turtle Expert Working Group, 2000). This movement represents the beginning of a new life stage, namely the juvenile developmental neritic stage

(NMFS et al., 2011). The habitat where these juvenile Kemp's ridleys develop can be characterized as somewhat protected, temperate waters, with a depth below 50 m (NMFS et al., 2011). A variety of substrates have been documented as good foraging habitat and include seagrass beds, oyster reefs, rock outcroppings, and sandy and/or mud bottoms (NMFS & USFWS, 2007).

A large portion of the neritic juveniles resides in waters with temperatures that vary seasonally (NMFS et al., 2011). For those juveniles that forage in the Northwest Atlantic, they do migrate down the coast to more favorable (ie-warmer) overwintering sites when the water temperatures begin to decline each year (NMFS et al., 2011). The timing of this emigration depends upon the latitude of the foraging habitat, with earlier emigration in the more northern waters (NMFS et al., 2011). The offshore waters south of Cape Canaveral have been identified as an important overwintering area for seasonal migrants along the U.S. Atlantic coast (NMFS & USFWS, 2007). In the spring, Kemp's ridleys residing in east-central Florida waters migrate northward (NMFS & USFWS, 2007). As water temperatures continue to rise even farther northward, juvenile Kemp's ridleys and loggerheads continue their northward migration. By June, they might appear in New England waters (NMFS et al., 2011).

Although adult Kemp's ridleys occur primarily in the Gulf of Mexico, some are occasionally found on the U.S. Atlantic coast (NMFS & USFWS, 2007). Common habitat for adults are nearshore waters of 37 m or less that are rich in crabs and have a sandy or muddy bottom (NMFS & USFWS, 2007).

2. Status

The Kemp's ridley sea turtle was originally listed under the Endangered Species Conservation Act of 1970 (35 FR 18319, 1970). It maintained its listing as an endangered species when the Endangered Species Act (ESA) went into effect in 1973. NOAA Fisheries and USFWS, which have joint jurisdiction for marine turtles, finalized the original recovery plan for Kemp's ridley turtles in the U.S. Caribbean, Atlantic and Gulf of Mexico in 1991 (NMFS, 2013). A revised bi-national (U.S. and Mexico) Recovery Plan was finalized in 2011. Since the largest nesting area occurs in Mexico, the Mexican government has played a critical role in the conservation of Kemp's ridley turtles. Since 1966, the Mexican government provided legal protection to the turtles. They implemented a complete ban on taking any species of sea turtle on May 28, 1990 (NMFS, 2013). NOAA Fisheries and USFWS were jointly petitioned in February of 2010 to designate critical habitat for Kemp's ridley sea turtles for nesting beaches along the coast of Texas and marine habitats in the Gulf of Mexico (WildEarth Guardians, 2010).

3. Distribution and Population Trends

The Kemp's ridley is one of the least abundant of the world's sea turtle species (NMFS, 2013b). Kemp's ridleys typically occur only in the Gulf of Mexico and the northwestern Atlantic Ocean, from Florida to New England (NMFS et al., 2011). The majority of Kemp's ridleys nest along a single stretch of beach near Rancho Nuevo, Tamaulipas, Mexico or the nearby beaches of Tepehuajes and Barra del Tordo (NMFS & USFWS, 2007); (NMFS et al., 2011). However, there is a limited amount of nesting in the U.S, particularly in South Texas (NMFS et al., 2011). It is not known what proportion of the Kemp's ridley population migrates to U.S. Atlantic coastal waters (NMFS & USFWS, 2007).

After emerging from the nest, hatchlings quickly enter the water to escape predators (NMFS et al., 2011). Although there is a brief neritic stage for hatchling/post-hatchling, not much is known of this transitional stage (NMFS et al., 2011). Post-hatchling Kemp's ridleys are believed to be carried by major oceanic currents and distributed predominantly in the Gulf of Mexico, but also in the Northwest Atlantic (NMFS & USFWS, 2007). The juveniles feed, often on *Sargassum* seaweed, and develop in the ocean (NMFS et al., 2011). After approximately 2 years of age, Kemp's ridleys will transition to benthic coastal habitats of the entire Gulf of Mexico and U.S. Atlantic coast (NMFS & USFWS, 2007); (Turtle Expert Working Group, 2000). Data indicates that developmental habitats for this life stage can occur in many coastal areas throughout the aforementioned range, and that these habitats may shift depending upon the availability of resources (Turtle Expert Working Group, 2000). Foraging areas along the U.S. coast include Charleston Harbor, Pamlico Sound, Chesapeake Bay, Delaware Bay, and Long Island Sound, North Carolina, as well as New York and New England (NMFS, 2013b). Adult Kemp's ridleys can be found in the coastal regions of the Gulf of Mexico and southeastern United States, but they are typically rare in the northeastern U.S. waters of the Atlantic (Turtle Expert Working Group, 2000).

According to the revised Recovery Plan for Kemp's ridley turtles, the nesting population is increasing exponentially, which may indicate that the population as a whole is increasing (NMFS et al., 2011). Although the number of nesting females was estimated to be 40,000 in 1947, the Kemp's ridley population declined significantly through the mid-1980's to fewer than 300 nesting females in the entire 1985 nesting season (Turtle Expert Working Group, 2000); (NMFS et al., 2011). As previously stated, egg collection was historically an extreme threat to this species' population. However the total number of nests at Rancho Nuevo and nearby beaches started to increase in the mid-1980's, with a 14-16% increase per year from 1988 – 2003 (NMFS et al., 2011). In 2009 alone, the total number of nests recorded at Rancho Nuevo and adjacent beaches exceeded 20,000, which represented approximately 8,000 nesting females (NMFS et al., 2011). Although there is limited nesting in the United States, a record 195 nests were documented in South Texas compared to only 6 in 1996 (NMFS et al., 2011). An updated population model, which is based on the assumption that current survival rates within each life stage remain constant, predicted a 19% per year population growth from 2010 – 2020 (Heppell, et al., 2005); (NMFS et al., 2011).

4. Population Risks & Stressors

Like other species of sea turtles, threats to Kemp's ridleys occur both on land (on nesting beaches) and in the marine environment (NMFS, 2013b). Historically, the exploitation of eggs in Mexico was a major factor in the decline of the Kemp's ridley sea turtle nesting population

(NMFS & USFWS, 2007). Although poaching of eggs occasionally still takes place in Mexico, there was a dramatic decrease since official beach protection started in 1966/67 (NMFS et al., 2011).

The list below highlights the current and greatest threats to marine turtles, including Kemp's ridleys:

- **Incidental capture in fishing gear (from commercial and recreational fisheries):** Entanglement in fishing gear can cause abrasions, restrictions, tissue necrosis, stress, or drowning (NMFS et al., 2011). The primary threat to Kemp's ridleys sea turtles has been, and continues to be, incidental capture in fishing gear, particularly with shrimp trawlers, but also in gill nets, longlines, traps/pots, and dredges (NMFS & USFWS, 2007). In the past, the National Academy of Sciences had estimated that between 500 and 5,000 Kemp's ridleys were killed annually by the offshore shrimping fleet in the Gulf of Mexico and southeastern U.S. Atlantic (Magnuson, et al., 1990); (NMFS et al., 2011). NMFS has worked with fishing industries and required the use of turtle excluder devices (TEDs), however the Revised Recovery Plan for Kemp's ridleys emphasized the need for conservation measures to be maintained and strengthened (NMFS et al., 2011).

- **Loss or Destruction of Nesting Habitat**: The nesting habitat for sea turtles can be destroyed or altered by storm events, natural predators, beach cleaning and/or beachfront development (NMFS et al., 2011). For example, erosion can impact the quality of nesting habitat while artificial lighting (light pollution) from beach development can disorient hatchings (NMFS, 2014). This is clearly an issue of concern for sea turtles, as a whole. However it should be noted that Massachusetts' waters only provide foraging habitat, not nesting habitat, for Kemp's ridleys.

- **Cold-Stunning:** Although cold-stunning can occur throughout the range of Kemp's ridleys, it may be a greater risk for sea turtles that use the northern habitats of Cape Cod Bay and Long Island Sound (NMFS, 2013b). According to the revised Recovery Plan, Kemp's ridleys strand along the coast of Massachusetts almost every winter due to cold stunning (NMFS et al., 2011).

- **Pollution:** According to NMFS's five year review of Kemp's ridleys, exposure to heavy metals and other contaminants in the marine environment, including oil from spills or pollutants from coastal runoff, are potential threats (NMFS & USFWS, 2007). Although explicit effects on sea turtle have not been documented yet, toxins are capable of altering metabolic activities, development, and reproductive capacity (NMFS et al., 2011).

- **Climate Change:** Climate change can result in an increase in temperature, sea level rise, potential changes in ocean productivity, and increased frequency of storm events (NMFS, 2013b). Atmospheric warming could lead to increased hurricane activity which could damage nesting beaches from beach erosion, increase levels of runoff near the shores, change ocean currents, or alter the turtles' food sources. Although the revised recovery plan for Kemp's ridley sea turtles does identify climate change as a threat, no significant impacts have been documented to date (NMFS et al., 2011).

H. Loggerhead Sea Turtle (*Caretta caretta)* – Northwest Atlantic Ocean DPS - Threatened

1. Life History

As previously mentioned, the generalized life stages of loggerhead sea turtles are similar to the life stages of other turtles, including Kemp's ridley sea turtles (Heppell, Crowder, Crouse, Epperly, & Frazer, 2003). Therefore, the phases discussed in Section 3.6.1, including those that occur in the terrestrial, neritic, and oceanic zones summarized in **Table 4**, are applicable for this section, as well. However, recent studies have established that the loggerhead's life history is more complex than originally believed. According to a recent NMFS Biological Opinion, research is showing that both adults and most likely neritic stage juveniles continue to move between their oceanic and neritic environments rather than making discrete development shifts between the two habitats (NMFS, 2013b). Neritic refers to the inshore marine environment from the surface to the sea floor in which water depths do not exceed 200 meters.

Loggerheads nest on ocean beaches and sometimes on estuarine shorelines with suitable sand. Females appear to prefer relatively narrow, steeply sloped beaches with coarse-grained sand (NMFS & USFWS, 2008). In the Northwest Atlantic, the major nesting concentrations in the U.S. are located from North Carolina through southwest Florida (Conant, et al., 2009). **Table 5**, below, which was taken from Table 3 of the Revised Recovery Plan, highlights some of the life history parameters and key values for loggerheads that nest in the U.S. (NMFS & USFWS, 2008).

Table 5: Typical values of life history parameters for loggerheads nesting in the U.S.

Life History Parameter	**Data**
Clutch size	100 – 126 eggs (Dodd 1988)
Clutch frequency (number of nests/female/season)	3 – 5.5 nests (Murphy and Hopkins (1984); Frazer and Richardson (1985); Hawkes *et al.* 2005; Scott 2006)
Nesting season	Late April – early September
Hatching season	Late June – early November
Age at sexual maturity	32-35 years (Melissa Snover, NMFS, personal communication, 2005; See Table A1-6)

Immediately after the hatchlings emerge from the nest, they are known to exhibit a period of frenzied activity. They move from their nest to the surf, swim and are swept through the surf zone, and continue swimming away from land for about 20-30 hours (NMFS & USFWS, 2008). After this frenzied phases, post-hatchlings enter a transitional, neritic phrase where they inhabit waters near the shoreline for weeks to months (NMFS & USFWS, 2008). These post-hatchlings have been described as low-energy float and wait foragers that feed upon a variety of floating items, including *Sargassum* seaweed (Witherington, Ecology of neonate loggerhead turtles inhabiting lines of downwelling near a Gulf Stream front, 2002).

Juvenile loggerheads then enter into an oceanic stage during which they spend about 75% of their time in the top 5 meters of the water column (Heppell, Crowder, Crouse, Epperly, & Frazer, 2003). Although the diet of these juveniles has not been studied extensively, they are known to be largely carnivorous; they primarily eat sea jellies and hydroids, and occasionally other organisms like snails, barnacles and crabs (NMFS & USFWS, 2008). After years of this phase, the juveniles transition from the oceanic to the neritic zone. According to the 2008 Recovery Plan, juvenile stage loggerheads in the North Atlantic commonly inhabit continental shelf waters from Cape Cod Bay, MA south though Florida, The Bahamas, and the Gulf of Mexico (NMFS & USFWS, 2008). North Atlantic sub-adults (as well as adults) are believed to eat a variety of organisms, including benthic invertebrates such as mollusks and benthic crabs (Burke, Standora, & SJ, 1993). Matrix models estimate that this neritic juvenile stage can last from 14 to 24 years (Heppell, Crowder, Crouse, Epperly, & Frazer, 2003).

Although non-nesting adult loggerheads also inhabit the neritic zone, the habitat preference for adults differs from that of juveniles (Conant, et al., 2009). Adults prefer shallow water habitats with vast access to the open ocean, like Florida Bay, as compared to juveniles who more frequently use enclosed, shallow water estuarine habitats with limited ocean access (Conant, et al., 2009). Offshore, adults primarily inhabit continental shelf waters, from New York south through Florida, The Bahamas, Cuba, and the Gulf of Mexico (NMFS & USFWS, 2008). Loggerheads are known to make extensive seasonal migrations between foraging areas and nesting areas (NMFS & USFWS, 2008).

2. Status

On July 28, 1978, the loggerhead turtle was initially listed as a threatened species under the Endangered Species Act throughout its range (43 FR 32800, 1978). In 2007, NMFS (which is the lead agency for marine turtles) and the U.S. Fish and Wildlife Service (which is the lead authority for the terrestrial areas/nesting beaches of sea turtles) completed a five year status review of loggerheads. The results of this review, as well as the second revision of the Recovery Plan for the Northwest Atlantic Population, were published in 2009.

In September of 2011, NMFS listed 9 Distinct Population Segments (DPSs) of loggerhead sea turtles under the ESA (76 FR 58868, 2011). Five DPSs were listed as endangered (North Pacific Ocean, South Pacific Ocean, North Indian Ocean, Northeast Atlantic Ocean, and Mediterranean Sea) while four DPSs were listed as threatened (Northwest Atlantic Ocean, South Atlantic Ocean, Southeast Indo-Pacific Ocean, and Southwest Indian Ocean) (76 FR 58868, 2011)(. It should be noted that the Northwest Atlantic DPS was one of two DPSs originally proposed as endangered; however, it was eventually listed as threatened based on population abundance and population trends (NMFS, 2013b).

In July of 2013, NMFS proposed the designation of critical habitat for the Northwest Atlantic Ocean DPS of Loggerhead Sea Turtle (78 FR 43305, 2013). 36 occupied marine areas within the Atlantic Ocean and the Gulf of Mexico, which contain “one or a combination of nearshore reproductive habitat, winter area, breeding areas, and migratory corridors,” were proposed (78 FR 43305, 2013). None of the proposed marine areas are located within or near Massachusetts’ waters.

3. Distribution and Population Trends

Loggerhead sea turtles are the most abundant species of sea turtle found in U.S. coastal waters (NMFS, 2013b). They occur throughout the temperate and tropic regions of the Atlantic, Pacific, and Indian Oceans (Dodd, 1988). Neritic juvenile loggerheads in the Northwest Atlantic DPS inhabit continental shelf waters from Cape Cod Bay, Massachusetts, south through Florida, The Bahamas, Cuba, and the Gulf of Mexico (76 FR 58868, 2011). However it should be noted that their presence varies with the seasons due to the changes in water temperature (NMFS, 2013b).

Although some loggerhead sea turtles occur year round in ocean waters off North Carolina, South Carolina, Georgia, and Florida, others begin to migrate to inshore waters of the Southeast United States and also move up in the U.S. Atlantic coast as coastal water temperatures warm in the spring (NMFS, 2013b). Loggerheads can appear in Virginia foraging areas as early as April/May and on the most northern foraging grounds in the Gulf of Maine in June (Shoop & Kenney, 1992). The trend is reversed in the fall as water temperatures cool (NMFS, 2013b).

According to the revised recovery plan, five recovery units were identified for the NWA DPS of loggerheads (NMFS & USFWS, 2008). These recovery units, which are based on nesting assemblages of the Northwest Atlantic DPS, are summarized in **Table 6,** below (NMFS & USFWS, 2008). Nest counts can be used to estimate the number of reproductively mature females nesting annually (NMFS, 2013b). In addition to listing the recovery units, **Table 7** also provides the population status/trend for each recovery unit (NMFS & USFWS, 2008).

Table 6: Description of Recovery Units of Northwest Atlantic DPS of Loggerheads & Population Status/Trends

Recovery Unit	Geographic Location	Population Status/Trends
Northern Recovery Unit (Represents northern-most range)	Loggerheads originating from nesting beaches from Florida-Georgia border through southern Virginia	From 1989-2008, total annual nest averaged 5,215 nests with approximately 1,272 females nesting per year (NMFS & USFWS, 2008) ;
Peninsular Florida Recovery Unit (Largest nesting assemblage for NWA DPS)	Loggerheads originating from nesting beaches from the Florida-Georgia border through Pinellas County of West coast of FLR (excludes islands west of Key West)	From 1989-2007, total annual nest averaged 64,513 nests with about 15,735 females nesting per year (NMFS & USFWS, 2008). From 1989-2008, overall declining nesting trend of 26%
Dry Tortugas Recovery Unit	Loggerheads originating from nesting beaches throughout islands located west of Key West, FL	From 1995-2004 (excluding 2002), total annual nest averaged 246 nests with approximately 60 females nesting per year (NMFS & USFWS, 2008).

Northern Gulf of Mexico Recovery Unit (Western Extent of U.S. nesting range)	Loggerheads originating from nesting beaches from Franklin County of Northwest Gulf coast of FL through Texas	Total annual nests from 1995-2007 averaged 906 nests with approximately 221 females nesting per year (NMFS & USFWS, 2008).
Greater Caribbean Recovery Unit	Loggerheads originating from all other nesting assemblages within the Greater Caribbean	Only available estimate is from Quintana Roo, Yucatan, Mexico: range of 903-2,331 nest per year from 1987-2001 (NMFS and USFWS 2007a **Get source)**; Nesting has declined since 2001 (NMFS & USFWS, 2008).

The 2008 Recovery Plan indicated that there had been a significant, overall nesting decline within the Northwest Atlantic DPS based on standardized data collected prior to October of 2008 (NMFS & USFWS, 2008). However, with the addition of nesting data from 2008-2010, the trend line has changed; although there is now a slight negative trend, the rate of decline is not statistically different from zero (76 FR 58868, 2011).

In the summer of 2010, line transect aerial abundance surveys (from Cape Canaveral, FL to the Gulf of St. Lawrence, Canada) and turtle telemetry studies were conducted along the Atlantic coast as part of the Atlantic Marine Assessment Program for Protected Species (AMAPPS) (NMFS NEFSC, 2011). The 2010 survey found a preliminary total surface abundance estimate within the study area of about 60,000 loggerheads (or 85,000 if a portion of unidentified hard-shelled sea turtles were included (NMFS NEFSC, 2011). The calculated preliminary regional abundance estimate is about 588,000 loggerheads along the U.S. Atlantic coast, with an inter-quartile range of 382,000 – 817,000 (NMFS NEFSC, 2011). However these estimates are considered very preliminary. It should be noted that population estimates for loggerhead sea turtles (as with other turtle species) are difficult to determine, particularly because of their life history characteristics (NMFS, 2013b).

4. Population Risks & Stressors

The threats outlined earlier in this document for Kemp's ridley sea turtles are also applicable to other sea turtles, including loggerheads. Therefore they will not be repeated in detail again. It is important to note that the factors that threaten sea turtles in the terrestrial zone (ie-on nesting beaches) often differ from those that threaten the turtles in the neritic and ocean zones. The 2008 Recovery Plan emphasized that the *highest* priority threats for the Northwest Atlantic DPS of loggerheads include:

- **Bycatch from fisheries** (including bottom trawl, pelagic longline and demersal gillnet fisheries);

- **Legal and illegal harvesting:** Although illegal directed harvest of juvenile and adult logger turtles in the waters of the continental U.S. is uncommon, 45% of Caribbean countries/territories allow the harvest of loggerheads (NMFS & USFWS, 2008). Also the illegal harvest (including the taking of eggs and the killing of nesting females) of loggerheads in 26 jurisdictions surveyed in the Lesser Antilles, Caribbean, and Central and South America has been documented (NMFS & USFWS, 2008).

- **Vessel strikes:** Unfortunately, propeller and collision injuries from boats and ships are common in sea turtles. 14.9% of all stranded loggerheads in the U.S. Atlantic and Gulf of Mexico from 1997 to 2005 were documented as having some type of propeller or collision injuries (NMFS & USFWS, 2008).

- Beach erosion;

- Marine debris entanglement/ingestion;

- Oil pollution;

- Light pollution;

- Predation by native and exotic species

I. Leatherback Sea Turtle (*Dermochelys coriacea)* - Endangered

Although leatherback sea turtles are listed as endangered on the species level, existing recovery plans are based upon population and management units within ocean basins. For example, the Recovery Plan for Leatherback Turtles in the U.S. Caribbean, Atlantic, and Gulf of Mexico was signed by NMFS and the USFWS in 1992, while the Recovery Plan for U.S. Pacific Populations of Leatherback Turtle was signed in 1998. The recent 5 year status review for leatherback turtles also concluded that a Distinct Population Segment policy was recommended for leatherbacks. Therefore the section below will focus on leatherback sea turtles in the U.S. Caribbean, Atlantic, and Gulf of Mexico because this includes the action area for this permit, namely Massachusetts and New Hampshire waters.

1. Life History

Leatherbacks are the largest living turtles and the only sea turtle that doesn't have a hard bony shell; instead, a leatherback's carapace (top shell) is made of leathery, oil-saturated connective tissue that lies above loosely interlocking dermal bones (NMFS & USFWS, 1992). Also unlike other sea turtles which possess chewing plates that enable them to feed on hard-bodied prey, leatherbacks have two toothlike projections that help them eat their diet of soft-bodied and gelatinous organisms, including jellyfish and salps (Pritchard, 1971); (NMFS & USFWS, 1992);
.

Courtship and mating for leatherbacks is believed to occur in coastal waters adjacent to nesting beaches and along migratory corridors (NMFS, 2013). Nesting beach habitat is generally associated with deep water and strong waves and oceanic currents; however leatherbacks will also use shallow water with mud banks (Turtle Expert Working Group, 2007). Female leatherbacks appear to prefer beaches with coarse-grained sand that are also free of rocks or other abrasive substrates (Eckert, Wallace, Frazier, Eckert, & Pritchard, 2012); (NMFS & USFWS, 2013). In the United States and Caribbean, female leatherbacks nest from March through July (NMFS, 2013b). They nest frequently (ranging from 5 -7 nests per year) and nesting occurs about every 2-3 years (Eckert, Wallace, Frazier, Eckert, & Pritchard, 2012); (NMFS & USFWS, 2013) . During the nesting season, females will generally stay within 100 km of the nesting beach. However they also undergo long distances between nesting events to forage in more temperate areas which support a high density of prey (Eckert, Wallace, Frazier, Eckert, & Pritchard, 2012); (NMFS & USFWS, 2013).

Little is known about the early life history of leatherbacks from the time they are hatchlings until they reach adulthood (NMFS & USFWS, 2013). However one study found that leatherback juveniles remain in waters warmer than 26°C until their curved carapace length (CCL) exceeds 100 cm; this suggests that the first part of a leatherback's life is spent in tropical waters (Eckert S. , 2002).

Adult leatherbacks are highly migratory and believed to be the most pelagic of all sea turtles (NMFS & USFWS, 1992). Based on evidence from tag returns and strandings in the western Atlantic Ocean, data suggests that adult leatherback sea turtles engage in routine migrations between northern temperate and tropic waters (NMFS & USFWS, 1992). Although leatherbacks primarily eat gelatinous organisms, they also ingest other prey including crustaceans, vertebrates, and plants (Eckert, Wallace, Frazier, Eckert, & Pritchard, 2012). It is essential that leatherbacks have access to areas of high food productivity because they must consume large amounts of such food to meet their energy demands (Heaslip, Iverson, & Bowen, 2012).

2. Status

The leatherback turtle was originally listed under the Endangered Species Conservation Act of 1970 (35 FR 8491, 1970). It maintained its listing as an endangered species when the Endangered Species Act (ESA) went into effect in 1973.

In 1988, NMFS designated critical habitat for leatherback turtles in the U.S. Virgin Islands, specifically for the coastal waters adjacent to Sandy Point, St. Croix, USVI (44 FR 17710, 1979). According to 44 FR 17710, courtship and mating for leatherbacks is believed to occur in these coastal waters which are adjacent to nesting beaches. (The USFWS had already designated a 0.2 mile wide strip of land at Sandy Point Beach as critical habitat in 1978). Additional critical habitat for endangered leatherback sea turtles was designated in 2012. This critical habitat is located along the U.S. West Coast. It includes approximately 16,910 square miles and was designated because of the abundant occurrence of prey species for leatherback sea turtles (77 FR 4170, 2012).

3. Distribution and Population Trends

Leatherback sea turtles are widely distributed throughout the world's oceans, including the Atlantic, Pacific, and Indian Oceans, as well as the Mediterranean Sea (Ernst & Barbaour, 1972). These migratory sea turtles range farther than any other sea turtles (NMFS, 2013b). They also have a distinct physiology with various thermoregulatory adaptations that allow leatherbacks to tolerate colder water temperatures than other sea turtles (NMFS & USFWS, 1992). Therefore they can be found in foraging grounds as far north as Labrador in the Western North Atlantic Ocean (NMFS & USFWS, 2013). Although leatherbacks are known as pelagic animals because they live in the open ocean, they do forage in coastal waters, including those of the U.S. continental shelf (NMFS, 2013b).

Leatherbacks nest on beaches in the tropics and sub-tropics and they forage into higher-latitude sub-polar waters (NMFS & USFWS, 2013). Although nesting sites for leatherbacks exist around the world, the largest nesting assemblages currently exist along the northern coast of South America and in Western Africa (Turtle Expert Working Group, 2007). The most significant leatherback nesting sites in the United States occur in the U.S. Virgin Islands (the aforementioned Sandy Point Beach in St. Croix), Culebra in Puerto Rico, and along the east coast of Florida (NMFS & USFWS, 2013). Tagging and satellite telemetry data indicate that the leatherback turtles from these western North Atlantic nesting beaches use the entire North Atlantic Ocean (Turtle Expert Working Group, 2007). For instance, leatherbacks that were tagged in Puerto Rico, Trinidad, and the Virgin Islands have subsequently been found on U.S. beaches of southern, mid-Atlantic, and northern states (NOAA, 2013).

According to the 5 year status review, migration patterns differ by region, depending upon the local oceanographic processes, and several migration strategies may exist within breeding populations (NMFS & USFWS, 2013). For leatherbacks in the Atlantic Ocean, some made round-trip migrations from where they started through the North Atlantic Ocean heading northwest to fertile foraging areas off the Gulf of Maine, Canada, and Gulf of Mexico; others crossed the ocean to areas off western Europe and Africa; while others spent time between northern and equatorial waters (NMFS & USFWS, 2013). Extensive research has been conducted on Canadian waters, which has one of the largest seasonal foraging population of leatherbacks in the Atlantic Ocean, as well as foraging areas off Massachusetts (particularly Cape Cod Bay) (NMFS & USFWS, 2013). According to the 1991 Recovery Plan for Leatherbacks in the U.S. Caribbean, Atlantic, and Gulf of Mexico, peak sightings for leatherbacks foraging in Cape Cod Bay, Massachusetts took place in August and September (Prescott, 1988); (NMFS & USFWS, 1992).

The 5-year review also compiled the most recent information on abundance and population trends for leatherback sea turtles in each of the ocean basins. The most recent population size estimate for the North Atlantic alone is a range of 34,000 – 94,000 adult leatherback sea turtles (Turtle Expert Working Group, 2007). However it should be noted that it is particularly difficult to monitor nesting population estimates and trends for adult female leatherbacks because they are known to frequently nest on different beaches (NMFS, 2013). **Table 7**, below, summarizes the results for only a select number of nesting assemblages, namely those nesting sites affiliated with the United States.

Table 7: Leatherback nesting Population Site Location Information

Location	Data: Nests, Females	Years	Annual Number	Trend	Reference
U.S. (Florida)	Nests	1979 - 2008	63-754	Increase	(Steward, et al., 2011)
Puerto Rico (Culebra)	Nests	1993 - 2012	395 - 32	Decrease	C. Diez, Department of Natural and Environmental Resources of Puerto Rico,, unpublished data; (Diez, et al., 2010); (Ramirez-Gallego, Diez, Barriento-Munoz, White, & Roman, 2013)
Puerto Rico (other)	Nests	1993 - 2012	131 – 1,291	Increase	C. Diez, Department of Natural and Environmental Resources of Puerto Rico,, unpublished data;
United States Virgin Islands (Sandy Point National Wildlife Refuge, St. Croix)	Nests	1986 - 2004	143-1,008	Increase	(Dutton, Dutton, Chaloupka, & Boulon, 2005); (Turtle Expert Working Group, 2007)

Since overall increases were recorded for mainland Puerto Rico and St. Croix, U.S. Virgin Islands, this might indicate that the decline of nests in Culebra might not be an actual loss to the breeding population; instead, it might just represent a shift in nesting site (Diez, et al., 2010); (Ramirez-Gallego, Diez, Barriento-Munoz, White, & Roman, 2013).

The 5-year review did observe contrasting population trends between the Atlantic, Pacific, and Indian Oceans. For instance, leatherback nesting populations are declining dramatically in the Pacific Ocean, yet appear stable (or are increasing) in many of the nesting areas of the Atlantic Ocean and South Africa in the Indian Ocean (NMFS & USFWS, 2013). No long-term data is available for nesting areas in West Africa (Turtle Expert Working Group, 2007). Many hypotheses have been proposed to explain the disparate trend of leatherbacks in the Pacific Ocean, including the variability in resource abundance (ie- prey) and distribution (NMFS & USFWS, 2013). For example, the high reproductive output and consistent, high quality foraging area in the Atlantic Ocean have likely contributed to their stable/recovering populations while lower prey abundance and distribution in the Pacific Ocean might be leading to this population's decline (NMFS & USFWS, 2013).

4. Population Risks & Stressors

As with other sea turtles, both natural and anthropogenic threats impact the leatherback sea turtles' nesting and marine habitats. Two of the greatest threats to leatherbacks worldwide include:

- **The collection of eggs and harvesting of turtles**; and

- **Incidental capture in fishing gear in artisanal and commercial fishing**: According to NMFS' Biological Opinion, of the Atlantic sea turtle species, leatherbacks seem to be the most vulnerable to entanglement in fishing gear, especially trap/pot gear (NMFS, 2013b). This susceptibility might result from leatherbacks' large body size, their diving/foraging behavior, and/or their possible attraction to gelatinous organisms and algae that collect near the buoys.

According to the most recent 5-year review of leatherback, additional threats include:

- **Ingestion of & Entanglement of Marine Debris**: In the marine environment, small debris can be ingested (and reduce food intake) while large debris can entangle animals. While the impact of marine debris on leatherbacks during their pelagic life stage has not been quantified, the 5-year review suggested the impacts may be severe, especially given the increase of plastics and other debris and pollution entering the marine environment over the past 20-30 years (NMFS, 2013b).

- **Development along coastal areas**: As with other sea turtles, development could result in the loss of suitable nesting habitat or cause light pollution (which could prevent females from nesting or disorient hatchlings)

- **Climate Change**: A rise in sea level could result in the loss of nesting habitat while warmer temperatures could impact prey abundance/distribution or skew the natural sex ratios of leatherbacks (as well as other sea turtles)

J. Green Turtle (*Chelonia mydas*) – Threatened or Endangered Threatened for Most Populations; Endangered for breeding populations in Florida & Pacific Coast of Mexico

1. Life History

Similar to the Kemp's ridley, loggerhead, and leatherback sea turtles, the green turtle uses three distinct habitats throughout its lifetime. These include: 1) high-energy beaches for nesting habitat, 2) convergence zones in the open (pelagic) ocean, and 3) relatively shallow, coastal waters which serve as their benthic feeding grounds (NMFS & USFWS, 1991). According to the five year review for the green turtle, relatively recent research has started to increase the understanding of the species, particularly during its time in the marine environment, but numerous gaps still exist (NMFS & USFWS, 2007b). This is particularly true of the oceanic phase of juvenile green turtles.

Mating occurs in the water off nesting beaches (NMFS & USFWS, 1991). Although the nesting season for the green turtle depends upon the location of the nest, females from the Florida breeding population generally nest between June and September, with the peak occurring in June and July (NMFS, 2013). Florida green turtles nest approximately 3-4 times per season (Johnson, 1994) and have a mean of 136 eggs per nest (Witherington & Ehrhart, Status of reproductive characteristics of green turtles (Chelonia mydas) nesting in Florida, 1989). Green turtles do exhibit a strong fidelity to their natal beaches and females generally lay eggs every two to four years (NMFS & USFWS, 1991).

Hatchlings leave the beach and apparently move into convergence zones in the open ocean (Carr A. , 1986). Once they reach a certain size/age, they move to coastal foraging areas, which includes both open coastline and protected bays (NMFS & USFWS, 2007b). The primary diet of adult green turtles consists of marine algae and seagrass, although some populations also forage on invertebrates (NMFS & USFWS, 2007b).

Adult green turtles participate in breeding migrations between foraging grounds and nesting areas every few years (Plotkin, 2003). They migrations can be extensive, ranging from hundreds to thousands of kilometers (NMFS & USFWS, 2007b).

2. Status

The green sea turtle was originally listed under the ESA on July 28, 1978. All populations of the green sea turtle were listed as threatened, except for the Florida and Mexican Pacific coast breeding populations which were listed as endangered (43 FR 32800, 1978). The waters surrounding Culebra Island in Puerto Rico has been designated as critical habitat for the green turtle, largely in part to the extensive amount of turtle grass present (63 FR 46693, 1998). Since seagrasses, such as turtle grass, represent an important component of the diet of juvenile and adult green turtles, these coastal waters provide important green turtle developmental habitat (63 FR 46693, 1998).

3. Distribution and Population Trends

Originally, the green sea turtle was abundant in tropical and subtropical regions throughout the world (NMFS & USFWS, 2007b). Although the species have declined significantly from its high historical numbers, green turtles are still believed to inhabit the continental coastal areas of more than 140 countries (NMFS & USFWS, 2007b); (Groombridge & Luxmoore, 1989). Green turtles are known to be high mobile and they partake in complex migratory behavior throughout their lifetimes (Musick & Limpus, 1997); (Plotkin, 2003). Similar to the sea turtles mentioned earlier in this document, a notable feature of the adult green turtle's life history is the migration between nesting sites and foraging areas (NMFS & USFWS, 2007b).

Below, information will be presented about green sea turtle nesting sites and discuss the breeding population in Florida (which is the only nesting area that occurs in the United States). Green turtles spend the majority of their lives in coastal foraging grounds which include both open coastline and protected bays and/or lagoons, where prey species like marine algae and seagrass are found (NMFS & USFWS, 2007b). So in addition to nesting sites in Florida, green turtles are also found in US waters.

In the U.S. waters of the western Atlantic Ocean, large juvenile and adult green sea turtles can be found (seasonally) in foraging and/or developmental habitats that stretch from Massachusetts to Texas, including the Gulf of Mexico (NMFS & USFWS, 1991). Key feeding areas in the western Atlantic Ocean also include the upper west coast of Florida, the Florida Keys, the northwestern coast of the Yucatan Peninsula, and the aforementioned designated critical habitat near Culebra Island in Puerto Rico (NMFS, 2013b); (NMFS & USFWS, 1991). Foraging areas for the green turtle are also found throughout the Pacific Ocean and along the southwestern U.S. coast (NMFS, 2013b). However for the eastern North Pacific Ocean, green turtles most commonly inhabit waters from San Diego south (NMFS & USFWS, 1991). The coastal waters of northwestern Mexico are known to be a particularly important foraging region for turtles that originate from mainland Mexico (NMFS & USFWS, 1991).

As previously mentioned, there has been a tremendous decline in the number of green turtles worldwide compared to historical numbers which can largely be attributed to the overharvesting of eggs and adults (NMFS & USFWS, 2007b). After analyzing historical and recent population trends for green turtles at 32 index nesting sites around the world, the Marine Turtle Specialist Group reported a 48-65% reduction in the number of mature females that nested annually over the past 100-150 years (NMFS, 2013).

The two largest nesting populations for the green sea turtle exist outside of the United States. One nesting population where an average of 22,500 females nest per season occurs on Tortuguero, which is located on the Caribbean coast of Costa Rica (NMFS, 2013)(. This is the most important nesting concentration for green sea turtles in the western Atlantic (NMFS & USFWS, 2007b). The other nesting population, where an average of 18,000 female green turtles nest per season, can be found on Raine Island on Australia's Great Barrier Reef (NMFS, 2013).

The most recent 5-Year review of the green turtle provided current nesting abundance for over 40 threatened and endangered nesting concentrations among 11 ocean regions throughout the world (NMFS & USFWS, 2007b). Those ocean regions included Western-, Central-, and Eastern Atlantic Ocean, Mediterranean Sea, Western-, Northern, and Eastern Indian Ocean, Southeast Asia, and Western-, Central-, and Eastern Pacific Ocean. Of the eight nesting locations in the Atlantic/Caribbean, all but one in the Eastern Atlantic Ocean, showed stable or increasing nest count/abundance data (NMFS & USFWS, 2007b). (Although the nesting site at Bioko Island in the eastern Atlantic Ocean might be decreasing, there was not sufficient data to determine a meaningful trend (NMFS & USFWS, 2007b). Similarly, eight of the nine nesting locations in the Pacific Ocean showed stable or increasing abundance trends (NMFS & USFWS, 2007b).

It should be noted that only one of the aforementioned nesting sites is located in the United States. This is the ESA-endangered breeding population in the state of Florida. Although most nesting occurs along a six county area in east central and southeast Florida, some occasional nesting has also been documented in other parts of the state (NMFS & USFWS, 1991); (Meylan, Schroeder, & Mosier, 1995). According to the five year review of the green turtle, nesting data collected during the 2000-2006 Statewide Nesting Beach Survey (SNBS) indicated that a mean of approximately 5,6000 nests are laid annually in Florida (NMFS & USFWS, 2007b). According to the Index Nesting Beach Survey (INBS) program, which has determined nesting trends at a specific number of beaches since 1989 and is distinct from the SNBS initiative, there has been an overall positive nesting trend for the Florida breeding population of green turtles (NMFS & USFWS, 2007b).

The green turtle breeding population along the Pacific coast of Mexico is also listed as an endangered population (43 FR 32800, 1978). The primary nesting concentration for this population (also known as black turtles) is located at Colola – Michoacan in Pacific Mexico (NMFS & USFWS, 2007b). According to the most recent five year review, the annual mean nests for the Colola, Michoacan site from 2000-2005 was 4,326 nests (NMFS & USFWS, 2007b).

4. Population Risks & Stressors

Green sea turtles encounter many of the same natural threats to the terrestrial and marine environments as loggerhead and Kemp's ridley sea turtles (NMFS, 2013b). Therefore the explanations provided earlier still apply. Some of the threats, as outlined in the five year review of the green turtle, include:

- **The collection of eggs and harvesting of turtles (for commercial and subsistence use)**: As previously mentioned, these activities led to the historical worldwide decline in green turtle numbers; According to the five year review for green turtles, three of the current greatest threats to these turtle continue to be the taking of eggs, killing of females while they're on nesting beaches, and the directed hunting of green turtles while in their foraging areas

- **Coastal development including the construction of buildings, beach armoring, and sand extraction :** Such activities can either result in the direct loss of beach (nesting) habitat or adversely impact the natural behaviors of nesting females and/or hatchlings;

- **Contamination from anthropogenic disturbances:** Contamination from herbicides, pesticides, chemicals, and oil spills can directly threaten the coastal marine habitats, including the seagrass and marine algae, upon which green sea turtles rely (NMFS & USFWS, 2007b); (Lee Long, Coles, & McKenzie, 2000). Seagrass habitats are possibly the most susceptible of all coastal marine habitats because these areas, often defined as sheltered coasts with good water quality, are frequently at the downstream end of drainages from human development (Waycott, Longstaff, & Mellors, 2005). Nutrient over-enrichment caused by nitrogen and phosphorous from urban and agricultural run-off can cause excess algal growth, which in turn can smother seagrasses and lower the oxygen content of water (63 FR 46693, 1998).

- **Fisheries bycatch, particularly in nearshore artisanal fisheries gear:** Green sea turtles are susceptible to artisanal and industrial fishing gear; This is true despite the fact that leatherback and loggerhead sea turtles receive more attention regarding the threat of bycatch

- **Climate Change:** As previously mentioned with the other sea turtles, an increase in temperature could alter the natural sex ratios of green turtle hatchlings; It could also lead to changes in the abundance of green turtles' food sources, including algae and plankton (Intergovernmental Panel on Climate Change , 2007b)

Another real threat to green sea turtles includes disease, particularly fibropapillomatosis. Although the specific cause(s) of this disease remains unknown, it causes small internal and external tumors (fibropapillomas) on the soft portion of a turtle's body (NMFS & USFWS, 2007b). Fibropapilloma tumors can impair green turtles' ability to forage, breath, swim and this could potentially lead to death (George, 1997). This disease was referenced in the Recovery Plan for the U.S. Population of Atlantic Green Turtle as a threat, particularly for immature green turtles (NMFS & USFWS, 1991). Also consistent with the risks stated above, the recovery plan for the U.S. Atlantic population indicated that significant threats were coastal development, commercial fisheries and pollution (NMFS & USFWS, 1991).

IV. Environmental Baseline

A. Prior Federal and State Actions

The Dewatering General Permit (DGP) was last issued on October 7, 2008. Although the permit expired on September 20, 2013, it has been administratively continued until this final permit is authorized. As discussed in Section II.D., over 70 dewatering activities had been granted coverage under the DGP since 2008; seven (7) of these permitted activities occurred in New Hampshire while the remainder occurred in Massachusetts. Twenty one (21) approved dewatering discharges are still in effect in the Commonwealth of Massachusetts and two (2) are still discharging in the state of New Hampshire.

B. Massachusetts Surface Water Quality Standards

Section 305(b) of the Federal Clean Water Act codifies the process in which waters are evaluated with respect to their capacity to support designated uses as defined in the Surface Water Quality Standards (MassDEP, 2006). The Massachusetts Surface Water Quality Standards (SWQS) define the goals for water quality in the state of Massachusetts.

Class A waters are designated as a source of public water supply. Both Class A and Class SA (for coastal and marine waters) provide excellent habitat for fish, other aquatic life and wildlife, including for their reproduction, migration, growth and other critical functions, and for primary and second contact recreation, irrespective of whether or not such activities are allowed (MassDEP, 2006).

Class B and Class SB waters are designated as a habitat for fish, other aquatic life, and wildlife, including for their reproduction, migration, growth and other crucial functions, and for primary and secondary contact recreation (MassDEP, 2006). The SWQS define a warm water fishery as a waterbody in which the maximum mean monthly temperature generally exceeds 68° F (20° C) during the summer months and which is not capable of sustaining a year-round population of cold water aquatic life (MassDEP, 2006).

Table 8, below, summarizes the parameters for select MA SWQS. Massachusetts provides narrative water quality standards for solids (in accordance with 314 CMR 4.05(3)(a)5, 4.05(3)(b)5, 4.05(4)(a)5, 4.05(4)(b)5) and narrative water quality standards for oil and grease (in accordance with 314 CMR 4.05(3)(a)7, 4.05(3)(b)7, 4.05(4)(a)7, 4.05(4)(b)7)). The pH limits for the applicable surface water quality standards are in accordance with 314 CMR 4.05(3)(a)3, 4.05(3)(b)3, 4.05(4)(a)3, 4.05(4)(b)3. The Commonwealth of Massachusetts' surface water-quality standards require the use of federal water-quality criteria where a specific pollutant could reasonably be expected to adversely affect existing or designated uses (314 CMR 4.05 (5)(e)). Parts 1.1 and 1.2 of the draft Dewatering General Permit provides the actual discharge limits for the permit, which incorporates both water quality standards for both Massachusetts and New Hampshire, respectively.

Table 8: Summary of Massachusetts Surface Water Quality Standards: Class A, Class B, Class SA, and Class SB (MassDEP 2006)

	Class A	**Class B**	**Class SA**	**Class SB**
Solids	"These waters shall be free from floating, suspended and settleable solids in concentrations or combinations that would impair any use assigned to this class, that would cause aesthetically objectionable conditions, or that would impair the benthic biota or degrade the chemical composition of the bottom"			
pH	6.5 – 8.3 SU and Δ0.5 outside the natural background range	6.5 – 8.3 SU and Δ0.5 outside the natural background range	6.5 – 8.5 SU and Δ0.2 outside the natural background range	6.5 – 8.5 SU and Δ0.2 outside the natural background range
Oils and grease	"Waters shall be free from oil, grease and petrochemicals that produce a visible film on the surface of the water, impart an oily taste to the water or an oily or other undesirable taste to the edible portions of aquatic life, coast the banks or bottom of the water course, or are deleterious or become toxic to aquatic life"			
Total Residual Chlorine	"all surface waters shall be free from pollutants in concentrations that are toxic to humans, aquatic life or wildlife"			

C. New Hampshire Surface Water Quality Standards

The New Hampshire Surface Water Quality Regulations define the goals for water quality in state of New Hampshire.

Class A waters in New Hampshire shall be of the highest quality, and there shall be no discharge of any sewage or wastes into waters of this classification. Class A waters are a potentially acceptable water supply after adequate treatment. However, The State of New Hampshire does not allow discharges to Class A waters under the Dewatering General Permit.

Class B water are considered acceptable for fishing, swimming, and other recreational purposes, and, after adequate treatment, for use as water supplies. New Hampshire does not classify marine waters.

Table 9, below, summarizes the parameters for select NH WQS. New Hampshire provides narrative water quality standards for solids (covered under General Water Quality Criteria Env-Wq 1703.03) and narrative water quality standards for oil and grease (in accordance with Env-Wq 1703.09). Env-Wq 1703.18 sets the applicable surface water quality standards in New Hampshire for pH while Env-Wq 1703.21 sets the water quality criteria for toxic substances (which includes chlorine).

Table 9: Summary of NH Water Quality Standards: Class B only

	Class B
Solids	"All surface waters shall be free from substances in kind or quality which: settle to form harmful deposits; float as foam, debris, scum, or other visible substances; produce odor, color, taste, or turbidity which is not naturally occurring and would render it unsuitable for its designated uses; result in the dominance of nuisance species"
pH	6.5 – 8.0 except when due to natural causes
Oil and grease	"waters shall contain no oil or grease in such concentrations that would impair any existing or designated uses"
Total Residual Chlorine	"all surface waters shall be free from toxic substances or chemical constituents in concentrations or combinations that injure or are inimical to plants, animals, humans, or aquatic life"

D. Merrimack River Watershed

The Merrimack River is the second largest river in New England and its watershed drains approximately 5,014 square miles as it travels from the White Mountain region of New

Hampshire to east-central Massachusetts (NHDES, 2008). The Upper Merrimack River begins at the confluence of the Pemigewasset and Winnipesaukee Rivers (near Franklin, NH), and then flows for approximately 30 miles to the town of Bow, NH. Although the Upper Merrimack River flows through Concord, NH, almost 80% of the land within three quarter miles of the river is currently undeveloped as forest, farm, or wetland (NHDES, 2008). As such, this stretch of the river has a high level of water quality, provides valuable habitat for plants and animals, and was designated under the NH Rivers Management and Protection Program in 1990 (NHDES, 2008). A Designated River is managed and protected for its outstanding natural and cultural resources (NHDES, 2014). The Lower Merrimack River in NH was also designated under the NH Rivers Management and Protection Program (NHDES, 2008). This segment begins at the Merrimack-Bedford town line and flows approximately 15 miles through Merrimack and then Nashua, before entering the Commonwealth of Massachusetts.

According to NH's 2012 303(d) list, three sections of the Upper Merrimack River (near Concord and Bow) were listed as impaired for pH, dissolved oxygen or aluminum (NHDES, 2014). Five segments of the Lower Merrimack River, including areas near Manchester and Nashua, were also on the 303(d) list. Likewise, these segments were impaired for pH, dissolved oxygen or aluminum, under the aquatic life use category.

Approximately 24% of the Merrimack River Watershed is located in Massachusetts. However, the Commonwealth of MA defines the Merrimack River Watershed on a smaller scale by excluding the Nashua, SuAsCo, Shawsheen River Watersheds, and all of the NH watersheds. (Executive Office of Environmental Affairs, 2001). This watershed encompasses all or parts of 24 MA communities. It also includes over 50 miles of the Merrimack River, from the New Hampshire border until it flows into the Atlantic Ocean at Newburyport and Salisbury.

As previously mentioned, the Massachusetts Surface Water Quality Standards (SWQS) assign all inland and coastal and marine waters to classes according to the intended beneficial uses of those waters (MassDEP, 2006). The Merrimack River in Massachusetts is classified as Class B, warm water fishery from the New Hampshire border to Haverhill (near the confluence of the Little River), while the 22-mile tidal section from Haverhill to the ocean is designated as Class SB (Meek & Kennedy, 2010).

According to the Massachusetts Year 2012 Integrated List of Waters, new water quality assessments were conducted for five specific watersheds and/or drainage areas, including the Merrimack River Watershed. Based on that data, the Merrimack River (from the state line to the mouth near the Atlantic Ocean) as well as other water bodies within the watershed were listed as Category 5 (MassDEP, 2013). Waters that fall under Category 5 are impaired waters that require a Total Maximum Daily Load, or TMDL, because the waterbodies are not meeting designated uses under technology-based controls. Pollutants include pathogens, such as coliform and *E.coli*, PCBs and mercury in fish tissue, and phosphorus (total). Wet weather discharges, including those from point sources, combined sewer overflow and urban runoff, are the major sources for the pathogens and nutrients. Atmospheric deposition causes the mercury in fish tissue, while the specific source of the PCBs is unknown (Executive Office of Environmental Affairs, 2001).

The Merrimack River Watershed does have a draft Pathogen TMDL (MADEP, Regioni, & International). TMDLs determine the amount of a pollutant that a waterbody can safely assimilate without violating water quality standards. The TMDL process is designed to assist states and watershed stakeholders in the implementation of water quality-based controls specifically targeted to identify source(s) of pollution in order to restore and maintain the quality of their water resources. It should also be noted that EPA approved the Northeast Regional Mercury Total Maximum Daily Load (TMDL) on December 20, 2007 (CTDEP, et al., 2007). The TMDL applies to all six New England states as well as the state of New York. It outlines a strategy for reducing mercury concentrations in fish in Northeast fresh waterbodies so that water quality standards can be met. A final addendum to this TMDL for the state of Massachusetts was finalized in September of 2012 (MassDEP, 2012).

E. Connecticut River Watershed

The Connecticut River Watershed is the largest river ecosystem in New England, encompassing approximately 11,000 square miles and spanning over four New England states, including Vermont, New Hampshire, Massachusetts, and Connecticut (Executive Office of Environmental Affairs, n.d.). From its origin near the Canadian border, the 410-mile Connecticut River flows southward to form the boundary between New Hampshire and Vermont (Carr & Kennedy, 2008). The Upper Connecticut River, the name for the river in NH and VT, spans approximately 255 miles. In New Hampshire, the river begins in the town of Pittsburg, NH (at the outlet of Fourth Connecticut Lake), flows through 26 communities, and drains approximately 3,046 square miles (NHDES, 2008). The Connecticut River (in both NH and VT) was designated into the NH Rivers Management and Protection Program in 1992 (NHDES, 2008).

The river then enters Massachusetts (near the Town of Northfield) and drains all or part of 45 municipalities before entering Connecticut (near the Towns of Agawam and Longmeadow) (Executive Office of Environmental Affairs, n.d.). The Middle Connecticut River usually refers to the stretch from Massachusetts through Central Connecticut, while the Lower Connecticut River includes the portion in southern CT which then empties into Long Island Sound.

According to NH’s final 2012 303(d) list, eighteen segments of the Connecticut River were listed as impaired waters in NH that require a TMDL (NHDES, 2014). The most common impairment was pH, while lead, aluminum, and benthic-macroinvertebrate bioassessments were listed as occasional impairments under the aquatic life use category. However, the prioritization for development of TMDLs to address these concerns was categorized as “Low.”

The Connecticut River is classified in the Massachusetts Surface Water Quality Standards as a Class B – warm water fishery (Carr & Kennedy, 2008). Segments MA34-01, MA34-02, MA34-03, MA34-04, and MA34-05, which cover the length of the Connecticut River from the New Hampshire/Massachusetts state line in the north to Massachusetts/Connecticut state line in the south, were listed as Category 5 – Impaired waters that requires a TMDL (MassDEP, 2013). The listed impairments included bacterial contamination from *E.coli* and nutrient enrichment from wet weather discharges, such as combined sewage outflows; high turbidity (total suspended solids or TSS); flow regime and streamside alterations from anthropologic activities including nearby hydro-electric facilities; and PCBs in fish tissue from unknown sources.

F. Cape Cod Watershed

The state of Massachusetts encompasses two geological provinces, namely the Coastal Plain and the New England Upland (MassDEP, 2013); Cape Cod (and the islands) form the coastal plain. The Cape Cod Watershed extends 70 miles into the Atlantic Ocean and is surrounded by the salt waters of Buzzards Bay, Cape Cod Bay, the Atlantic Ocean, and Nantucket Sound. The watershed includes the 15 towns that comprise Barnstable County. It also encompasses a drainage area of approximately 440 square miles and includes 559 miles of coastline, 360 ponds, 145 public water supply wells, and 8 areas of Critical Environmental Concern (EOEEA, c). In addition to the highly significant environmental resources of these ACEC, such as the Inner Cape Cod Bay, the Cape also supports a number of Class SA waters, including the waters in and adjacent to the Cape Cod National Seashore (MassDEP, 2006). As stated previously in this document, dewatering discharges to ACECs (along with other categories listed in Section 1.D. of the Fact Sheet) are not eligible under this Dewatering General Permit.

Based upon the 2004 Cape Cod Watershed Assessment, one of the greatest threats to water quality on the Cape was (and continues to be) excessive nutrients, particularly nitrogen (MassDEP, 2011). Some of the water recharging the Cape Cod Aquifer is wastewater discharge from on-site septic systems, municipal wastewater treatment plants, irrigation, or road runoff (MassDEP, 2011). The assessment concluded that increased population, intense development pressures, and sprawling land use patterns on Cape Cod resulted in increased non-point source pollution and loss of open space, habitat, and biodiversity. Pathogens, particularly fecal coliform and Enterococcus, are other common pollutants that can impair various water bodies in the Cape (MassDEP, 2013).

The 2004 – 2008 Surface Water Quality Assessment Report for Cape Cod Coastal Drainage Areas provided an assessment of five river segments (15.4 miles), 63 lake segments (5649 acres), and 89 estuarine/embayment segments (42.363 mi^2) (MassDEP, 2011). Water quality assessments for over 100 water bodies were also conducted for some of the drainage areas in the Cape Cod Watershed and incorporated into Massachusetts Year 2012 Integrated List of Waters (MassDEP, 2013).

Multiple studies and efforts have taken place to counteract the impairment issues in the Cape. The Massachusetts Estuaries Program (MEP), which represents a partnership between entities such as the UMASS-Dartmouth School of Marine Science and Technology (SMAST) and MassDEP, has resulted in the development of 66 nitrogen TMDLs for waters in the Cape Cod and Buzzards Bay drainage systems. According to MA's 2012 Integrated List of Waters report, the MEP will continue their efforts to develop nitrogen criteria and TMDLs for coastal waters. The project plans estimate that TMDLs for an additional 12 embayments will be developed each year (MassDEP, 2013). Also, a Pathogen Total Maximum Daily Load for the Cape Cod Watershed was approved in August 2009, and an addendum was approved in August 2012 (MassDEP, I, & International, Final Pathogen TMDL for the Cape Cod Watershed, 2009); (MassDEP, 2013).

G. Piscataqua River & Great Bay Estuary

Formed by the confluence of the Salmon Falls and Cocheco rivers, the Piscataqua River originates at the boundary of Dover, New Hampshire, and Eliot, Maine, and flows southeasterly for approximately 13 miles to Portsmouth Harbor (and the Atlantic Ocean) (USACE, 2014). The drainage basin of the river is approximately 1,495 square miles (3,870 km^2), and it encompasses the additional watersheds of the Great Works River and five rivers, namely the Bellamy, Oyster, Lamprey, Squamscott, and Winnicut, whose freshwaters all flow into the Great Bay. Since the Piscataqua River is a tidal estuary, it also brings salt water into the Great Bay with the tides (NH DES, 2014).

New Hampshire's Great Bay is one of the largest estuaries on the Atlantic Coast and it's also unique because the estuary is set apart from the coastline, approximately 10 miles inland. Although Great Bay has been designated by the U.S. EPA as one of only 28 "estuaries of national significance," there is concern about this ecosystem's health (NH DES, 2014). According to the 2013 State of Our Estuaries Report, which is compiled by the Piscataqua Region Estuaries Partnership every three years, 15 of the 22 key indicators used to assess the health of the estuaries were negative and/or had cautionary results (Piscataqua Region Estuaries Partnership, 2014). For example, concentrations of dissolved inorganic nitrogen (the most reactive form of nitrogen) have significantly increased over the long term, suspended sediment conditions have increased over the long term, and dissolved oxygen levels are frequently too low in the tidal rivers (Piscataqua Region Estuaries Partnership, 2014).

According to NH's final 2012 303d list, which highlights impaired waters that require a TMDL, various portions of both the Piscataqua River and Great Bay were listed. This included two stretches in the Upper Piscataqua River (in Dover), two stretches in the Lower Piscataqua River (one in Newington and one Portsmouth), and three areas in Great Bay (two in Newmarket and one in Newington). For these areas, the aquatic life use was impaired for estuarine bioassessments, light attenuation, total nitrogen, and pH (for the Great Bay stretches). The fish consumption use was impaired due to mercury and polychlorinated biphenyls while the shellfishing use was impaired for dioxin, mercury, and/or polychlorinated biphenyls (NHDES, 2014).

V. Effects of the Action

A. Potential Effects

As discussed in Section III (Status of Species and Critical Habitat) of this document, the Shortnose sturgeon, Atlantic sturgeon, North Atlantic right whale, humpback whale, fin whale, Kemp's ridley sea turtle, Northwest Atlantic Distinct Population Segment (DPS) of the loggerhead sea turtle, leatherback sea turtle, and green sea turtle are the ESA-listed species of concern for this assessment. Of these, only the shortnose sturgeon and Atlantic sturgeon are found in the riverine environment (including the Connecticut River downstream of Turner's Falls in MA; the Merrimack River below the Essex Dam (Merrimack River Dam) in Lawrence, MA; and the Piscatagua River in New Hampshire. Although Atlantic Sturgeon have historically been found in the Taunton River, this river was not included in the assessment below. The Taunton

River is listed as a Wild and Scenic River in Massachusetts and waters with such designation are excluded from coverage under the Dewatering General Permit.

In this assessment, a particular emphasis has been placed on any potential impact of dewatering discharges on the shortnose and Atlantic sturgeon. As will be discussed in Section V.A.1 (below), TSS (the contaminant of most concern from the DGP) can have deleterious impacts on aquatic life, particularly on earlier life stages including eggs and larvae. Although the aforementioned 4 ESA-listed sea turtles and three ESA-listed whales can be found in coastal embayments and/or marine waters of both Massachusetts and New Hampshire, the species are either not in their earliest life stages or are a distance from the near-shore dewatering activities covered under the Dewatering General Permit. In addition, these sea turtles and whales which inhabit offshore waters are highly mobile species. Based on these factors as well as the intrinsic protective measures of the Dewatering General Permit (discussed below), EPA believes that any impact from the small (well below 1 MGD), localized, and temporary/short-term dewatering discharges covered under this permit will be insignificant and/or discountable and are not likely to adverse impact the North Atlantic right whale, humpback whale, fin whale, Kemp's ridley sea turtle, Northwest Atlantic Distinct Population Segment (DPS) of the loggerhead sea turtle, leatherback sea turtle, and green sea turtle.

In further examining the potential effects of the issuance of the DGP on ESA listed species, (particularly the shortnose and Atlantic sturgeon) and critical habitat, EPA focused on the impacts from the following parameters: TSS, pH, oil and grease, and total residual chlorine (TSC). Discharges authorized under the DGP are not from an industrial process nor do they come in contact with any raw material, intermediate product, waste product or finished product. Therefore based on the allowed discharges under the permit and the fact that the Dewatering General Permit only authorizes *uncontaminated* discharges from dewatering activities, other pollutants are not expected to be present in the discharge and were not considered in this assessment.

EPA's assessment, below, now concentrates on the protective measures afforded by the Dewatering General Permit.

- The effluent limitations established in this permit ensure protection of aquatic life and maintenance of the receiving water(s) as an aquatic habitat;
- The General Permit prohibits the addition of materials or chemicals in amounts that would be toxic to aquatic life;
- The proposed limits in this General Permit are also sufficiently stringent to assure that state and federal water quality standards will be met.
- As part of the NOI process, EPA requires that permittees identify and include a schematic of the specific BMPs/treatment that will be utilized to ensure that the numeric and non-numeric effluent limits outlined in Parts 1.1 and 2.1 of the DGP are met. More details about these runoff, erosion, and sediment control measures can be found in Section III.F. of the fact sheet.

The following portion of this document provides the rationale to support the aforementioned statements:

1. Total Suspended Solids (TSS)

As previously stated, the principal pollutant of concern associated with these dewatering discharges is total suspended solids (TSS). TSS measures the total mass of suspended sediment particles in water. Exposure to soil, rock, and man-made material create the potential for TSS in each of these discharges. As indicated in Parts 1.1 and 2.1 of the DGP, permittees under the DGP are required to monitor for TSS. The average monthly discharge limit for TSS is 50 mg/l while the maximum daily discharge limit is 100 mg/l.

The aforementioned TSS discharge limits are continued from the Existing Permit in accordance with anti-backsliding requirements found in 40 CFR Section 122.44(1). These limitations were established using best professional judgment (BPJ) pursuant to Section 402(a)(1) of the CWA. They are based on the Massachusetts narrative water quality standard for solids that waters shall be free from floating, suspended and settleable solids in concentrations that would impair any use assigned to the class or would impair the benthic biota and New Hampshire's narrative standard in Env-Wq 1703.03.

Parts 1.2.5 and 2.2.5 of the DGP (and Section III.F of the fact sheet) also outline the BMPs for erosion control, sediment control, and runoff control that permittees should utilize to ensure the effluent limits are met. Also as stated in Section III.A. of the DGP fact sheet, coverage under this permit will *not* be granted for those discharges which EPA, or the applicable State, believes a more stringent water quality-based TSS limit is needed.

Solids/sediments can contribute to many water quality, habitat and aesthetic problems in urban waterways. Elevated levels of solids increase turbidity, reduce the penetration of light at depth within the water column, and limit the growth of desirable aquatic plants. Solids that settle out as bottom deposits contribute to sedimentation and can alter and eventually destroy habitat for fish, including sturgeon, and bottom-dwelling organisms. Turbidity can exert impacts on aquatic biota, such as the ability of submerged aquatic vegetation to receive light and the ability of fish and aquatic insects to use their gills.

TSS can either affect aquatic life directly by killing them or reducing growth rate or resistance to disease, by preventing the successful development of fish eggs and larvae, by modifying natural movements and migration, and by reducing the abundance of available food (USEPA, 1976). For example, the Biological Assessment for the shortnose sturgeon stated that elevated turbidity, from events including dredging, construction, or erosion, can be lethal by clogging the gills of (juvenile) fish (Ross, 1996). It can also impair the ability of juvenile and adult sturgeon when foraging for prey (Peterson, et al., 2000). It should be noted that eggs and larvae are less tolerant to sediment levels than juveniles and adults because successful spawning for both shortnose and Atlantic sturgeon is dependent upon the availability of relatively clean, hard substrate upon which the eggs can adhere (McCord, n.d.).

Studies of the effects of turbid water (high sediment concentrations) on fish suggest that concentrations of suspended sediments can reach the thousands of milligrams per liter before an acute toxic reaction is expected (Burton, 1993). The TSS maximum daily discharge limit of 100 mg/l for the DGP is significantly below such a threshold. Based on all of these factors, EPA concludes that the impact of TSS from dewatering discharges under the DGP on ESA listed species, including the Shortnose Sturgeon and the Atlantic Sturgeon, will be insignificant and/or discountable and not likely to adversely affect any of the ESA-listed species**.**

2. pH

The effluent limits for pH in the Draft Dewatering General Permit are established to be consistent with water quality standards in Massachusetts and New Hampshire. Based on these water-quality standards, the Draft Permit contains the following limits for the indicated waterbody classifications.

Massachusetts Class A and B: 6.5 – 8.3 standard units
Massachusetts Class SA and SB: 6.5 – 8.5 standard units
New Hampshire Class B: 6.5 – 8.0 standard units

MassDEP and NHDES, with EPA concurrence, may expand the pH range to the federal standard 6.0-9.0 s.u., on a case-by-case basis when conditions warrant it (see Parts 1.3 and 2.3 of the General Permit). Only non-toxic chemicals may be used for pH neutralization and/or dechlorination.

According to a prior ESA concurrence letter from NMFS to EPA regarding a separate general permit (regarding the Lawrence Hydroelectric Project Under the NPDES HYDROGP), a pH range of 6.0 – 9.0 is harmless to most marine/aquatic organisms, including the ESA listed species of shortnose and Atlantic sturgeon (NMFS, Nov. 4, 2013). Since the pH effluent limit for the draft DGP fall within this 6.0 – 9.0 range, EPA believes that the impact of pH from dewatering discharges will be insignificant and/or discountable. Therefore, it is not likely to adversely affect any of the aforementioned endangered species.

3. Oil and grease

Oil and grease is frequently used as a surrogate for all hydrocarbons because it is the most often measured hydrocarbon parameter. These can contain carcinogenic compounds and may be toxic to plants and animals (Schueler, 2003).

As a result of the pumping systems used in dewatering processes, there is the *potential* for oil and grease to be present in these discharges. Therefore, sampling for oil and grease is required if a periodic inspection indicates the presence of a visible sheen. Currently both Massachusetts and New Hampshire have narrative standards for oil and grease. As it has done historically for other permits, EPA has interpreted this narrative criteria for oil and grease to be 15mg/l, which is the approximate concentration at which a visible oil sheen is likely to occur in the receiving water. Therefore, the maximum daily oil and grease limit for the Dewatering General Permit has been set at 15 mg/l.

In accordance with Parts 1.2.6 and 2.2.6 of the draft DGP, permittees must stop any discharges immediately upon the detection of any visible sheen and the problem must be corrected.

Permittees frequently use an oil and water separator to address this parameter. In addition, the permittee must notify the proper authorities (also outlined in Parts 1.2.6 and 2.2.6 of the draft DGP) and the use of any chemicals/dispersants to treat the sheen is prohibited under the DGP.

Based on these protective measures intrinsic to the dewatering general permit, EPA concludes that the potential impact of oil and grease from dewatering discharges under the DGP will be insignificant and/or discountable to any ESA listed species under NMFS' jurisdiction. Therefore the reissuance of the DGP is not likely to adversely affect any shortnose sturgeon, Atlantic sturgeon, the 4 ESA-listed sea turtles or the three ESA-listed whales.

4. Total Residual Chlorine (TRC)

Total residual chlorine is typically present as a disinfectant in potable water prior to dechlorination and could be present in discharges originating from a municipal source. Therefore, TLC only needs to be monitored for such discharges.

The acute and chronic water quality criteria for total residual chlorine (TRC) defined in the 2002 EPA National Recommended Water Quality Criteria for freshwater are 19 ug/L and 11 ug/L, respectively and for seawater are 13 ug/L and 7.5 ug/L, respectively. The State of New Hampshire's water-quality standards for chlorine, found at Chapter 1700, Surface Water Quality Regulations, Part Env-Wq. 1703.21(b), is the same as the recommended federal water-quality criteria. The Commonwealth of Massachusetts' surface water-quality standards require the use of federal water-quality criteria where a specific pollutant could reasonably be expected to adversely affect existing or designated uses (314 CMR 4.05 (5)(e)). The Massachusetts Water Quality Standards Implementation Policy for the Control of Toxic Pollutants in Surface Waters, dated February 23, 1990, states that waters shall be protected from unnecessary discharges of excess chlorine. The maximum effluent concentration of chlorine shall not exceed 1.0 mg/l TRC.

Therefore the established effluent limits for TRC in the Dewatering General Permit follow the recommended federal water-quality criteria and are summarized below:

- Freshwater acute (Class A* or B) = 19 ug/l (0.019 mg/l); use for daily maximum
- Freshwater chronic (Class A* or B) = 11 ug/l (0.011 mg/l); use for average monthly
- Marine acute (Class SA* or SB) = 13 ug/l (0.013 mg/l); use for daily maximum
- Marine chronic (Class SA* or SB) = 7.5 ug/l (0.0075 mg/l); use for average monthly

(* As previously noted, dewatering discharges to Class A waters in New Hampshire are *not* allowed under the DGP. Therefore the aforementioned limits only apply to Class A waters in the Commonwealth of MA.)

In the Draft Permit, the maximum daily and average monthly concentration allowed in the effluent are based on the appropriate water-quality criterion and the available dilution in the receiving water. (See Appendix VIII of the draft DGP for the equations.) If the discharge contains municipal water, and therefore is expected to contain chlorine, the dilution factor and applicable chlorine limits will be approved by EPA and the appropriate state agency during review of the facilities' notice of intent (NOI). The permittee will be provided with these limits when notified of permit coverage. If EPA and the appropriate state agency determine that the receiving water affords no dilution, the limits for total residual chlorine will be the appropriate federal water-quality criterion listed above.

There are a number of studies that have examined the effect of TRC (Post 1987, Buckley 1976, EPA 1986) on fish; however, no directed studies have examined the effects of TRC on listed species within the action area. The EPA has set the Criteria Maximum concentration (CMC or acute criteria; defined in 40 CFR 131.36 as equal to the highest concentration of a pollutant to which aquatic life can be exposed for a short period of time (up to 96 hours) without deleterious effects) at 19 ug/L, based on an analysis of exposure of 33 freshwater species in 28 genera (EPA 1986) where acute effect values ranged from 28 ug/L for *Daphnia magna* to 710 ug/L for the threespine stickleback. The CMC is set well below the minimum effect values observed in any species tested. As the water quality criteria levels have been set to be protective of even the most sensitive of the 33 freshwater species tested, it is reasonable to judge that the criteria are also protective of ESA species, including the shortnose sturgeon and Atlantic sturgeon. For this reason, EPA concludes that discharges containing TRC under the DGP are likely to have an insignificant and/or discountable effect on ESA species and are not likely to adversely affect the listed species or critical habitat.

Also as highlighted in Section II.D of this document, EPA presented aggregate data regarding the overall volume and duration of discharges from past dewatering activities to demonstrate that discharges covered under this Dewatering General Permit are *small* in size (well below 1 MGD) and *temporary, short termed and/or intermittent* in nature. In addition, Section II.B. of this document summarized some of the categories (i.e., including sensitive environmental areas/water bodies) that are specifically excluded from receiving dewatering discharges. Section 1.D. of the Fact Sheet provides a list of all of the categories of discharges that are specifically excluded from coverage or are only eligible if certain conditions are met. These factors further support EPA's position that the dewatering discharges from the draft Dewatering General Permit are not likely to adversely impact the ESA-listed species.

Because of the relatively temporary nature of eligible dewatering activities, current permittees are not likely to seek coverage from future Dewatering General Permits for the exact same projects. In this regards, EPA does recognize that the Dewatering General Permit differs from other general permits. This also means that it is not possible for EPA to anticipate the *location* of future dewatering discharges (i.e., whether discharges will occur near critical habitat(s) of ESA-listed species, including the Connecticut River, Merrimack River, Piscatagua River/Great Bay Estuary, and embayments or marine waters of MA and NH. EPA will not receive such information until each Notice of Intent (NOI) is received from applicants seeking coverage under the Dewatering General Permit.

EPA firmly believes that the draft Dewatering General Permit contains appropriate measures, including the effluent limitations and adherence to water quality standards, to ensure the protection of ESA-listed species and their habitat. However as an added level of protection, upon EPA-Region One receipt, the Agency would be amenable to forwarding a copy of an NOI (along with relevant supporting documentation) from any DGP applicants whose dewatering activities are located near ESA-listed species under the jurisdiction of NMFS. This would allow NMFS the opportunity, if desired, to review and provide input to EPA. In order to ensure that EPA forwards the appropriate NOIs to NMFS, the Agency requests a copy of a list of the towns or a detailed map(s), which includes the specific boundaries that NMFS uses when determining the applicable ESA-listed species under their jurisdiction.

B. Effects of the Action on Essential Elements of Critical Habitat

As discussed in detail in Section III.D.3.b. of this document, designated critical habitat for the North Atlantic right whale (*Eubalaena glacialis*) does fall within a portion of the Action Area for this permit. The Cape Cod Bay Critical Habitat Area in Massachusetts, which is part of the broader Northeast Atlantic critical habitat, was designated in June of 1994 because of its importance as a feeding/forage ground for North Atlantic right whales (59 FR 28805, 1994).

A wide range of human activities may impact the designated critical habitat including vessel activities, fisheries, and possible habitat degradation through pollution, sea bed mining, and oil and gas exploration (59 FR 28805, 1994). Vessel activities within the CCB, including those from the Cape Cod Canal, Boston Harbor traffic lanes, commercial fishing and whale-watching activities, can change the behavior of whales, disrupt their feeding practices, disperse their food sources, and injure or kill whales. Entanglement, particularly from gill nets and associated ropes, can serious injure or kill whales. The final ruling also indicated that the discharge of pollutants including oil, drilling muds, and suspended solids from oil/gas exploration or discharges from municipal, industrial and non-point sources could degrade essential habitat in northern CCB. However, the dewatering discharges covered under the Dewatering General Permit are uncontaminated, small (well below 1 MGD), localized, and of a temporary/short-term nature.

One public comment submitted to NMFS in 59 FR 28805 did indicate concern about such discharges and suggested the need for a water quality monitoring program. NMFS responded that a Right Whale Recovery Plan Implementation Team had been assembled to investigate possible activities in Massachusetts Bay that could affect the CCB (59 FR 28805, Comment 20). NMFS' 2005 Recovery Plan for the North Atlantic Right Whale did discuss potential sources of habitat degradation, but focused more on oil spills, noise pollution from shipping or oil and gas development, and dredging. Although NMFS' 5 Year Review of the North Atlantic right whale mentioned that pollution from human activities did represent a *potential* risk to habitat degradation, it should be noted that the review also stated that this was *not* limiting the recovery of the species (NMFS, 2012).

As discussed in Section V.A (above), the draft Dewatering General Permit does have established effluent limitations for TSS, pH, oil and grease (when applicable), and TRC (when applicable) which are sufficiently stringent to assure that state and federal water quality standards will be met. These limits have been designed to ensure the protection of aquatic life and maintenance of the receiving water(s) as an aquatic habitat. Also based on the distance between the localized, on-shore dewatering activities and the Cape Cod Bay Critical Habitat Area, EPA has determined that the activities authorized under the DGP are not likely to adversely impact the critical habitat of the North Atlantic Right Whale.

C. Indirect Effects

The Dewatering General Permit requires permittees to comply with discharge limits, by using appropriate BMPs (when necessary), and to meet federal and state water quality standards for all receiving waters. Indirect effects to the 2 ESA-listed species of sturgeon, 4 ESA-listed sea turtles, and 3 ESA- listed whales or their habitat as a result of EPA's reissuance of the Dewatering General Permit are not expected to occur.

D. Effects from interdependent and related actions

Interdependent actions are defined as actions with no independent use apart from the proposed action. Interrelated actions include those that are part of a larger action and depend on the larger action for justification. No interdependent/interrelated actions are expected to result from the reissuance of the NPDES permit for dewatering discharges within the states of Massachusetts and New Hampshire.

E. Summary Effects Determination for Listed Species

EPA has determined that any direct effects of DGP dewatering discharges on the two ESA-listed species of sturgeon, three ESA-listed species whales, and four ESA-listed species of sea turtles in Massachusetts and New Hampshire will be insignificant and/or discountable. As such, the reissuance of EPA's Dewatering General Permit (NPDES Permit MAG070000 and NHG070000) is **not likely to adversely affect (NLAA)** the shortnose sturgeon, Atlantic sturgeon, North Atlantic right whale, humpback whale, fin whale, Kemp's ridley sea turtle, Northwest Atlantic Distinct Population Segment (DPS) of the loggerhead sea turtle, leatherback sea turtle, or green sea turtle, nor the designated Cape Cod Bay Critical Habitat Area for the North Atlantic right whale.

Works Cited

32 FR 4001. (1967, March 11). Native Fish and Wildlife: Endangered Species Act Listing (of Shortnose Sturgeon). *32 Federal Register 48*, 4001. Office of the Secretary of the Interior.

35 FR 18319. (1970, December 2). Conservation of Endangered Species and Other Fish or Wildlife: List of Endangered Foreign Fish and Wildlife (Including Listing for Right Whale, Humpback Whale, Kemp's ridley sea turtle). 18319-18322. US Dept. of the Interior, USFWS.

35 FR 8491. (1970, June 2). Conservation of Endangered Species and Other Fish or Wildlife (Includes Leatherback Turtle). *35 FR 106*, 8491-8498. Dept. of Interior (USFWS).

43 FR 32800. (1978, July 28). Listing and Protecting Loggerhead Sea Turtles as Threatened Species and Populations of Green and Olive Ridley Sea Turtles as Threatened Species or Endangered Species. 32800-32811. NOAA (NMFS) & Dept. of Interior (USFWS).

44 FR 17710. (1979, March 23). Final Ruling for the Determination of Critical Habitat for the Leatherback Sea Turtle. 17710-17712. NOAA (NMFS).

59 FR 28805. (1994, June 3). Final Ruling for Designated Critical Habitat for Northern Right Whale. 28805-28835. NOAA.

63 FR 46693. (1998, September 2). Final Ruling: Designated Critical Habitat; Green and Hawksbill Sea Turtles. *63 FR 170*, 46693-46701. NOAA.

73 FR 12021. (2008, March 6). Endanagered and Threatened Species; Final Ruling for Endangered Status for North Pacific and North Atlantic Right Whales. 12021-12030. NOAA.

73 FR 60173. (2008, October 10). Endangered Fish and Wildlife: Final Rule to Implement Speed Restrictions to Reduce the Threat of Ship Collisions with North Atlantic Right Whales. 60173-60191. NOAA.

76 FR 58868. (2011, September 22). Endangered and Threatened Species: Final Ruling on Determination of Nine Distinct Population Segments of Loggerhead Sea Turtles as Endangered or Threatened. *76 FR 184*, 58868-58952.

77 FR 4170. (2012, January 26). Endangered and Threatened Species: Final Rule to Revise the Critical habitat Designation for the Endangered Leatherback Sea Turtle. 4170-4201. NOAA (NMFS).

77 FR 5880. (2012, February 6). Endangered and Threatened Wildlife and Plants:; Final rule for threatened and endangered status for distinct population segments of Atlantic Sturgeon in the Northeast Region. *24*, 5880-5912. National Oceanic and Atmospheric Administration.

77 FR 5914. (2012, February 6). Endangered and Threatened Willdlife and Plants; Final Listing Determinations for Two Distinct Population Segments of Atlantic Sturgeon (Acipenser oxyrinchus oxyrinchus) in the Southeast. *24*, 5914-5982. NOAA.

78 FR 34024. (2013, June 6). Endangered Fish and Wildlife: Proposed Rule to Eliminate the Expiration Date Contained in the Final Rule to Reduce the Threat of Ship Collisions with North Atlantic Right Whales. 34024-34030. NOAA.

78 FR 43305. (2013, July 18). Endangered and Threatened Species: Designation of Critical Habitat for the Northwest Atlantic ocean Loggerhead Sea Turtle Distinct Population Segment (DPS) and Determination Regarding Critical habitat for the North Pacific Ocean Loggerhead. 43305-43054. NOAA (NMFS) & Dept. of Interior (USFWS).

78 FR 53391. (2013, August 29). Endangered and Threatened Wildlife: 90 Day Finding on a Petition to Delist the North Pacific Population of the Humpback Whale and Notice of Status Review. 53391-53397. NOAA.

78 FR 69310. (2013, November 19). Endangered and Threatened Wildlife and Plants; Protective Regulations for the Gulf of Maine Distinct Population Segment of Atlantic Sturgeon. 69310-69315. NOAA.

Allen, B., & Angliss, R. (2011). *Alaska marine mammal stock assessments, 2010.* US Dept. of Commerce, NOAA Tech Memo: NMFSAFSC-223.

Atlantic States Marine Fisheries Commission. (1990). Interstate fishery 116 management plan for Atlantic sturgeon. Washington, D.C.: Fisheries Management Report No.17 - Atlantic States Marine Fisheries Commission.

Atlantic States Marine Fisheries Commission. (2007). Estimation of Atlantic Sturgeon Bycatch in Coastal Atlantic Commercial Fisheries of New England and the Mid-Atlantic. *Special Report to the ASMFC Atlantic Sturgeon Management Board.* Woods Hole.

Atlantic Sturgeon Status Review Team. (2007, February 23). Status Review of Atlantic sturgeon (Acipenser oxyrinchus oxyrinchus). *Report to National Marine Fisheries Service*. Northeast Regional Office.

Bolten, A. (2003). Variation in Sea Turtle Life History Patterns: Neritic vs. Oceanic Developmental Stages. In P. Lutz, J. Musick, & J. Wyneken (Eds.), *The Biology of Sea Turtles, Vol. II* (pp. 243-257). Washington, DC: CRC Press.

Burke, V., Standora, E., & SJ, M. (1993). Diet of juvenile Kemp's ridley and loogerhead sea turtles from Long Island, NY. *Copeia, 4,* 1176-1180.

Burkett, C., & Kynard, B. (1993). Sturgeons of the Taunton River and Mt.Hope Bay: Distribution, habitats and movements. Boston, MA: Final Report for Project AFC-24-1: Massachusetts Division of Marine Fisheries.

Carr, A. (1986). Rips, FADS, and little loggerheads. *Bioscience, 36,* pp. 92-100.

Carr, J., & Kennedy, L. (2008). *Connecticut River Basin: 2003 Water Quality Assessment Report.* Worcester, MA: MassDEP, Division of Watershed Management, Report Number 34-AC-2. Retrieved from http://170.63.28.40/eea/docs/dep/water/resources/07v5/34wqar07.pdf

Carretta, J., Forney, K., Oleson, E., Martien, K., Muto, M., Lowry, M., . . . Hill, M. (2011). *U.S. Pacific Marine Mammal Stock Assessment: 2010.* US Department of Commerce, NOAA Technical Memo, NMFS-SWFSC-476.

Center For Watershed Protection. (2003). *Impacts of Impervious Cover on Aquatic Systems.*

Christensen, I., Haug, T., & Oien, N. (1992). A review of feeding and reproduction in large baleen whales (Mysticeti) and sperm whales (Physeter macrocephalus) in Norwegian adjacent waters. *Fauna norvegica Series A, 13*, 13-48.

Clapham, P., & Mead, J. (1999). Megaptera novaeangeliae. *Mammalian Species, 604*, 1-9.

Conant, T., Dutton, P., Eguchi, T., Epperly, S., Fahy, C., Godfrey, M., . . . Witherington, B. (2009). *Loggerhead sea turtle (Caretta caretta) 2009 status review under the US Endangered Species Act.* NMFS.

CTDEP, MEDEP, MADEP, NHDEP, NYSDEC, RIDEM, NEIWPCC. (2007, October 24). *Northeast Regional Mercury Total Maximum Daily Load*. Retrieved February 2014, from http://www.mass.gov/eea/docs/dept/water/resources/a-thru-m/mertmdl.pdf

Dadswell, M. J., Taubert, B. D., Squiers, T. J., Marchette, D., & Buckley, J. (1984). *Synopsis of Biological Data on Shortnose Sturgeon, Acipenser brevirostrum.* NOAA Technical Report NMFS-14, FAO Fisheries Synopsis No. 140.

Diez, C., Soler, R., Olivera, G., White, A., Tallevast, T., Young, N., & van Dam, R. (2010). Caribbean leatherbacks: results of nesting seasons from 1984-2008 at Culebra Island, Puerto Rico. *Marine Turtle Newsletter*, pp. 22-23.

Dodd, C. J. (1988). *Synopsis of the biological data on the loggerhead sea turlte Caretta caretta (linnaeus 1758).* US Fish and Wildlife Service: Biological Report 88 (14).

Dutton, D., Dutton, P., Chaloupka, M., & Boulon, R. (2005). Increase of a Caribbean leatherback turtle Dermochelys coriacea nesting population linked to long-term nest protection. *Biological Conservation*, pp. 186-194.

Eckert, K., Wallace, B., Frazier, J., Eckert, S., & Pritchard, P. (2012). *Synopsis of the biological data on the leatherback sea turtle (Dermochelys coriacea).* Washington, DC: US DOI, USFWS-Biological Technical Publication BTP-R4015-2012.

Eckert, S. (2002). Distribution of juvenile leatherback sea turlte Dermochelys coriacea sightings. *Marine Ecology Progress Series 230*, pp. 289-293.

EOEEA. (c). *Cape Cod Watershed*. Retrieved January 2014, from http://www.mass.gov/eea/waste-mgnt-recycling/water-resources/preserving-water-resources/mass-watersheds/cape-cod-watershed.html

EPA. (2012, Aoruk). National Coastal Condition Report IV. *EPA-842-R-10-003*. Washington, D.C.: US EPA Office of Research and Development/Office of Water.

Ernst, C., & Barbaour, R. (1972). *Turtles of the United States.* Lexington: University Press of Kentucky.

Executive Office of Energy and Environmental Affairs. (b). *Taunton River Watershed*. Retrieved January 2014, from http://www.mass.gov/eea/waste-mgnt-recycling/water-resources/preserving-water-resources/mass-watersheds/taunton-river-watershed.html

Executive Office of Environmental Affairs. (2001). Merrimack River: A Comprehensive Watershed Assessment Report. Boston, MA: Massachusetts Executive Office of

Environmental Affairs. Retrieved from http://www.mass.gov/eea/docs/eea/water/assess-rpt-merrimack-2000.pdf

Executive Office of Environmental Affairs. (n.d.). *Connecticut River Watershed*. Retrieved January 2014, from http://www.mass.gov/eea/waste-mgmt-recycling/water-resources/preserving-water-resources/mass-watersheds/connecticut-river-watershed.html

George, R. (1997). Health Problems and Diseases of Sea Turtles. In P. Lutz, & J. Musick (Eds.), *The Biology of Sea Turtles* (pp. 363-386). Boca Raton, FL: CRC Press.

Geraci, J., Anderson, D., Timperi, R., St. Aubin, D., Early, G., Prescott, J., & Mayo, C. (1989). Humpback Whales (Megaptera novaeangliae) Fatally Poisoned by Dinoflagellate Toxin. *Can. J. Fish and Aquat. Sci, 46*(11), 1985-1898.

Groombridge, B., & Luxmoore, R. (1989). The green turtle and hawksbill (Reptilia: Cheloniidae): world status, exploitation and trade. Lausanne, Switzerland: Secretariat of the Convention on International Trade in Endangered Species of Wild Fauna and Flora.

Grout, D. (2006). Personal Communication. (I. ASSRT, Interviewer)

Hain, J., Human, M., Kenney, R., & H.E.Winn. (1985). The role of cetaceans in the shelf-edge region of the northeastern United States. *Mar. Fish. Rev, 47*(1), 13-17.

Hain, J., Ratnaswamy, M., Kenney, R., & Winn, H. (1992). The fin whale (Balaenoptera physalus) in waters of the northeastern United States continental shelf. *Report of the International Whaling Commission, 42*, 653-669.

Health, A. (1987). *Water Pollution and Fish Physiology.* Boca Raton, Florida: CRC Press, Inc.

Heaslip, S., Iverson, S., & Bowen, W. J. (2012). Jellyfish support high energy intake of leatherback sea turtles (Dermochelys coariacea): video evidence from animal-bourne cameras. *7(e33259), 3*. PLoS ONE.

Henry, A., Cole, T., Garron, M., & Hall, L. (2011). *Mortality and Serious Injury Determinations for Baleen Whale Stocks along the Gulf of Mexico, United States and Canadian Eastern Seaboards, 2005-2009.* US Dept. Commerce, Northeast Fish Science Center Reference Doc. 11-18.

Henry, A., Cole, T., Garron, M., Hall, L., Ledwell, W., & Reid, A. (2012). *Mortality and serious injury determinations for baleen whale stocks along the Gulf of Mexico, United States East Coast and Atlantic Canadian Provinces, 2006-2010.* NEFSC, Reference Document 12-11.

Heppell, S., Crouse, D., Crowder, L., Epperly, S., Gabriel, W., Henwood, T., . . . Thompson, N. (2005). A population model to estimate recovery time, population size, and management impacts on Kemp's ridley sea turtles. *Chelonian Conservation and Biology, 4*(4), pp. 767-773.

Heppell, S., Crowder, L., Crouse, D., Epperly, S., & Frazer, N. (2003). Population models for Atlantic loggerheads: past, present, and future. In A. Bolten, & B. Witherington (Eds.), *Loggerhead Sea Turtles* (pp. 255-273). Washington, DC: Smithsonian Books.

Intergovernmental Panel on Climate Change . (2007b). Summary for Policymakers. In S. Solomon, D. Quin, M. Manning, Z. Chen, M. Marquis, K. Averyt, . . . H. Miller (Ed.), *Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change.* Cambridge, UK & New York, NY: Cambridge University Press.

Intergovernmental Panel on Climate Change. (2007a). Climate Change 2007: The Physical Basis ---A Summary for Policymakers. In S. Solomon, D. Qin, Z. Manning, M. Chen, K. Marquis, T. Avery, & M. Tignor (Ed.), *Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change.*

International Whaling Commission. (1992). *Report of the comprehensive assessment special meeting on North Atlantic fin whales.* Reports of the International Whaling Commission 42.

Jefferson, T., Webber, M., & Pitman, R. (2008). *Marine Mammals of the World, A Comprehensive Guide to their Identification.* Amsterdam, Elsevier.

Jimenez, M., Filonov, A., Tereshchenko, I., & Marquex, R. (2005). Time-series analyses of the relationship between nesting frequency of the Kemp's ridley sea turtle and meterological conditions. *Chelonian Conservation and Biology, 4*(4), 774-780.

Johnson, S. (1994). *Reproductive ecology of the Florida green turtle (Chelonia mydas) - Unpublished Master's Thesis.* Orlando: University of Central Florida.

Kahnle, A., Hattala, K., & McKown, K. (2007). Status fo Atlantic sturgeon of the Hudson River estuary. In J. Munro, D. Hatin, K. McKown, J. Hightower, K. Sulak, A. Kahnle, & F. Caron (Ed.), *Proceedings of the symposium on anadromous sturgeon: Status and trend, anthropogenic impact, and essential habitat.* Bethesda, Maryland: American Fisheries Society.

Kenney, R., & Winn, H. (1986). Cetacean high-use habitats of the northeast United States continental shelf. *Fish Bull., 84*, 345-357.

Kynard, B., Bronzi, P., & Rosenthal, H. (2012). Life history and behaviour of Connecticut River Shortnose and other sturgeons. *World Sturgeon Conservation Society Special Publication, No.4*, 320.

Laist, D., Knowlton, A., Mead, J., Collet, A., & Podesta, M. (2001). Collisions between ships and whales. *Marine Mammal Science, 17*(1), 35-75.

Lee Long, W., Coles, R., & McKenzie, L. (2000). Issues for seagrass conservation management in Queensland. *Pacific Conservation Biology, 5*, pp. 321-328.

MADEP, Regioni, U. N., & International, E. (n.d.). *Draft Pathogen TMDL for the Merrimack River Watershed.* Worcester, MA: Massachusetts Department of Environmental Protection, Divisiion of Watershed Management. Retrieved from http://www.mass.gov/eea/docs/dep/water/resources/a-thru-m/merimac1.pdf

Magnuson, J., Bjorndal, K., DuPaul, W., Graham, G., Owens, D., Peterson, C., . . . West, C. (1990). *Decline of the sea turtles: causes and prevention.* Washington, DC: National Research Council, National Academy Press.

MassDEP. (2006). Massachusetts Surface Water Quality Standards (Revision of 314 CMR 4.00). Boston, MA: Massachusetts Department of Environmental Protection.

MassDEP. (2011). *Cape Cod Coastal Drainage Areas: 2004 - 2008 Surface Water Quality Assessment Report.* Worcester, MA: MassDEP, Division of Watershed Management. Retrieved from http://www.mass.gov/eea/docs/dep/water/resources/71wqar09/96wqar12.pdf

MassDEP. (2012, September). *Northeast Regional Mercury Total Maximum Daily Load: Final Addendum for Massachusetts (CN 377.0)*. (D. o. MassDEP, Editor) Retrieved February 2014, from http://www.mass.gov/eea/docs/dep/water/resources/a-thru-m/mertmdla.pdf

MassDEP. (2013). Massachusetts Year 2012 Integrated List of Waters. *Final Listing of the Condition of Massachusetts' Waters Pursuant to Sections 305(b), 314 and 303(d) of the Clean Water Act*. Boston, MA: Massachusetts Department of Environmental Protection, Bureau of Resource Protection, Division of Watershed Management. Retrieved from http://www.mass.gov/eea/docs/dep/water/resource/07v5/12list2.pdf

MassDEP, I, U. R., & International, E. (2009). *Final Pathogen TMDL for the Cape Cod Watershed.* Worcester, MA: MassDEP, Division of Watershed Management. Retrieved from http://ww.mass.gov/eea/docs/dep/water/resources/a-thru-m/capecod1.pdf

MassDEP, I, U. R., & International, E. (2011). *Final Pathogen TMDL for the Taunton River Watershed.* Worcester, MA: MassDEP, Division of Watershed Management. Retrieved from http://www.mass.gov/eea/docs/dep/water/resources/n-thru-y/taunton1.pdf

McCord, J. (n.d.). *Sturgeons*. (S. C. Resources, Editor) Retrieved from https://www.dnr.sc.gov/cwcs/pdf/Sturgeon.pdf

Meek, J., & Kennedy, L. (2010). *Merrimack River Watershed: 2004-2009 Water Quality Assessment Report.* Worcester, MA: MassDEP, Division of Watershed Management. Retrieved from http://www.mass.gov/eea/docs/dep/water/resources/71wqar09/84wqar09.pdf

Meylan, A., Schroeder, B., & Mosier, A. (1995). Sea Turtle Nesting Activity in the State of Florida, 1979-1992. *Florida Marine Research Publication*, pp. 1-51.

Moore, M., Miller, C., Weisbrod, A., Shea, D., Hamilton, P., Kraus, S., . . . Stegeman, J. (1998). Cytochrome P450 1A and chemical contaminants in dermal biopsies of northern and southern right whales. *Submitted to the IWC Workshop on the Comprehensive Assessment of Right Whales: A Worldwide Comparison, SC/M98/RW24;*. Cape Town, South Africa.

Musick, J., & Limpus, C. (1997). Habitat utilization and migration in juvenile sea turtles. In P. Lutz, & J. Musick (Eds.), *The Biology of Sea Turtles* (pp. 137-164). Boca Raton, Florida: CRC Press.

NH DES. (2014, June). *Great Bay*. Retrieved from http://des.nh.gov/organization/divisions/water/wmb/coastal/great-bay-estuary.html

NH Fish and Game. (1981). Inventory of the natural resources of the Great Bay estuarine system, Vol. 1. p. 254.

NHDES. (2008). *The Connecticut River Factsheet*. Retrieved from http://des.nh.gov/organization/commissioner/pip/factsheets/rl/documents/rl-4.pdf

NHDES. (2014, February 12). *2012 Final 303d List*. Retrieved from http://des.nh.gov/organization/divisions/water/wmb/swqa/2012/documents/2012-final-303d_submitted.pdf

NHDES. (2014, June). *Designated Rivers*. Retrieved from http://des.nh.gov/organization/divisions/water/wmb/rivers/desigriv.htm

NHDES. (2014, June). *Lower Merrimack River*. Retrieved from http://des.nh.gov/organization/commissioner/pip/factsheets/rl/documents/rl-8.pdf

NHDES. (2014, June). *NH 2012 Final 303d Submitted*. Retrieved from http://des.nh.gov/organization/divisions/water/wmb/swqa/2012/documents/2012-final-303d_submitted.pdf

NHDES. (2014, June). *Upper Merrimack River*. Retrieved from http://des.nh.gov/organization/commissioner/pip/factsheets/rl/documents/rl-13.pdf

NMFS & USFWS. (1991). *Recovery Plan for US Population of Atlantic Green Turtle.* Washington, DC: National Marine Fisheries Service.

NMFS & USFWS. (1992). *Recovery Plan for Leatherback Turtles in the US Caribbean, Atlantic and Gulf of Mexico.* Washington, DC: National Marine Fisheries Service.

NMFS & USFWS. (2007). *Kemp's Ridley Sea Turtle (Lepidochelys kempii) 5 Year Review: Summary and Evaluation.* National Marine Fisheries Service, Office of Protected Resources (Silver Spring, MD) & US Fish and Wildlife Service, Southwest Region (Albuquerque, NM).

NMFS & USFWS. (2007b). *Green Sea Turtle (Chelonia Mydas) 5-Year Review: Summary and Evaluation.* National Marine Fisheries Service, Office of Protected Resources (Silver Spring, MD) & USFWS, Southeast Region (Jacksonville, Fl).

NMFS & USFWS. (2008). *Recovery Plan for the Northwest Atlantic Population of the Loggerhead Sea Turtle (Caretta caretta).* Silver Spring, MD: NMFS.

NMFS & USFWS. (2013). *Leatherback Sea Trutle (Dermochelys coriacea) 5-Year Review and Evaluation.* NMFS, Office of Protected Resources (Silver Spring, MD) & USFWS, Southeast Region (Jacksonville, FL).

NMFS. (19 Nov 2013). *Atlantic Sturgeon (Acipenser oxyrinchus oxyrinchus)*. Retrieved January 2014, from http://www.nmfs.noaa.gov/pr/species/fish/atlanticsturgeon.htm

NMFS. (1991). *Recovery Plan for the Humpback Whale (Megaptera novaengliae).* Silver Spring, MD: Prepared by the Humpback Whale Recovery Team for the National Marine Fisheries Service.

NMFS. (1998). *Recovery Plan for the Shortnose Sturgeon (Acipenser brevirostrum).* Silver Spring, Maryland: Prepared by the Shortnose Recovery Team for the National Marine Fisheries Service.

NMFS. (2005). *Recovery Plan for the North Atlantic Right Whale.* Silver Spring, MD: National Marine Fisheries Service.

NMFS. (2010, November). Stock Assessment Report of Blue Whale (Balaenoptera musculus musculus): Western North Atlantic Stock.

NMFS. (2010b). *Recovery Plan for the fin whale (Balaenoptera physalus).* Silver Spring, MA: National Marine Fisheries Service.

NMFS. (2012). *Stock Assessment Report of North Atlantic Right Whale (Eubalaena glacialis): Western Atlantic Stock.*

NMFS. (2012b). *Stock Assessment Report of Humpback Whale (Megaptera novaeangliae): Gulf of Maine Stock.*

NMFS. (2013, September 4). *Fin whale (Balaenoptera physalus)*. Retrieved February 2014, from http://www.nmfs.noaa.gov/pr/species/mammals/cetaceans/finwhale.htm

NMFS. (2013, June 21). *Green Turtle (Chelonia Mydas)*. Retrieved February 2014, from http://www.nmfs.noaa.gov/pr/species/turtles/green.htm

NMFS. (2013, March 4). *Kemp's Ridley Turtle (Lepidochelys kempii)*. Retrieved January 2014, from http://www.nmfs.noaa.gov/pr/species/turtles/kempsridley.htm

NMFS. (2013, November 19). *Leatherback turtle (Dermochelys coriacea)*. Retrieved January 2014, from http://www.nmfs.noaa.gov/pr/species/turtles/leatherback.htm

NMFS. (2013a, March 22). Letter regarding the New Hampshire MS4 NPDES permit. (t. E. Webster, Ed.) NMFS Assistant Regional Administrator Mary Colligan.

NMFS. (2013b, April 10). Endangered Species Action Section 7 Consultation on the Commercial Wind Lease Issuance and Site Assessment Activities on the Atlantic Outer Continental Shelf in MA, RI, NY, and NJ Wind Energy Areas. *Biological Opinion*.

NMFS. (2013c). *Stock Assessment Report of Fin Whale (Balaenoptera physalus): Western North Atlantic Stock.*

NMFS. (2013c, May). Stock Assessment Report of Sei Whale (Balaenoptera borealis borealis): Nova Scotia Stock.

NMFS. (2013e, September 24). Endangered Species Action Biological Opinion: Re-Initiation of Formal ESA Section 7 Consultation for the Kennebec River Fish Assemblage Study.

NMFS. (2013f, November 4). ESA Section 7 Consultation Letter on Authorization of discharges from Lawrence Hydroelectric Project under the NPDES HYDROGP. (t. U. Nagle), Compiler) Mary A. Colligan for Regional Administrator John K. Bullard.

NMFS. (2013g, September 5). *Humpback Whale*. Retrieved Feb 2014, from http://www.nmfs.noaa.gov/pr/species/mammals/cetaceans/humpbackwhale.htm

NMFS. (2014, January 23). *Threats to Marine Turtles*. Retrieved January 2014, from http://www.nmfs.noaa.gov/pr/species/turtles/threats.htm

NMFS et al. (2011). *Bi-National Recovery Plan for the Kemp's Ridley Sea Turtle (Lepidochelys kempii), Second Revision.* Silver Spring: National Marine Fisheries Service, US Fish and Wildlife & SEMARNAT.

NMFS. (n.d.). *Fact Sheet for Atlantic Sturgeon Carolina Distinct Population Segment: Endangered*. Retrieved January 2014, from http://www.nmfs.noaa.gov/pr/pdfs/species/atlanticsturgeon_carolina_dps.pdf

NMFS. (n.d.). *Fact Sheet for Atlantic Sturgeon Chesapeake Bay Distinct Population Segment: Endangered*. Retrieved January 2014, from http://www.nmfs.noaa.gov/pr/pdfs/species/atlanticsturgeon_chesapeakbay_dps.pdf

NMFS. (n.d.). *Fact Sheet for Atlantic Sturgeon South Atlantic Distinct Population Segment: Endangered*. Retrieved January 2014, from http://www.nmfs.noaa.gov/pr/species/fish/atlanticsturgeon.htm

NMFS. (n.d). *Fact Sheet for Atlantic Sturgeon New York Bight Distinct Population Segment: Endangered*. Retrieved January 2014, from http://www.nmfs.noaa.gov/pr/pdfs/species/atlanticsturgon_nybight_dps.pdf

NMFS NEFSC. (2011). *Preliminary Summer 2010 regional abundance estimate of loggerhead turtles (Caretta caretta) in northwestern Atlantic Ocean continental shelf waters.* US Dept. Commerce, Northeast Fisheries Science Center Reference Document 11-03.

NMFS. (n.d.). *North Atlantic Right Whale*. Retrieved February 2014, from http://www.nmfs.noaa.gov/pr/species/mammals/cetaceans/rightwhale_northatlantic.htm

NMFS. (Nov. 4, 2013). *ESA Concurrence Letter Regarding the Lawrence Hydroelectric Project Under the NPDES HYDROGP.*

NOAA. (2013). *Sea Turtle Stranding and Salvage Network - Southeast Fisheries Science Center*. Retrieved January 2014, from http://www.sefsc.noaa.gov/species/turtles/strandings.htm

NOAA Fisheries. (2012, August). 5-Year Review of North Atlantic Right Whale (Eubalaena glacialis): Summary and Evaluation Report. Gloucester, MA: NOAA Fisheries, Northeast Regional Office.

O'Shea, T., & Brownell, R. (1994). Organochlorine and metal contaminants in baleen whales: a review and evaluation of conservation implications. *Science of the Total Env., 154*, 179-200.

Overholtz, W., & Nicolas, J. (1979). Apparent feeding by the final whale, Balaenoptera physalus, and humpback whale, Megaptera novaeangliae, on the American sand lance, Ammodytes americanus, in the northwest Atlantic. *Fish Bull, U.S.*, *77*, 285-287.

Perry, S., DeMaster, D., & Silber, G. (1999). The great whales: History and status of six species listed as endangered under the U.S. Endangered Species Act of 1973. *Mar Fish Rev, 61*(1), 1-74.

Peterson, C., Summerson, H., Thompson, E., Lenihan, H., Grabowski, J., Manning, L., . . . Johnson, G. (2000). Synthesis of linkages between benthic and fish communities as a key to protecting essential fish habitat. *Bulletin of Marine Science, 66*(3), pp. 759-774.

Piscataqua Region Estuaries Partnership. (2014, june). *2013 State of our Estuaries Report*. Retrieved from http://www.prep.unh.edu/resources/pdf/2013%20SOOE/SOOE_2013_FA2.pdf

Plotkin, P. (2003). *Adult migrations and habitat use* (Vol. 2). (P. Lutz, J. Musick, & J. Wyneken, Eds.) Boca Raton, Florida: CRC press.

Prescott, R. (1988). Leatherbacks in Cape Cod Bay, MA, 1977-1987. In B. Schroeder (Ed.), *Proceedings of the Eighth Annual Workshop on Sea Turtle Conservation and Biology* (pp. 83-84). NOAA Tech. Memo NMFS-SEFC-2 14.

Pritchard, P. (1971). The leatherback or leathery turtle, Dermochelys coriacea. *IUCN Monog. 1*, pp. 1-39.

Ramirez-Gallego, Diez, C., Barriento-Munoz, K., White, A., & Roman, A. (2013). Continued decline of nesting leatherback turtles at Culebra Island, Puerto Rico. In T. Tucker, L. Belskis, A. Panagopoulou, A. Rees, M. Frick, K. Williams, . . . K. Stewart (Ed.), *Proceedings of the Thirty-Third Annual Symposium of Sea Turtle Biology and Conservation.* NOAA Tech. Memo NMFS-SEFSC 645.

Reeves, R., Silber, G., & Payne, P. (1998b). *Draft recovery plans for the fin whale (Balaenoptera physalus) and sei whale (Balaenoptera borealis).* Silver Spring, MD: National Marine Fisheries Service.

Robbins, J., & Mattila, D. (2001). *Monitoring entanglements of humpback whales (Megaptera novaeangliae) in the Gulf of Maine on the basis of caudal peduncle scarring.* Impington, Cambridge, UK: International Whaling Commission Scientific Committee.

Rojko, A., Tamul, S., & Kennedy, L. (2005). *Taunton River Watershed: 2001 Water Quality Assessment Report.* Worcester, MA: MassDEP, Division of Watershed Management. Retrieved from http://www.mass.gov/eea/docs/dep/water/resources/3baapp/62wqar1.pdf

Rorvik, C., Jonsson, J., Mathisen, O., & Jonsgard, A. (1976). Fin whales, Balaenoptera physalus (l), off the west coast of Iceland distribution, segregation by length and exploitation. *RitFish, 5*, 1-30.

Ross, S. L. (1996). *Movements of juvenile fishes using surf zone nursery habitats and the relationship of movement to beach nourishment along a North Carolina beach: pilot project.* Wilmington, NC: North Carolina National Estuarine Research Reserve.

Savoy, T. (1996). Anadromous fish studies in Connecticut waters. Connecticut Department of Environmental Protections: Completion Report AFC-22-3.

Schueler, T. (2003). *Impacts of Impervious Cover on Aquatic Systems.* Ellicott City, MD: Center for Watershed Protection.

Schuller, P., & Peterson, D. (2006). Population status and spawning movements of Atlantic sturgeon in the Altamaha River, Georgia. *Presetation to the 14th American Fisheries Society Southern Division Meeting.* San Antonio.

Sears, R. a. (1987). *The blue whale: a catalog of individuals from the western North Atlantic (Gulf of St. Lawrence).* St. Lambert, Quebec, Canada: Mingan Island Cetacean Study.

Seipt, I., Clapham, P., Mayo, C., & Hawvermale, M. (1990). Population characteristics of individually identified fin whale, Balaenoptera physalus, in Massachusetts Bay. *Fish Bull., 88*, 271-278.

Shoop, C., & Kenney, R. (1992). Seasonal distributions and abundance of loggerhead and leatherback sea turtles in waters of the northeastern United States. *Herpetological Monographs 6*, pp. 43-67.

Shortnose Sturgeon Status Review Team. (2010, November 1). A Biological Assessment of shortnose sturgeon (Acipenser brevirostrum). *Report to National Marine Fisheries Service, Northeast Regional Office*, 417 pp.

Smith, T., Allen, P., Clapham, P. H., Larsen, F., Lien, J., Mattila, D., . . . Stevick, P. O. (1991). An ocean-basin-wide mark-recapture study of the North Atlantic humpback whale (Megaptera novaengliae). *Mar. Mamm. Sci, 15*(1), 1-32.

Steward, K., Sims, M., Meylan, A., Witherington, B., Brost, B., & Crowder, L. (2011). Leatherback nests increasing significantly in Florida, USA; Trends assessed over 30 years using multilevel modeling. *Ecological Applications, 21*(1), pp. 263-273.

Turtle Expert Working Group. (2000). *Assessment update for the Kemp's ridley and loggerhead sea turtle populations in the western North Atlantic.* NOAA Technical Memo NMFS-SEFSC-444.

Turtle Expert Working Group. (2007). *An assessment of the leatherback turtle population in the Atlantic ocean.* NOAA Technical Memo NMFS-SEFSC-555.

United States Department of Interior. (1973, March). Threatened Wildlife of the United States. *Resource Publication, 114*.

US EPA. (1999). *Results of the Nationwide Urban Runoff Program.*

USACE. (2014, June). *Portsmouth Harbor and Piscataqua River Navigation Project* . Retrieved from http://www.nae.usace.army.mil/Missions/CivilWorks/Navigation/NewHampshire/Portsmouth.aspx

USEPA. (1976). *Quality Criteria for Water (Red Book).* PB-263 943.

Waring, G., Josephson, E., Maze-Folew, K., & Rosel, P. (2012). *U.S. Atlantic and Gulf of Mexico Marine Mammal Stock Assessments--2011*. NOAA Tech Memo; NMFS New England 221.

Waring, G., Quintal, J., & Swartz, S. (2000). *U.S. Atlantic and Gulf of Mexico marine mammal stock assessments-2000.* NOAA Tech. Memo NMFS-NE-162.

Waycott, M., Longstaff, B., & Mellors, J. (2005). Seagrass population dynamics and water quality in the Great Barrier Reef region: a review and future research directions. *Marine Pollution Bulletin, 51*, pp. 343-350.

WildEarth Guardians. (2010, February 17). Petition to Designate Critical Habitat for the Kemp's Ridley Sea Turtle (Lepidochelys kempii). Petition submitted to the US Secretary of Interior, Acting through the USFWS & the US Secretary of Commerce, Acting through NOAA, NMFS.

Witherington, B. (2002). Ecology of neonate loggerhead turtles inhabiting lines of downwelling near a Gulf Stream front. *Marine Biology, 140*, 843-853.

Witherington, B., & Ehrhart, L. (1989). Status of reproductive characteristics of green turtles (Chelonia mydas) nesting in Florida. In L. Ogren, F. Berry, K. Bjorndal, H. Kumpf, R. Mast, G. Medina, . . . R. Witham (Ed.), *Proceedings of the Second Western Atlantic Turtle Symposium* (pp. 351-352). NOAA Tech Memo NMFS-SEFSC-226.

Woodley, T., Brown, M., Kraus, S., & Gaskin, D. (1991). Organochlorine levels in North Atlantic right whale (Eubalaena glacialis) blubber. *Arch. Environ. Contam. Toxicol., 21*(1), 141-145.

Wynne, K., & Schwartz, M. (1999). *Guide to marine mammals and turtles of the U.S. Atlantic and Gulf of Mexico.* Narragansett: Rhode Island Sea Grant.