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ACOE- NY NJ Harbor Dredging

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UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Silver Spring, Maryland 20910

OCT 13 2000

Mr. Frank Santomauro
Chief, Planning Division
Environmental Analysis Branch, Technical Support Section
Department of the Army
New York District, Corps of Engineers
Jacob K. Javits Federal Building
New York, NY 10278-0090

Dear Mr. Santomauro:

Enclosed is the National Marine Fisheries Service's (NMFS) Biological Opinion on the impacts of the Army Corps of Engineers (ACOE) New York District dredging project in selected channels of the New York and New Jersey Harbor Complex on threatened and endangered sea turtles. This Biological Opinion was prepared pursuant to the inter-agency consultation requirements of Section 7 of the Endangered Species Act.

Based on our review of the ACOE's Biological Assessment, the Feasibility Report for the New York and New Jersey Harbor Navigation Study, and available scientific information, NMFS concludes that the initial and maintenance dredging of Ambrose, Anchorage, Bay Ridge, Port Jersey, Kill van Kull, Arthur Kill, and Newark Bay channels may adversely affect, but are not likely to jeopardize the continued existence of listed species under NMFS' jurisdiction.

The enclosed Biological Opinion provides an Incidental Take Statement (ITS) for threatened and endangered sea turtles, as well as reasonable and prudent measures and terms and conditions necessary for ACOE to minimize impacts to these species. The ITS authorizes the take of two (2) loggerhead, one (1) green, one (1) Kemp's ridley, or one (1) leatherback sea turtle for the duration of the initial Ambrose Channel dredging project. Since maintenance dredging is not expected in the Ambrose Channel, no additional incidental take is anticipated beyond the initial dredging activities. As stated in the preliminary working schedule in the Main Report for the New York and New Jersey Harbor Navigation Study, the length of time proposed for initial

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dredging of Ambrose Channel is approximately 3 years. Regular maintenance dredging is not expected to be conducted in Ambrose Channel due to the continued sand mining that will remove the shoaling sediments.

Due to the proposed method of dredging and location to suitable sea turtle habitat, dredging activities in Anchorage Channel, Bay Ridge Channel, Port Jersey Channel, Kill van Kull, Arthur Kill, and Newark Bay channels are not expected to result in any lethal or non-lethal take of sea turtles. No incidental take level was designated for dredging activities in these channels.

The NMFS expects ACOE to implement the reasonable and prudent measures and terms and conditions as outlined in the ITS. The measures of the ITS are non-discretionary and must be undertaken by ACOE for the incidental take exemption to apply. For example, if hopper dredging is conducted from May 1 through November 15, dredges must have trained NMFS-approved observers on board, be equipped with rigid deflector dragheads, and follow designated equipment specifications.

This Biological Opinion concludes consultation for the initial and maintenance dredging of selected channels in the New York and New Jersey Harbor Complex, including the marine disposal of dredged material at the Historical Area Remediation Site, the Atlantic Beach, New York artificial reef site, the Sandy Hook, New Jersey reef site, and sub-channel cells in the Bay Ridge Channel. Reinitiation of this consultation is required if: (1) the amount or extent of taking specified in the ITS is exceeded; (2) new information reveals effects of these actions that may affect listed species or critical habitat in a manner or to an extent not previously considered; (3) project activities are subsequently modified in a manner that causes an effect to the listed species that was not considered in this Biological Opinion; or (4) a new species is listed or critical habitat designated that may be affected by the identified actions. As identified in the Biological Opinion, NMFS Northeast Regional staff should be contacted immediately should an interaction with a sea turtle occur.

For further information regarding any consultation requirements, please contact Chris Mantzaris, Assistant Regional Administrator for Protected Resources, NMFS Northeast Regional Office, at (978) 281-9346.

The Biological Assessment, as well as the information and assistance provided by the ACOE during the consultation process,

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was excellent. The NMFS appreciates your help with the protection of threatened and endangered sea turtles. I look forward to continued cooperation with ACOE during future Section 7 consultations.

Sincerely,

for Donald R. Knowles, Director
Office of Protected Resources

Enclosure

cc: ACOE - Howard Ruben
F/NER3 - Colligan, McDaniel
F/NER-SH - Greene
F/PR - Cain
GCNE - Collins

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NATIONAL MARINE FISHERIES SERVICE
ENDANGERED SPECIES ACT SECTION 7 CONSULTATION
BIOLOGICAL OPINION

AGENCY:	Army Corps of Engineers, New York District
ACTIVITY CONSIDERED:	New York and New Jersey Harbor Navigation Project (F/NER/2000/00596)
CONDUCTED BY:	National Marine Fisheries Service Northeast Regional Office
DATE ISSUED:	
APPROVED BY:	

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This is the National Marine Fisheries Service's (NMFS) biological opinion on the effects of the Army Corps of Engineers' (ACOE) proposed New York and New Jersey Harbor Navigation Project on threatened and endangered species in accordance with section 7 of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 et seq.). The correspondence between the NMFS and the ACOE on February 18, 2000, initiated formal consultation.

This biological opinion is based on information provided in the September 1999 Biological Assessment (BA) prepared by the ACOE and Dr. Steven Morreale, Cornell University, the December 1999 Feasibility Report for the New York and New Jersey Harbor Navigation Study that included the Main Report and the Final Environmental Impact Statement (FEIS), correspondence with Mr. Howard Ruben, ACOE, and other sources of information. A complete administrative record of this consultation is on file at the NMFS Northeast Regional Office.

CONSULTATION HISTORY

The proposed project involves the initial and maintenance dredging of selected New York/New Jersey Harbor Complex (Harbor Complex) channels and the subsequent disposal of the dredged material. Previous consultations were conducted on two of the three marine sites selected for dredged material disposal, the New York/New Jersey fish reef site and the Historic Area Remediation Site (HARS).

On December 15, 1993, NMFS sent a letter to the ACOE New York District that highlighted a list of "no effect" activities for which no further consultation is necessary. The designated reef disposal sites, located at the Atlantic Beach artificial reef in New York and the Sandy Hook artificial reef in New Jersey, are covered within these specified activities.

On July 30, 1997, in a letter to the Environmental Protection Agency (EPA), NMFS concluded that the designation and subsequent operation of the 54 km^2 HARS in the New York Bight Apex

was not likely to adversely affect protected marine species. This consultation also recommended several modifications to the general use of HARS that would improve the rate of remediation and its ultimate effectiveness in protecting or eliminating the potential to adversely affect protected species and their prey.

A portion of the Bay Ridge Channel dredged material will be placed in a third marine disposal site, the sub-channel cells, located within the Bay Ridge Channel. The effects of the dredged material disposal in the sub-channel cells on listed species will be addressed in this biological opinion.

On June 14, 1999, the New York District ACOE began consulting informally with the NMFS under section 7 of the ESA regarding a proposal to deepen some of the major channels in the Harbor Complex. Several concerns were raised by NMFS because endangered and threatened sea turtles have the potential to be in the project area. Informal consultation discussions with ACOE and NMFS were not able to adequately ensure that sea turtles would not be harmed by the project due to the type of dredge proposed in selected channels and the project time frame. Therefore, it was determined that formal consultation was necessary.

On January 5, 2000, the ACOE sent NMFS supplemental information and clarification on the BA and FEIS for the proposed project. In a January 21, 2000, letter to NMFS, the ACOE requested formal consultation on this action. Before NMFS agreed to initiate formal consultation, additional information was requested and supplied to NMFS via a telephone conversation on February 15, 2000.

On February 18, 2000, NMFS informed the ACOE that all of the information necessary for a formal section 7 consultation and the preparation of a biological opinion had been received and reminded ACOE not to make any irreversible or irretrievable commitment of resources that would prevent the NMFS from proposing or the ACOE from implementing any reasonable and prudent alternatives to avoid jeopardizing sea turtles.

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DESCRIPTION OF THE PROPOSED ACTION

The ACOE proposes to dredge and maintain selected existing channels in the Harbor Complex in New York and New Jersey. The ACOE also proposes to dispose of the dredged material produced by these operations. The purpose of the proposed action is to provide a more reliable connection between the Atlantic Ocean and ports in the Harbor Complex. The ACOE proposes to take this action pursuant to the Water Resources Development Act of 1996.
The Harbor Complex has been one of the most active ports in the world for most of the 20th century and includes the water bodies that contain the respective federally maintained channels, namely the Upper New York Bay, the Lower New York Bay, the Raritan Bay, Newark Bay, and the Kill van Kull. There is continued concern that the existing channels are not deep enough to adequately meet modern shipping needs, so this project will deepen some of the major channels that lead from the Atlantic Ocean to ports in the Harbor Complex.

The New York/New Jersey Harbor Navigation Study Main Report (December 1999) outlined a preliminary construction schedule for the initial dredging, lasting for approximately 14 years (for

all channels combined). The schedule time frame is based upon assumptions that there may be as many as four drill boats working at one time, with a maximum of two per contract area; as many as three excavators working at one time, with a maximum of one per contract area; as many as six clamshells working at one time, with a maximum of three per contract area; and as many as two large (>6,000 CY) hopper dredges, or four medium (4,000-6,000 CY) hopper dredges working at once, with a maximum of one large or two medium hopper dredges per contract area.

In addition to the initial deepening of the selected channels, the proposed project entails 50 years of maintenance dredging beyond that which is required to maintain the existing channels. Maintenance dredging will occur as needed, following the same approximate cycle as currently used. Initial dredging will excavate the virginal soil or rock to attain the design channel depths while subsequent maintenance dredging will dredge the fine grained silts and clays that have been deposited within the channels since the last dredging operation. As stated in the Main Report for the New York and New Jersey Harbor Navigation Study, the initial construction (deepening) of all the specified channels will result in 7,662,000 CY of non-HARS material; 35,507,000 CY of HARS material; and 8,168,000 CY of rock material. There are several different placement options for the dredged material, including both terrestrial and marine sites. The dredged material is determined to be HARS suitable or HARS unsuitable depending on effects-based biological testing of the dredged material. The ACOE is assuming that any material shoaling in the channels after the initial construction will be very fine silts not suitable for HARS, therefore, no material from the maintenance dredging is expected to be placed at HARS. Dredging projects will take place in the following channels:

Ambrose Channel
The recommended plan requires deepening the entire 10.6 nautical miles of the Ambrose Channel extending from deep water in the Atlantic Ocean to the Narrows. The channel will be excavated and maintained at a depth of 53 ft and a bottom width of 2000 ft. A hopper dredge will be used to excavate the clean sand in this channel. This non-contaminated sand will be placed at either HARS, located in the New York Bight Apex, or at a New Jersey quarry site. Maintenance dredging is not expected to be conducted in Ambrose Channel due to the continued sand mining that will remove the shoaling sediments.

Anchorage Channel
The Anchorage Channel will be dredged for 19,000 ft from the Narrows to the point 1,000 ft north of the junction with the Port Jersey Channel. The channel will be deepened and maintained at a depth of 50 ft, with a bottom width of 2000 ft. Surficial silt, clay, and sands found in this channel will be dredged by a clamshell bucket dredge and placed at HARS, and the soft material unsuitable for placement at HARS will be excavated by an environmental dredge (sealed clamshell bucket). The non-HARS dredged material will be placed at upland placement sites. Maintenance dredging is not expected to occur in Anchorage Channel, as it has not been conducted in 27 years and this channel does not typically shoal.

Bay Ridge Channel
The entire 3 nautical mile-long channel is proposed to be dredged and maintained at a depth of 50 ft. The proposed channel bottom width will be reduced to 600 ft from the current width of

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1,200 to 1,750 ft. Surficial silt, clay, and sands found in this channel will be dredged by a clamshell bucket dredge and placed at HARS, and the soft material unsuitable for placement at HARS will be excavated by an environmental dredge (sealed clamshell bucket). The non-HARS dredged material will be placed in sub-channel placement cells within Bay Ridge Channel. After channel deepening, maintenance dredging will occur approximately every 1.2 years and shoaling will produce approximately 512,700 CY of sediment per year.

Port Jersey Channel

The Port Jersey Channel is to be deepened to 52 ft and maintained at a depth of 50 ft, allowing 2 ft of the naturally-hard bottom to fill with soft sediments. The channel will be deepened for a distance of 10,000 ft from its juncture with the Anchorage Channel through the berthing areas at the Global Marine Terminal and Military Ocean Terminal at Bayonne (MOTBY) Peninsula. The channel bottom width will be 500 ft. Non-contaminated surficial silt, clay, and sands found in this channel will be dredged by a clamshell bucket dredge and placed at HARS, and the soft material unsuitable for placement at HARS will be excavated by an environmental dredge (sealed clamshell bucket). The FEIS states that bedrock found in this channel will be removed by blasting and dredging. Stiffer virgin soils and blasted bedrock will be dredged using marine excavators (backhoe dredges) or specially designed rock buckets. The material unsuitable for placement at HARS will be placed at upland placement sites. After channel deepening, maintenance dredging will occur approximately every 10 years and shoaling will produce approximately 53,200 CY of sediment per year.

Kill van Kull

The Kill van Kull is to be deepened to a depth of 52 ft and maintained at 50 ft, allowing the bottom 2 ft of the channel to fill with soft sediment over time. Extending from its juncture with the Anchorage Channel to its juncture with the Newark Bay Channel, 5.3 nautical miles will be cut with a channel bottom width of 800 ft. Surficial silt, clay, and sands found in this channel will be dredged by a clamshell bucket dredge and placed at HARS, and the soft material unsuitable for placement at HARS will be excavated by an environmental dredge (sealed clamshell bucket). Bedrock found in this channel will be removed by blasting and dredging. Stiffer virgin soils and blasted bedrock will be dredged using marine excavators (backhoe dredges) or specially designed rock buckets. The rock will be placed at fish reefs off New York and New Jersey, and the soft material unsuitable for placement at HARS will be placed at upland placement sites. After channel deepening, maintenance dredging will occur approximately every 3 years and shoaling will produce approximately 30,700 CY of sediment per year.

Arthur Kill

The Arthur Kill Channel is proposed to be deepened from its juncture with the Kill van Kull near Bergen Point to the Howland Hook Marine Terminal. This 2.4 nautical mile segment of the channel will be dredged to a depth of 52 ft and maintained at 50 ft. The existing channel varies in width from 500 to 800 ft, but the entirety will be widened to 800 ft. Clean surficial silt, clay, and sands found in this channel will be dredged by a clamshell bucket dredge and placed at HARS, and the soft material unsuitable for placement at HARS will be excavated by an environmental dredge (sealed clamshell bucket). The soft material unsuitable for HARS placement will be deposited at upland placement sites. The FEIS states that bedrock found in this channel will be removed by blasting and dredging. Stiffer virgin soils and blasted bedrock

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will be dredged using marine excavators (backhoe dredges) or specially designed rock buckets. The rock will be placed at fish reefs off New York and New Jersey. After channel deepening, maintenance dredging will occur approximately every 9.9 years and shoaling will produce approximately 120,500 CY of sediment per year.

Newark Bay channels
The Newark Bay channels consisting of the main Newark Bay Channel, South Elizabeth Channel and Elizabeth Channel, are proposed for dredging. Each of the aforementioned channels will be dredged to a depth of 52 ft and maintained at 50 ft. The main Newark Bay Channel will be dredged from its juncture with the Kill van Kull near Bergen Point to a point located 1,500 ft north of the Elizabeth Channel. This channel length of 14,000 ft will have a bottom width varying from 800 to 2,200 ft. The 2,700 ft-long South Elizabeth Channel will be widened from its present 290 ft to 500 ft, and the 8,800 ft-long Elizabeth Channel will remain at its present width, which varies from 500 to 800 ft. Clean surficial silt, clay, and sands found in these channels will be dredged by a clamshell bucket dredge. The clay material will be placed at an upland landfill site while all other clean materials will the placed at HARS. Soft material unsuitable for placement at HARS will be excavated by an environmental dredge (sealed clamshell bucket) and placed at upland placement sites. The FEIS states that bedrock found in Newark Bay and the South Elizabeth Channel will be removed by blasting and dredging. Stiffer virgin soils and blasted bedrock will be dredged using marine excavators (backhoe dredges) or specially designed rock buckets. The rock will be placed at fish reefs off New York and New Jersey. After channel deepening, maintenance dredging will occur approximately every 6.8 years and shoaling will produce 625,600 CY of sediment per year.

Action area
The proposed project areas are within the Harbor Complex, located at the apex of the New York Bight. The dredging events (both initial and maintenance) will be completed in the channels listed previously (Ambrose, Anchorage, Bay Ridge, Port Jersey, Kill van Kull, Arthur Kill, and Newark Bay channels). The action area for this biological opinion is the entire Harbor Complex, not only the immediate channel area to be dredged.

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STATUS OF SPECIES OR CRITICAL HABITAT

The following endangered or threatened species under NMFS' jurisdiction are likely to occur in the action area.

ENDANGERED:

Green sea turtle	*Chelonia mydas*
Kemp's ridley sea turtle	*Lepidochelys kempi*
Leatherback sea turtle	*Dermochelys coriacea*

THREATENED:

Loggerhead sea turtle	*Caretta caretta*

No critical habitat has been designated for species under NMFS' jurisdiction in the action area.

Background information on the range-wide status of these species and a description of critical habitat can be found in a number of published documents. These sources include recent documents on the status of sea turtles (NMFS and USFWS 1995), Recovery Plans for the loggerhead sea turtle (NMFS and USFWS 1991) and leatherback sea turtle (NMFS and USFWS 1992), and status reports on Kemp's ridley and loggerhead sea turtles provided by the Turtle Expert Working Group (TEWG 1998 and in prep.). Summary information on the biology of these species is provided below.

Green sea turtle

Green turtles are distributed circumglobally, mainly in waters between the northern and southern 20° C isotherms (Hirth 1971). In the continental U.S. waters, green turtles are found from Texas to Massachusetts, and immature turtles are the most common size class reported in U.S. waters (Thompson 1988). Hatchlings occupy pelagic habitats after leaving the nesting beach where they are assumed to be omnivorous, with a strong tendency toward carnivory during early life stages. At approximately 8 to 10 inches straight carapace length (SCL), juveniles leave the pelagic habitats and enter benthic foraging areas, shifting to a chiefly herbivorous diet (Bjorndal 1997). The large juvenile and adult green sea turtle is a solitary nektonic animal that appears to prefer marine grasses (e.g., *Zostera marina*) and algae in shallow bays, lagoons and reefs (Rebel 1974, Burke et al. 1991). Some of the principal feeding pastures in the western Atlantic occur in the Indian River Lagoon System in Florida, Florida Bay, the Culebra archipelago and other Puerto Rico coastal waters, the south coast of Cuba, the Mosquito coast of Nicaragua, the Caribbean coast of Panama, and scattered areas along Colombia and Brazil (Hirth 1971).

Green turtles are the largest chelonid (hard-shelled) sea turtle, with an average adult carapace of 3 feet SCL and weight of 330 lbs. Ninety percent of green turtles found in Long Island are between 10 and 15.7 inches SCL, with the largest reported being 26.8 inches (Burke et al. 1991). Based on growth rate studies of wild green turtles, greens have been found to grow slowly with an estimated age of sexual maturity ranging from 20 to 50 years (Balazs 1982, Frazer and Ehrhard 1985 in NMFS and USFWS 1991a).

The majority of the green sea turtle's life is spent in foraging grounds, but in the western Atlantic, several major nesting assemblages have been identified and studied (Peters 1954, Carr and Ogren 1960, Parsons 1962, Pritchard 1969, Carr et al. 1978). In the continental United States, green turtle nesting primarily occurs on the Atlantic coast of Florida (Ehrhart 1979). Occasional nesting has been documented along the Gulf coast of Florida, at Southwest Florida beaches, as well as the beaches on the Florida Panhandle (Meylan et al. 1995). Most documented green turtle nesting activity occurs on Florida index beaches, which were established to standardize data collection methods and effort on key nesting beaches. The pattern of green turtle nesting shows biennial peaks in abundance, with a generally positive trend during the ten years of regular monitoring since establishment of the index beaches in 1989, perhaps due to increased protective legislation throughout the Caribbean (Meylan et al. 1995).

In 1978, the green turtle was listed as threatened under the ESA, except for the breeding populations in Florida and on the Pacific coast of Mexico, which were listed as endangered (NMFS and USFWS 1991a). Green turtles were traditionally highly prized for their flesh, fat, eggs, and shell, and fisheries in the United States and throughout the Caribbean are largely to

INACTIVE

responsible for the decline of the species. Green turtles continue to be heavily exploited by man, with the degradation of nesting and feeding habitats, incidental capture in fisheries, and marine pollution acknowledged as serious hindrances to species recovery.

Kemp's ridley sea turtle

This species is the smallest of all extant sea turtles, the weight of an adult generally being less than 100 lbs and averaging around 2 feet SCL (USFWS and NMFS 1992). Hatchlings are pelagic, probably controlled by current patterns, and juveniles (>8 inch SCL) inhabit nearshore waters, primarily those with seagrass beds or mud bottoms favored by crabs (Wynne and Schwartz 1999). Kemp's ridleys feed heavily on a diet composed mainly of crabs (e.g., spider, rock and lady crabs), while fish, shrimp, and mollusks are consumed less frequently (Burke et al. 1990, Morreale and Standora 1992, Bjorndal 1997).

Kemp's ridleys are found primarily in the Gulf of Mexico waters, and the nearshore waters are believed to provide important developmental habitat for juvenile Kemp's ridley turtles. Preliminary analyses of the data collected from satellite and radio telemetry studies at the Texas A&M University and the NMFS Galveston Laboratory suggest that subadult Kemp's ridleys stay in shallow, warm, nearshore waters in the northern Gulf of Mexico until cooling waters force them offshore or south along the Florida coast (M. Renaud, pers. comm.). Many Kemp's ridleys undergo seasonal migrations. Juvenile and subadult Kemp's ridleys use northeastern and mid-Atlantic coastal waters of the U.S. Atlantic coastline as primary developmental habitat during summer months, with shallow coastal embayments serving as foraging grounds for benthic immature turtles of 8-24 inches SCL. Kemp's ridleys have been found to migrate south as temperatures drop below 14° C, generally in late October (Morreale et al. 1992, Ruben and Morreale 1999).

Kemp's ridleys nest primarily on Rancho Nuevo in Tamaulipas, Mexico, where nesting females emerge synchronously during the day to nest in aggregations known as arribadas. Until approximately 50 years ago, this sea turtle was abundant in the Gulf of Mexico, with an estimated 40,000 females nesting one day in 1947 (Hildebrand 1963 in USFWS and NMFS 1992).

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Status and trend of Kemp's ridley sea turtles

The Kemp's ridley is the most endangered of all sea turtles. The Kemp's ridley was listed as endangered throughout its range on December 2, 1970, under United States law (USFWS and NMFS 1992). Unfortunately, a substantial lack of knowledge about Kemp's ridley life cycles (e.g., age of sexual maturity, longevity, location of mating areas) makes it increasingly difficult to protect this species from the many sources of natural and human-induced mortality. This mortality includes incidental takes in fishing gear, pollution, and marine habitat degradation.

The Turtle Expert Working Group (TEWG; 1998) developed a population model to evaluate trends in the Kemp's ridley population through the application of empirical data and life history parameter estimates chosen by the TEWG. Model results identified three trends in benthic immature Kemp's ridleys. Benthic immatures are those turtles that are not yet reproductively mature but have recruited to feed in the nearshore benthic environment, where they are available to nearshore mortality sources that often result in strandings. Benthic immature ridleys are

estimated to be 2-9 years of age and 8-24 inches in length. Increased production of hatchlings from the nesting beach beginning in 1966 resulted in an increase in benthic ridleys that leveled off in the late 1970s. A second period of increase followed by leveling occurred between 1978 and 1989 as hatchling production was further enhanced by the cooperative program between U.S. Fish and Wildlife Service (FWS) and Mexico's Instituto Nacional de Pesca to increase the nest protection and relocation program in 1978. A third period of steady increase, which has not leveled off to date, has occurred since 1990 and appears to be due to the greatly increased hatchling production and an apparent increase in survival rates of immature turtles beginning in 1990 due, in part, to the introduction of Turtle Excluder Devices (TEDs).

Analyses conducted by the TEWG have indicated that the Kemp's ridley population is in the early stages of recovery, but the total population size and current mortality rates for Kemp's ridleys are not presently available. Over the period from 1987 to 1995, the rate of increase in the annual number of nests accelerated in a trend that has continued with enhanced hatchling production and the use of TEDs. Nesting data indicated that the number of adults declined from a population that produced 6,000 nests in 1966 to a population that produced 924 nests in 1978 and a low of 702 nests in 1985. In 1995, the number of nests increased to 1,930, while over 6,000 nests were found on all Mexican beaches in 2000. Using trends in nest abundance, the trajectory of adult abundance was estimated at 9,600 adults in 1966 to 1,050 in 1985. The TEWG estimated that in 1995 there were 3,000 adult ridleys. The increased recruitment of new adults is illustrated in the proportion of neophyte, or first time nesters, which has increased from 6% to 28% from 1981 to 1989 and from 23% to 41% from 1990 to 1994. The TEWG population model projected that Kemp's ridleys could reach the intermediate recovery goal, identified in the Kemp's Ridley Recovery Plan, of 10,000 nesters by the year 2020 if the assumptions of age to sexual maturity and age specific survivorship rates used in their model are correct.

The current species' population is still far below historic levels, but the TEWG (1998) identified an average Kemp's ridley population growth rate of 13% per year between 1991 and 1995. The population growth rate does not appear as steady as originally forecasted by the TEWG, but annual fluctuations, due in part to irregular inter-nesting periods, are normal for other sea turtle populations. Also, as populations increase and expand, nesting activity would be expected to be more variable. As noted by the TEWG, trends in Kemp's ridley nesting, even on the Rancho Nuevo beaches alone, suggest that recovery of this population has begun, but continued caution is necessary to ensure recovery and to meet the goals identified in the Kemp's Ridley Recovery Plan.

Leatherback sea turtle

The leatherback is the largest living sea turtle, often weighing well over 1100 lbs (Magnuson et al. 1990). They draw their sustenance primarily from a diet of cnidarians and tunicates and are often found in association with jellyfish (NMFS and USFWS 1995, Lutcavage 1996). This is the only species of sea turtle covered in tough, oil-saturated black connective tissue with 7 dorsal and 5 ventral keels.

The leatherback sea turtle ranges farther than any other sea turtle species, being widely distributed throughout the oceans of the world. This species regularly occurs in deep waters (>328 ft) and are deep divers, with recorded dives to depths in excess of 3280 ft (Eckert et al.

INACTIVE

1998). However, leatherbacks may come into shallow waters if there is an abundance of jellyfish nearshore. An aerial survey study in the Northeast found that leatherbacks were sighted in water depths ranging from 3 to 13,618 ft, with a median sighting depth of 131.6 ft (Shoop and Kenney 1992). This same study found leatherbacks in waters ranging from 7 to 27.2° C. This sea turtle is able to inhabit intensely cold waters for a prolonged period of time because leatherbacks are able to maintain body temperatures several degrees above ambient temperatures. This may be due to several features, including their large body mass, an insulating layer of subepidermal fat, and a countercurrent heat exchange in the flippers (NMFS and USFWS 1992). Frequent sighting of leatherbacks in extremely cold, northern waters, far from their mainly tropical nesting beaches, is in itself fairly good evidence that they undertake breeding migrations (Meylan 1995). In fact, the few existing long-distance recaptures of tagged leatherbacks document some of the longest migrations ever recorded for any reptile.

Although leatherbacks are a long lived species (>30 years), they are somewhat faster to mature than other sea turtle species (e.g., loggerheads), with an estimated age at sexual maturity reported as 13-14 years for females (Zug and Parham 1996).

Compared to the current knowledge regarding loggerhead populations, the genetic distinctness of leatherback populations is less clear. However, genetic analyses of leatherbacks to date indicate that within the Atlantic basin significant genetic differences occur between St. Croix, U.S. Virgin Islands and mainland Caribbean populations (Florida, Costa Rica, Suriname and French Guiana) and between Trinidad and the same mainland populations (Dutton et al. 1999), leading to the conclusion that there are at least 3 separate subpopulations of leatherbacks in the Atlantic. Much of the genetic diversity is contained in the relatively small insular subpopulations. To date, no genetic studies have been published on pelagic or benthic foraging leatherbacks in the Atlantic, so it is difficult to determine what populations are being impacted by anthropogenic mortality sources.

Spotila et al. (1996) describe a hypothetical life table model based on estimated ages of sexual maturity at both ends of the species' natural range (5 and 15 years). The model concluded that leatherbacks maturing in 5 years would exhibit much greater population fluctuations in response to external factors than would turtles that mature in 15 years. Furthermore, the simulations indicated that leatherbacks could maintain a stable population only if both juvenile and adult survivorship remained high, and that if other life history stages (i.e., egg, hatchling, and juvenile) remained static. Model simulations indicated that an increase in adult mortality of more than 1% above background levels in a stable population was unsustainable. Spotila et al. (1996) concluded that "the Atlantic population is the most robust, but it is being exploited at a rate that cannot be sustained and if this rate of mortality continues, these populations will also decline. Leatherbacks are on the road to extinction."

Status and trend of leatherback sea turtles

The leatherback was listed as endangered on June 2, 1970 and a recovery plan was issued in 1992 to help recover and/or protect the species. The main sources of mortality to leatherbacks include entanglement in fishing gear (e.g., longlines, lobster pots, weirs), boat collisions, and ingestion of marine debris.

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Nest counts are currently the only reliable indicator of population status available for leatherback turtles. Recent declines have been seen in the number of leatherbacks nesting worldwide (NMFS and USFWS 1995). The status of the leatherback population in the Atlantic is difficult to assess since major nesting beaches occur over broad areas within tropical waters outside the United States. The nesting population within U.S. jurisdiction is presumed to be stable. Numbers at some nesting beaches (e.g. St. Croix, Florida, Puerto Rico) are increasing (P. Dutton, pers. comm.), although some nesting beaches in the U.S. Virgin Islands have been extirpated, including nesting assemblages in other areas of the Caribbean such as St. John and St. Thomas. The nesting beach at Sandy Point, St. Croix, which has witnessed an increase in population, has been subject to intensive conservation management efforts since 1981. However, it is not known whether the observed increase is due to improved adult survival or recruitment of new nesters, since flipper tag loss is so high in this species. Better data collection methods implemented since the late 1980s may soon help to answer these questions. Based on an expected inter-nesting interval of one to five years, Dutton et al. (in press) estimate a 19-49% mortality rate for re-migrating females at Sandy Point. Researchers are currently unable to explain the underlying mechanisms which are simultaneously resulting in high mortality levels to nesting age females, and yet exponential growth in the nesting population. It does appear, however, that the Western Atlantic portion of the population is being subjected to mortality beyond sustainable levels, resulting in a continued decline in numbers of nesting females.

Globally, leatherback populations have been decimated worldwide. The population was estimated to number approximately 115,000 adult females in 1980 (Pritchard 1982) and only 34,500 by 1995 (Spotila et al. 1996). The decline can be attributed to many factors including fisheries and intense exploitation of the eggs (Ross 1979). On some beaches nearly 100% of the eggs laid have been harvested (Eckert 1996). Eckert (1996) and Spotila et al. (1996) record that adult mortality has also increased significantly, particularly as a result of driftnet and longline fisheries. The Pacific population appears to be in a critical state of decline, now estimated to number less than 3,000 total adult and subadult animals (Spotila 2000). The status of the Atlantic population is less clear. In 1996, it was reported to be stable, at best (Spotila 1996), but numbers in the Western Atlantic at that writing were reported to be on the order of 18,800 nesting females. According to Spotila (pers. comm.), the Western Atlantic population currently numbers about 15,000 nesting females, whereas current estimates for the Caribbean (4,000) and the Eastern Atlantic (i.e., off Africa, numbering approximately 4,700) have remained consistent with numbers reported by Spotila et al. in 1996. Between 1989 and 1995, marked leatherback returns to the nesting beach at St. Croix averaged only 48.5%, but the overall nesting population grew (McDonald et al. 1993). This is in contrast to a Pacific nesting beach at Playa Grande, Costa Rica, where only 11.9% of turtles tagged in 1993-94 and 19.0% of turtles tagged in 1994-95 returned to nest over the next five years. Characterizations of this population suggest that is has a very low likelihood of survival and recovery in the wild under current conditions.

INACTIVE

Loggerhead sea turtle

Loggerhead sea turtles occur throughout the temperate and tropical regions of the Atlantic, Pacific, and Indian Oceans and are the most abundant species of sea turtle occurring in U.S. waters. Adult loggerheads are known to make considerable migrations between foraging areas and nesting beaches (TEWG 1998). Loggerhead sea turtles concentrate their nesting in the north and south temperate zones and subtropics, but generally avoid nesting in tropical areas of Central America, northern South America, and the Old World (Magnuson et al. 1990). The largest known nesting aggregation of loggerhead sea turtles occurs on Masirah and Kuria Muria Islands in Oman (Ross and Barwani 1982). In the western Atlantic, most loggerhead sea turtles nest from North Carolina to Florida and along the gulf coast of Florida, while over 90% of the southeastern U.S. nesting activity occurs on eastern Florida beaches. Adult female loggerheads are iteroparous both within and among years, typically displaying high fecundity (NMFS and USFWS 1995). While non-nesting, adult female loggerheads are reported throughout the U.S. and Caribbean Sea, little is known about the distribution of adult males who are seasonally abundant near nesting beaches during the nesting season. Aerial surveys suggest that loggerheads (benthic immatures and adults) in U.S. waters are distributed in the following proportions: 54% in the southeast U.S. Atlantic, 29% in the northeast U.S. Atlantic, 12% in the eastern Gulf of Mexico, and 5% in the western Gulf of Mexico (TEWG 1998).

The best scientific and commercial data available on the genetics of loggerhead sea turtles suggests there are four major subpopulations of loggerhead sea turtles in the western North Atlantic: (1) a northern nesting subpopulation that occurs from North Carolina to northeast Florida, about 29° N; (2) a south Florida nesting subpopulation, occurring from 29° N on the east coast to Sarasota on the west coast; (3) a Florida panhandle nesting subpopulation, occurring at Eglin Air Force Base and the beaches near Panama City, Florida; and (4) a Yucatán nesting subpopulation, occurring on the eastern Yucatán Peninsula, Mexico (TEWG 1998).

Although NMFS has not completed the administrative processes necessary to formally recognize populations or subpopulations of loggerhead sea turtles, these sea turtles are generally grouped by their nesting locations. Based on the most recent reviews of the best scientific and commercial data on the population genetics of loggerhead sea turtles and analyses of their population trends (TEWG 1998, TEWG in prep.), NMFS treats these loggerhead turtle nesting aggregations as distinct sub-populations whose survival and recovery is critical to the survival and recovery of the species. Natal homing to the nesting beach provides the genetic barrier between these subpopulations, preventing recolonization from turtles from other nesting beaches. The importance of maintaining these subpopulations in the wild is shown by the many examples of extirpated nesting assemblages in the world.

The loggerhead sea turtles in the action area are likely to represent differing proportions of the four western Atlantic subpopulations. Although the northern nesting subpopulation produces about 9 percent of the total loggerhead nests, they comprise more of the loggerhead sea turtles found in foraging areas from the northeastern U.S. to Georgia: between 25 and 59 percent of the loggerhead sea turtles in this area are from the northern subpopulation (Sears 1994, Norrgard 1995, Sears et al. 1995, Rankin-Baransky 1997, Bass et al. 1998). About 10 percent of the loggerhead sea turtles in foraging areas off the Atlantic coast of central Florida are from the northern subpopulation (Witzell et al. in prep).

INACTIVE

Loggerhead sea turtles originating from the western Atlantic nesting aggregations are believed to lead a pelagic existence in the North Atlantic Gyre for as long as 7-12 years. Turtles in this life history stage are called "pelagic immatures" and are best known in the eastern Atlantic near the Azores and Madeira and have been reported in the Mediterranean as well as the eastern Caribbean (Bjorndal et al. in press). Stranding records indicate that when pelagic immature loggerheads reach 16-24 inches SCL they recruit to coastal inshore and nearshore waters of the continental shelf throughout the U.S. Atlantic and Gulf of Mexico.

Benthic immatures have been found from Cape Cod, Massachusetts, to southern Texas, and occasionally strand on beaches in northeastern Mexico (R. Márquez-M., pers. comm.). Small benthic immature turtles (<27.5 inches) are the predominant loggerhead size class found everywhere from Cape Cod southward through Texas, except in southern Florida and the eastern Gulf of Mexico where large benthic immature loggerheads are the most common size class (TEWG 1998). Large benthic immature loggerheads (28-36 inches) represent a larger proportion of the strandings and in-water captures (Schroeder et al. 1998) along the south and western coasts of Florida as compared with the rest of the coast, but it is not known whether the larger animals actually are more abundant in these areas or just more abundant within the area relative to the smaller turtles. Given an estimated age at maturity of 21-35 years (Frazer and Ehrhart 1985, Frazer and Limpus 1998), the benthic immature stage is estimated to be at least 10-25 years old.

Aerial surveys of loggerhead and leatherbacks conducted in the northeastern United States found that loggerheads are most common in waters from 72 to 161 ft deep and in waters approximately 21-24° C (Shoop and Kenney 1992). Loggerheads move northward as water temperatures approach 20° C (Burke et al. 1989, Musick et al. 1984) to feed on benthic invertebrates, leaving the northern embayments in the fall when water temperatures drop. Loggerheads are primarily benthic feeders, opportunistically foraging on crustaceans, mollusks and sponges in the open ocean of the northeastern U.S. and along continental shelves, bays, lagoons, and estuaries (NMFS and USFWS 1991b). Under certain conditions they also feed on finfish, particularly if they are easy to catch (e.g., caught inside pound nets where the fish are accessible to turtles).

Status and trend of loggerhead sea turtles

The loggerhead was listed as a threatened species under the Endangered Species Act of 1973 on July 28, 1978, but is considered endangered by the World Conservation Union (IUCN) and under the Convention of International Trade in Endangered Species of Flora and Fauna (CITES). The major factors inhibiting recovery include fishery interactions and degradation of the nesting beach environment. A recovery plan was published in 1991 to address these issues and to delineate appropriate actions to recover and protect this species.

Based on the data available, it is not possible to estimate the size of the loggerhead sea turtle population in the U.S. or its territorial waters. There is, however, general agreement that the number of nesting females provides a useful index of the species' population size and stability at this life stage. Nesting data collected on index nesting beaches in the U.S. from 1989-1998 represent the best dataset available to index the population size of loggerhead sea turtles. Between 1989 and 1998, the total number of nests laid along the U.S. Atlantic and Gulf coasts

INACTIVE

ranged from 53,016 to 89,034 annually, representing, on average, an adult female population of 44,780. On average, 90.7% of the nests were from the South Florida subpopulation, 8.5% were from the northern subpopulation, and 0.8% were from the Florida Panhandle subpopulation. There is limited nesting throughout the Gulf of Mexico west of Florida, but it is not known to what subpopulation they belong. There are only an estimated 3,700 nesting females in the northern loggerhead subpopulation, and the status of this population is officially documented as stable at best (TEWG in prep.).

From a global perspective, the southeastern U.S. nesting aggregation is critical to the survival of this species: it is second in size only to the nesting aggregations in the Arabian Sea off Oman and represents about 35 and 40 percent of the nests of this species. The status of the Oman nesting beaches has not been evaluated recently, but they are located in a part of the world that is vulnerable to extremely disruptive events (e.g. political upheavals, wars, and catastrophic oil spills), the resulting risk facing this nesting aggregation and these nesting beaches is cause for considerable concern (Meylan et al. 1995).

Several published reports have presented the problems facing long-lived species that delay sexual maturity in a world replete with threats from a modern, human population (Crouse et al. 1987, Congdon et al. 1993, Congdon and Dunham 1994, Crowder et al. 1994, Crouse 1999). In general, these reports concluded that animals that delay sexual maturity and reproduction must have high, annual survival as juveniles through adults to ensure that enough juvenile sea turtles survive to reproductive maturity and then reproduce enough times to maintain stable population sizes. This general rule applies to sea turtles, particularly loggerhead sea turtles, because the rule originated in studies of sea turtles (Crouse et al. 1987, Crowder et al. 1994, Crouse 1999). Crouse (1999) concluded that relatively small changes in annual survival rates of both juvenile and adult loggerhead sea turtles will adversely affect large segments of the total loggerhead sea turtle population.

The four major subpopulations of loggerhead sea turtles in the northwest Atlantic – northern, south Florida, Florida panhandle, and Yucatán – are all subject to fluctuations in the number of young produced annually because of human-related activities as well as natural phenomena. Loggerhead sea turtles face a number of threats in the marine environment, including oil and gas exploration, development, and transportation; marine pollution; trawl, purse seine, hook and line, gill net, pound net, longline, and trap fisheries (state and federal); underwater explosions; dredging; offshore artificial lighting; power plant entrapment; entanglement in debris; ingestion of marine debris; marina and dock construction and operation; boat collisions; and poaching. On nesting beaches in the U.S., loggerhead sea turtles are threatened with beach erosion, armoring, and nourishment; artificial lighting; beach cleaning; increased human presence; recreational beach equipment; exotic dune and beach vegetation; predation by exotic species; and poaching.

Loggerhead sea turtles also face numerous threats from natural causes. For example, there is a significant overlap between hurricane seasons in the Caribbean Sea and northwest Atlantic Ocean (June to November) and loggerhead sea turtle nesting season (March to November); hurricanes can have potentially disastrous effects on the survival of eggs in sea turtle nests. In 1992, Hurricane Andrew affected turtle nests over a 90-mile length of coastal Florida; all of the eggs were destroyed by storm surges on beaches that were closest to the eye of this hurricane

INACTIVE

(Milton et al. 1992). These natural phenomena probably have significant, adverse effects on the size of specific year classes; particularly given the increasing frequency and intensity of hurricanes in the Caribbean Sea and northwest Atlantic Ocean.

Sea turtles in the Northeast

A number of different theories are used to explain why young sea turtles end up in northeastern waters, but it is now accepted that these waters provide important developmental habitat for a number of sea turtles during the warmer months (Shoop and Kenney 1992, Morreale and Standora 1994, Ruben and Morreale 1999). The turtles found in northeastern nearshore waters are small juveniles with the most abundant being the loggerhead followed by the Kemp's ridley (Morreale 1999). Shoop and Kenney (1992) found that loggerhead turtles are relatively abundant off the Northeast (from near Nova Scotia, Canada to Cape Hatteras, North Carolina), with populations estimated at 7,000-10,000 individuals. From November to March in 1985 through 1988, Morreale et al. (1992) collected 130 cold-stunned turtles along the Long Island shoreline, including 97 Kemp's ridleys. All of these Kemp's ridleys were small, with a mean SCL of 29.4 cm. Additionally, 277 turtles stranded from cold-stunning in Cape Cod Bay from November 8, 1999 to January 7, 2000, with Kemp's ridleys being the most numerous species (218 animals). Included in the 1999-2000 cold-stun event were 54 loggerheads and 5 green turtles. While green sea turtles are relatively uncommon at Northeast latitudes, the waters off Long Island are warm enough to support green turtles from June through October (Burke et al. 1991).

The three species of chelonid turtles found in the Northeast remain very briefly in open ocean waters, spending most of their time during the summer months in harbors and estuarine waters (Ruben and Morreale 1999). The abundant resources in the nearshore environments result in extremely high measured growth of the juveniles before they slow down their activity in the fall (Burke et al. 1990).

Leatherbacks in the Northeast appear to be mostly adults or large sub-adults that feed primarily on soft-bodied coelenterates and cnidarians. Located in New England and New York in the warmer months, this species is found in coastal waters of the continental shelf and near the Gulf Stream edge, but rarely in the inshore areas (Lutcavage 1996). Shoop and Kenney (1992) observed concentrations of leatherbacks during the summer off the south shore of Long Island and off New Jersey. Leatherbacks in these waters are thought to be following their preferred jellyfish prey. This aerial survey estimated the leatherback population for the northeastern U.S. at approximately 300-600 animals (from near Nova Scotia, Canada to Cape Hatteras, North Carolina).

The general trend for sea turtles found in the New York Bight is to migrate to the New York area in early summer and return south when the water temperature decreases around October. Morreale et al. (1992) found that the first live turtles were found in New York inshore waters at water temperatures higher than 20° C. By late November, waters become unsuitable with the highest number of cold-stunned turtles coinciding with water temperatures less than 10° C. An aerial survey study found that loggerheads were most common in June and then declined steadily until October, but leatherbacks increased gradually over the summer season being most common

INACTIVE

in September (Shoop and Kenney 1992). Both species were rare or absent from November through April, with leatherbacks also rare in May.

Data from long-term telemetry studies indicated that loggerhead and Kemp's ridley sea turtles migrating from New York waters exhibit spatial and temporal consistency (Morreale and Standora 1992, 1994, 1998). Turtles moving southward travel mainly within a corridor running over 497 miles along the coastline within a maximum width of less than 37 miles. Turtles have also been observed to travel within the same time frame each fall. Morreale and Standora have placed satellite transmitters on twelve loggerhead and three Kemp's ridley sea turtles over 1990, 1991, 1992, 1995 and 1996. All of these turtles migrated southward when the temperature declined abruptly around late September, so this similar behavior could be extrapolated to the migratory patterns of the vast majority of the turtles in the Northeast region. The researchers also noted that some individuals spend a considerable amount of time traveling back and forth across the New York Bight on summer foraging expeditions.

While sea turtles occur in nearby New York waters (e.g., Long Island Sound, the eastern and southern bays) throughout the warmer months each year, there is limited documented evidence of their presence within the Harbor Complex. There are no published references to live sea turtles inhabiting the Upper New York Bay, neither historically nor recently, and there is minimal published acknowledgement of their presence in the Lower New York Bay.

Several studies in the Harbor Complex have had the opportunity to encounter sea turtles in the project area. In 1984 and 1985, FWS used a variety of gill nets, fyke nets, and otter trawls to extensively sample habitats shallower than 36 ft in the Upper New York Bay, but no turtles were encountered (USFWS 1996 in Ruben and Morreale 1999). Other habitat sampling in the Harbor Complex revealed no sightings or encounters with sea turtles after extensive trawl net sampling and monitoring over all seasons in different years (Woodhead et al. 1987 in Ruben and Morreale 1999).

While habitat sampling has not recorded any sea turtles within the Upper New York Bay, the Lower New York Bay, and the Newark Bay, there has been little attention and few resources focused directly on determining the frequency and extent of sea turtle distribution within the Harbor Complex. For example, no active studies on sea turtles are being conducted in the project area at this time and the fishing industry in the region does not use gear that generally captures sea turtles. There is not a large pound net fishery in this area (the type of gear that usually captures turtles) and the Upper New York Bay has minimal fishing effort and a deficiency of historical reporting of sea turtle captures. Given this lack of information, it is difficult to confirm the presence or absence of sea turtles in any areas within the Harbor Complex.

Sea turtle strandings have been documented as some dead individuals wash up on shore along Staten Island, Coney Island, and Rockaway each summer. However, these carcasses often are of large turtles, much larger than the size of juvenile turtles expected to be in nearshore waters. It has been assumed that these individuals are transported from offshore distant areas by prevailing winds and surface currents.

INACTIVE

Sea turtles have not been abundantly documented in the Harbor Complex, but they are found in New York waters (e.g., New York Bight, Long Island Sound) in the warmer months and are known to inhabit shallow harbors and embayments. Therefore, it is reasonable to assume that sea turtles may inhabit the project area during the proposed time period, especially since Ambrose Channel is located at the New York Bight Apex (where turtles have been documented). Three assumptions must be acknowledged with this rationalization: 1) sea turtles occur in the Harbor Complex on the same seasonal schedule as they do in the rest of New York and northeastern U.S. waters; 2) the ecological requirements for sea turtles in the Harbor Complex are similar to those of sea turtles in the region; and 3) habitat preferences of sea turtles within the Harbor Complex are similar to those observed for turtles in nearby waters.

With these assumptions in mind, the BA for this project outlined an index that calculated the most suitable habitat for sea turtles within the Harbor Complex. The purpose of this model was to predict the likelihood a sea turtle would occur in the action area based upon habitat suitability. Previous analyses of temporal and spatial positions of sea turtles within the northeastern U.S. were used to define a period of time during which turtles would be expected to occur within the Harbor Complex. The model predicted that by the end of October nearly all of the sea turtles would have left the northern waters, located at least as far away as 31 miles south of Ambrose Channel. With the exception of a few cold-stunned turtles, young sea turtles do not arrive again until the waters are warm, which could be as early as May. Therefore, the model predicted that within the period of time between October 26 and May 1, turtles would not likely be present in the Harbor Complex.

The model also evaluated habitat suitability based on several environmental variables considered to be important for sea turtle foraging: depth, current velocity, prey density (crabs and mollusks), and substrate quality. It is thought that the availability of appropriate food and suitable nesting beaches are probably the two most important controlling factors of sea turtle distribution and abundance (Shoop and Kenney 1992). In the model, the likelihood a sea turtle would forage in a particular habitat dictated the designated suitability of the environmental variables. During the warmer months, most turtles in the Northeast appear to spend the majority of the time in waters between 16 and 49 feet. Most of the area within Ambrose Channel and Anchorage Channel is deeper than 50 feet, while portions of the Port Jersey Channel and Bay Ridge Channel have depths ranging from 15 to 49 feet. The majority of the harbor channels proposed for dredging are too deep to be considered suitable for sea turtle foraging. The depth of Kill van Kull and Newark Bay channels was not evaluated due to a lack of data, as identified in the BA. Turtles usually spend most their summer foraging time in slow moving or still waters. Most of the channels in the action area are subject to strong currents (> 1 knot) and are unsuitable for foraging juvenile turtles. The deeper main channels such as the Kill van Kull, Anchorage Channel, and Ambrose Channel, were classified as unsuitable for turtles based on their swiftly moving velocities exceeding 2.5 knots in many areas. The model also evaluated densities of crab and mollusks, the preferred prey of loggerheads and Kemp's ridleys. Ambrose Channel was the only location within the proposed project area that contained a high density of crabs, while several small pockets of high and low mollusk densities were found in the upper Newark Bay (out of the proposed dredging area) and the Upper New York Bay. Most of the proposed project area contained sandy substrate which is optimal for young foraging sea turtles, while the remaining areas of the Upper New York Bay consisted of silt substrate. The Kill van

INACTIVE

Kull and Newark Bay channels were not evaluated for bottom substrate due to a lack of data, as identified in the BA.

Overall habitat suitability was calculated based on depth, current velocity, crab abundance, mollusk abundance, and bottom substrate requirements. Habitat was designated as being suitable for sea turtles if 1) the dates were between May 1 and October 26, and 2) the five environmental variables ranked as either high or marginal habitat quality. Approximately 35% of the available habitat in the Harbor Complex was found to be suitable for sea turtles, but the model did not categorize any of the upper portions of the harbor as optimal habitat for turtles. Based on the model predictions of suitable habitat, the channels proposed for dredging that are the most likely to encounter sea turtles are the Ambrose Channel and Anchorage Channel. Furthermore, potential suitable sea turtle habitat was designated on both sides of Ambrose Channel. The Bay Ridge Channel has a marginal likelihood of encountering sea turtles based upon the habitat suitability index. The remaining channels, the Port Jersey Channel, Kill van Kull, Arthur Kill, and the Newark Bay channels, have the least likelihood of encountering a sea turtle during the proposed dredging project.

ENVIRONMENTAL BASELINE

By regulation, environmental baselines for biological opinions include the past and present impacts of all State, Federal or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of State or private actions which are contemporaneous with the consultation in process (50 CFR §402.02). The environmental baseline for this biological opinion includes the effects of several activities that affect the survival and recovery of threatened and endangered species in the action area.

Within the Harbor Complex, optimal sea turtle habitat and any turtles located in the action area most likely have been impacted by previous dredging projects and pollution. Dredging activities have the ability to impact sea turtles by entraining and killing turtles; resuspending sediment containing contaminants and exposing turtles to these pollutants; increasing vessel traffic leading to a greater likelihood of vessel collisions; and altering foraging habitat. Marine debris (e.g., discarded fishing line or lines from boats) can also entangle turtles in the water and drown them. Turtles commonly ingest plastic or mistake debris for food, and with the large amount of waterfront development in the Harbor Complex there would be the potential for pollution to enter the marine environment. Chemical contaminants may also have an effect on sea turtle reproduction and survival. While the effects of contaminants on turtles is relatively unclear, it may make sea turtles more susceptible to disease by weakening their immune systems.

Heavy usage of the harbor and widespread development of the waterfront (i.e., industrial parks, marine terminals, recreational real estate) could have affected sea turtles in the action area. Coastal development and/or construction sites often result in excessive water turbidity which could influence sea turtle foraging ability. There are numerous bridges and tunnels located in the Harbor Complex, and the development of this infrastructure could have impacted sea turtles and disrupted foraging patterns. Another potential contributor to sea turtle mortality in the harbor is collisions with vessels, from both commercial and recreational sources. These impacts

INACTIVE

could have negatively impacted the abundance of sea turtles in the Harbor Complex, but it is difficult to quantify the effects of these actions on sea turtles due to a lack of information on and documentation of turtles within the action area.

The best available information on the abundance of sea turtles in the Harbor Complex is sea turtle stranding data. Documentation from the Sea Turtle Stranding and Salvage Network (STSSN) from 1980 through 1997 show stranded sea turtles in the vicinity of the proposed project area, including Sandy Hook, Staten Island, Coney Island, and Rockaway. While sea turtles are commonly found in the New York Bight during the warmer months, it is important to note that sea turtle carcasses are subject to currents and oceanic patterns so the presence of a stranded turtle in a particular area is not always indicative of live turtles in the immediate waters (i.e., the Upper New York Bay).

While sea turtles are in the vicinity of the action area during the summer months and a portion of the habitat within the Harbor Complex is suitable for sea turtle species, there has been no evidence as to the abundance of turtles within the action area in recent years. Due to the limited knowledge about the population status of endangered or threatened sea turtles in the action area, it is impossible to accurately assess the past and present impacts of harbor activities on sea turtles at this time.

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EFFECTS OF THE PROPOSED ACTION

This section of a Biological Opinion assesses the direct and indirect effects of the proposed action on threatened and endangered species or critical habitat, together with the effects of other activities that are interrelated or interdependent (50 CFR §402.02). Indirect effects are those that are caused later in time, but are still reasonably certain to occur. Interrelated actions are those that are part of a larger action and depend upon the larger action for their justification. Interdependent actions are those that have no independent utility apart from the action under consideration (50 CFR §402.02).

In this section of a biological opinion, as required by the ESA and interagency section 7 regulations, NMFS assesses the direct and indirect effects of the proposed action, and of interrelated and interdependent actions on threatened and endangered species and designated critical habitat. The purpose of this assessment is to determine if it is reasonable to expect the ACOE's proposed action to have direct or indirect effects on threatened and endangered species that appreciably reduce their likelihood of both the survival and recovery in the wild [which is the "jeopardy" standard established by 50 CFR §402.02]. The purpose of this assessment is also to determine if it is reasonable to expect the proposed action to appreciably diminish the value of designated critical habitat for both the survival and recovery of threatened and endangered species in the wild [which is the "destruction or adverse modification" standard established by 50 CFR §402.02].

The proposed action is likely to adversely affect threatened and endangered sea turtles in four different ways; (1) the dredges can entrain and kill sea turtles, (2) the proposed action can alter the sea turtle's foraging habitat, (3) the dredging can resuspend sediment that contains contaminants and expose the sea turtles to those contaminants, and (4) the proposed action can increase the number of turtles killed in collisions with vessels by increasing vessel traffic in the

action area. Biological interactions result from disturbance of normal sea turtle foraging behavior and changes in the composition of the marine community. This Biological Opinion assesses each of these four effects on the sea turtles' likelihood of surviving and recovering in the wild.

The proposed project under consideration is the deepening of selected channels in the Harbor Complex. Sea turtles may occur in the action area at various times of the year and may therefore be adversely affected directly or indirectly by the channel dredging. The primary factor influencing sea turtle presence in New York waters is seasonal temperature patterns (Ruben and Morreale 1999). Temperature is correlated with the time of year, with the warmer waters in the late spring, summer, and early fall being the most suitable for cold-blooded sea turtles. If sea turtles are expected to be more common in the Harbor Complex during the warmer months and the proposed project is expected to occur, in part, in the late spring, summer, and early fall, the likelihood that dredging activities would affect sea turtles is greater at this time than in other times of the year.

Crowder et al. (1994) found that population growth rates of loggerheads and Kemp's ridleys are strongly influenced by changes in survival of large juveniles. The chelonid turtles found in Northeast nearshore waters are small juveniles, and the abundant resources in these nearshore environments results in extremely high measured growth of juveniles (e.g., Kemp's ridleys had growth rates as high as 25% of their body weight per month in Long Island, New York) before they slow down their activity in the fall (Burke et al. 1990, Morreale and Standora 1994). If medium to large juveniles are present, most likely foraging, in the project area before they migrate southward, particular care should be taken to protect these sea turtles from any adverse impacts.

The sea turtle recovery plans identify the impacts of dredging as both the destruction or degradation of habitat and the incidental take of sea turtles. The proposed project involves both types of impacts. Since dredging involves removing the bottom material down to a specified depth, the benthic environment could be severely impacted by dredging operations. Dredging would likely cause indirect effects on sea turtles by reducing prey species through the alteration of the existing biotic assemblages. The most common sea turtles found in the Northeast, the loggerhead and Kemp's ridley, forage mainly on benthic species, namely crabs and mollusks (Morreale and Standora 1992, Bjorndal 1997). The loss of foraging habitat could be especially detrimental to sea turtles because these species primarily enter northeastern shallow harbors and bays to forage (NMFS 1995). The FEIS predicted that the loss of bottom feeding areas would be temporary because natural sedimentation is expected to occur fairly rapidly, but the loss of littoral zone feeding areas in the Kill van Kull, Newark Bay and Arthur Kill would be permanent. The permanent reduction of foraging habitat in these three channels will not likely disrupt sea turtle feeding because these channels are not likely to be suitable habitat for sea turtles. Turtles are not very easily affected by changes in water quality, increased suspended sediments, or even by moderate alterations of flow regimes. Nevertheless, if these changes make the habitat less suitable for turtles, in the long run sea turtles would tend to leave or avoid these less desirable areas, especially if they became food limited (Ruben and Morreale 1999).

INACTIVE

Entrainment is the most imminent danger for sea turtles during selected dredging operations. Hopper dredges are known to entrain sea turtles (Magnuson et al. 1990, Slay 1995), while cutterhead, clamshell bucket, and similar dredges that are usually stationary or extremely slow moving and involve dropping a bucket on a single point for extended periods of time do not characteristically impact sea turtles. Hopper dredging is proposed only for the Ambrose Channel. The direct impacts of dredging on sea turtles in all other channels is minimal given the type of dredges proposed (e.g., conventional clamshell, environmental clamshell, and backhoe) and while the possibility of sea turtle interactions with clamshell-type dredges is not impossible, it is very unlikely. It is important to note, however, that regardless of the type of dredge employed, the likelihood of interactions with sea turtles increases during the warmer months, especially in specific channels (e.g., Ambrose Channel, Anchorage Channel and Bay Ridge Channel).

As mentioned previously, the December 1999 Main Report for the New York and New Jersey Harbor Navigation Study stated that several dredges could be used at one time. Except for in Ambrose Channel, the number of dredges used should not cause a large amount of additional impact to sea turtles because the type of dredging proposed (mechanical dredges) is not likely to entrain turtles. In Ambrose Channel, the likelihood of hopper dredges encountering sea turtles is compounded when using more than one dredge. Because the number of dredges to be used in each channel has not yet been finalized, this biological opinion and the accompanying incidental take statement assumes that the maximum number of dredges, as stated in the Main Report, will be used.

Sea turtle mortality in hopper dredging operations occurs when the turtles are sucked into the dredge draghead, pumped through the intake pipe and then killed as they cycle through the centrifugal pump and into the hopper. In King's Bay, Georgia, turtle parts were found at the mouth of the hopper dredge draghead (Slay and Richardson 1988), and at least 38 sea turtle mortalities associated with hopper dredging were recorded during 1991 in three ports located in Brunswick, Georgia, Savannah, Georgia, and Charleston, South Carolina (Slay 1995).

Documented mortalities are more common in the southeastern U.S. probably due to the greater abundance of turtles in these waters, but the potential for an individual sea turtle to be entrained in hopper dredges would be the same for turtles present in the Northeast. Sea turtle mortality in dredging activities has been documented in the Northeast; a loggerhead turtle was taken by a hopper dredge off the coast of Sea Girt, New Jersey during an ACOE beach renourishment project on August 23, 1997. This turtle was closed up in the hinge between the draghead and the dragarm as the dragarm lifted off the bottom. Additionally, during the dredging of 1,200,000 CY of sediment from Delaware Bay in 1994, a loggerhead turtle was entrained in a hopper dredge.

Because entrainment is believed to occur primarily while the draghead is operating on the bottom, it is likely that only those species feeding or resting on or near the bottom would be vulnerable to entrainment. In rare cases, animals may be entrained if suction is created in the draghead by current flow while the device is being placed or removed. However, it is possible to operate the dredge in a manner that minimizes potential for such incidents as noted in the Monitoring Specifications for Hopper Dredges (Appendix A).

INACTIVE

While turtles primarily forage in shallow environments, they have been found resting in deeper waters which could cause additional impacts from dredging activities. In 1981, observers documented the take of 71 loggerheads by a hopper dredge at the Port Canaveral Ship Channel, Florida (Slay and Richardson 1988). This channel is a deep, low productivity environment in the Southeast Atlantic that encourages turtles to rest on the bottom, making them extremely vulnerable to entrainment. The large number of turtle mortalities at the Port Canaveral Ship Channel in the early 1980s resulted in part from turtles being buried in the mud, but this is the only area on the east coast where this is known to occur. Chelonid turtles have been found to make use of deeper, less productive channels as resting areas that afford protection from predators because of the low energy, deep water conditions. Leatherbacks have been shown to dive to great depths, often spending a considerable amount of time on the bottom (NMFS 1995). The proposed channels for dredging currently range between 35 and 45 ft in depth (Ambrose Channel is 45 ft deep), but given that sea turtles in the Harbor Complex are infrequent visitors and most likely inhabit the area to forage in water depths between 16 and 49 ft, the probability that turtles are resting in these channels, devoid of suitable benthic resources, is low.

As stated in the FEIS, portions of several channels, Kill van Kull, Arthur Kill, Port Jersey Channel, Newark Bay and South Elizabeth Channel, are proposed to undergo bedrock blasting to effectively deepen the channels. Although infrequent visitors to the inner harbor where these channels are located, sea turtles have the potential to sustain injuries as a result of pressure waves produced by the blast. In July of 1999, the ACOE requested the NMFS' concurrence that the planned deepening/blasting of Reaches 1 and 2 of the Kill van Kull was not likely to adversely affect endangered and threatened sea turtles and marine mammals. In a letter dated August 6, 1999, the NMFS concluded that with the exception of occasional transients, no endangered or threatened species were expected to be found in the area proposed for blasting. NMFS' previous conclusion holds true for the proposed blasting project in the Kill van Kull. The likelihood that a sea turtle would be found in the other channels proposed for blasting is the same or less than that of the Kill van Kull, so the portion of the project involving blasting in the channels is not anticipated to have any impact on sea turtles.

The proposed deepening of the navigation channels in the Harbor Complex could affect the degree of exposure of biological receptors to contaminants. A well documented effect of dredging activities is the resuspension of sediments, thus the potential for exposure to contaminated sediments would increase with dredging. In 1995, a study was performed to evaluate the degree of resuspension of sediment particles into the water column from dredging activities (Lawler, Matusky and Skelly Engineers 1997 in ACOE 1999). This study took place in the Arthur Kill at the Howland Hook Marine Terminal, an area with contaminated clay sediments and high current velocities (i.e., potential for suspended sediments to be transported great distances). The study concluded that the range of transported suspended solids in the water column after dredging operations with an environmental dredge was less than 500 ft from the dredge. The areas most likely to experience an increase in biological exposure to contaminants due to dredging activities are within 500 ft of the navigation channels in Newark Bay, the Arthur Kill, the Kill van Kull, and the Bay Ridge Channel (ACOE 1999). These regions are the most contaminated within the Harbor Complex and also contain the highest proportions of fines in the sediment.

INACTIVE

Because turtles forage on benthic invertebrates and vegetation, in which contaminants accumulate primarily from the sediment rather than from the water column, suspension of contaminants in the water column during dredging activities is not expected to increase the turtles' exposure significantly (ACOE 1999). However, suspension of contaminated sediments will subject sea turtles to direct physical contact with these toxics. Loggerheads have consistently higher levels of PCBs (Polychlorinated biphenyl) and DDE (1,1-dichloro-2, 2-bis(p-chlorophenyl)ethylene) than green sea turtles, and it has been hypothesized that the variation is due to dietary differences (George 1997). Little is known about the effect of chemical pollutants on sea turtles, but based on knowledge of the effects in other organisms it is possible that pollutants can cause immunosuppression which could lead to disease later in life. Regardless, sea turtles are not likely to be readily found in the areas of proposed contamination.

The purpose of this project is to deepen the channels to provide more convenient access to the harbor by larger, deeper-draft vessels. By deepening the channels, the number and size of vessels entering the harbor would increase, leading to the probable expansion of the associated tug fleet. The resulting traffic would increase the potential for accidents and associated petroleum-product spills. Sea turtles are exposed to the harmful effects of oil pollution by prolonged physical contact with the floating oil, eating contaminated food or tar balls, or breathing the surface layer of air containing petroleum vapor before diving (Lutcavage et al. 1997). While channel deepening could reduce the potential for accidents and associated spills by broadening the window suitable for passage and thus relieving congestion, a larger number of vessels will be in the area nevertheless, elevating the likelihood of vessel associated problems.

Countless numbers of loggerheads and 5 to 50 Kemp's ridley turtles are estimated to be killed by vessel traffic per year in the U.S. (Lutcavage et al. 1997). Although some of these strikes may be post-mortem, the data show that vessel traffic is a substantial cause of sea turtle mortality. An increase in vessel traffic associated with the deepening of channels in the Harbor Complex would magnify the potential for vessel interactions with turtles. In addition, the placement of dredged material and the associated increase in boat and barge traffic could also impact sea turtles. While there is a greater risk of lethal and non-lethal impacts as a result of ship strikes from increased marine congestion, the small size of the chelonid turtles utilizing the project area reduces the susceptibility of encounters with commercial vessel traffic. Leatherbacks are transient in the project area and the potential for impacts from any additional vessel/barge traffic created by this dredging project is low. Furthermore, the impacts on endangered and threatened species related to dredged material disposal were already considered for the HARS and the reef sites, as mentioned previously. The third marine disposal site, the sub-channel cells, is located within the Bay Ridge Channel. Considering that the disposal of the Bay Ridge Channel dredged material is in the same area as the proposed dredging and sea turtles have a marginal likelihood of being in this area, this action will not likely have any additional effects on protected species outside those of the dredging process itself.

Based on the knowledge of sea turtle life history, the project methodology, the magnitude of the project impacts, and the minimal evidence of sea turtles in the Harbor Complex, the NMFS believes that the proposed project is not likely to appreciably reduce sea turtles' likelihood of survival and recovery in the wild. Most of the channels proposed for dredging (Bay Ridge, Port Jersey, Kill van Kull, Arthur Kill, and Newark Bay channels) are located within the Upper New

INACTIVE

York Bay. It is unlikely that turtles are found in the Harbor Complex, especially in the Upper New York Bay and the highly congested and trafficked channels of the inner harbor. Additionally, the physical habitat characteristics in the project area do not suggest that it would represent a concentration area for sea turtles, especially in Port Jersey, Kill van Kull, Arthur Kill and Newark Bay channels. Therefore, clamshell bucket/backhoe dredging and blasting in these channels are expected to have minimal impact on sea turtle foraging ability and survival.

The greatest likelihood of encountering sea turtles is in Ambrose Channel, Anchorage Channel and Bay Ridge Channel, based on the proximity to suitable sea turtle habitat and the New York Bight where turtles have been documented. While hopper dredging has been found to harm sea turtles, the type of slow-moving mechanical dredge proposed for use in Anchorage Channel and Bay Ridge Channel is thought to have minimal impact on sea turtles. While this type of dredge can adversely affect sea turtles' habitat and foraging ability, given the minimal likelihood of sea turtle injury or mortality with the proposed dredge and the frequency of turtles in these two channels, this dredging activity is not likely to reduce sea turtle survival or recovery in the wild. Hopper dredging in Ambrose Channel does have the ability to cause sea turtle mortality via entrainment, but there is also limited documentation of sea turtles in this channel area. Even though the subpopulation of loggerheads most likely to be found in the action area is the northern subpopulation (which has a small population and stable or declining nesting numbers), the potential impacts of hopper dredging in Ambrose Channel are not likely to appreciably reduce the reproduction, numbers or distribution of loggerheads (or Kemp's ridley, leatherback or green sea turtles) in the action area. Since maintenance dredging is not expected to be conducted in Ambrose Channel due to ongoing commercial sand mining which removes shoaled sediments, the potential for incidental take of sea turtles by hopper dredges is limited to the initial dredging activities described above (estimated to be completed within an interval of approximately 3 years).

INACTIVE

CUMULATIVE EFFECTS

Cumulative effects include the effects of future state, tribal, local or private actions that are reasonably certain to occur within the action area considered in this biological opinion. Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

Natural mortality of sea turtles, including disease (parasites), predation, and cold-stunning, occurs in Northeast waters. In addition to dredging activities, sources of human-induced mortality and/or harassment of turtles in the action area include incidental takes in state-regulated fishing activities, vessel collisions, ingestion of plastic debris, and pollution. While the combination of these activities may affect populations of endangered and threatened sea turtles, preventing or slowing a species' recovery, the magnitude of these effects is currently unknown.

Fishing activities are considered one of the most significant causes of death and serious injury for sea turtles. A 1990 National Research Council report estimated that 550 to 5,500 sea turtles (juvenile and adult loggerheads and Kemp's ridleys) die each year from all other fishing activities besides shrimp fishing. Fishing gear in state waters, including bottom trawls, gillnets, and pound nets, take a large number of sea turtles in the New York/New Jersey area each year.

Between 1979 and 1988, 58 stranded sea turtles reported in the New York Bight exhibited signs of entanglement with debris or inactive or fixed fishing gear (Magnuson et al. 1990). In 1996, one loggerhead was observed in a trawl in coastal waters off the south side of Long Island, and in the same year, another loggerhead was observed taken in a trawl inside the New York Bight. Most pound net takes in the New York Bight do not result in mortalities, but deaths could occur if the turtles get tangled in the hedging or stringers. NMFS expects commercial and recreational fisheries managed by states along the Atlantic coast to continue within the action area in the foreseeable future.

NMFS STSSN data indicate that interactions with small recreational vessels are responsible for a large number of sea turtles stranded each year on New York/New Jersey shores. Collision with boats can stun or easily kill sea turtles, and many stranded turtles have obvious propeller or collision marks (R. Boettcher, pers. comm.).

Marine debris (e.g., discarded fishing line or lines from boats) can entangle turtles in the water and drown them. Turtles commonly ingest plastic or mistake debris for food, as observed with the leatherback sea turtle. The leatherback's preferred diet includes jellyfish, but similar looking plastic bags are often found in the turtle's stomach contents (Magnuson et al. 1990). Chemical contaminants may also have an effect on sea turtle reproduction and survival. While the effects of contaminants on turtles is relatively unclear, pollution may be linked to the fabropapilloma virus that kills many turtles each year (NMFS 1997). If pollution is not the causal agent, it may make sea turtles more susceptible to disease by weakening their immune systems.

Excessive turbidity due to coastal development and/or construction sites could influence sea turtle foraging ability. As mentioned previously, turtles are not very easily affected by changes in water quality or increased suspended sediments, but if these alterations make habitat less suitable for turtles and hinder their capability to forage, eventually they would tend to leave or avoid these less desirable areas (Ruben and Morreale 1999).

INACTIVE

CONCLUSION

After reviewing the current status of the species discussed herein, the environmental baseline for the action area, the effects of the proposed action and the cumulative effects, it is the NMFS' biological opinion that the proposed action may adversely affect but is not likely to jeopardize the continued existence of endangered Kemp's ridley, green, leatherback or threatened loggerhead sea turtles. No critical habitat has been designated in the action area, therefore, none will be affected.

INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and Federal regulations pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by NMFS to include any act which actually kills or injures fish or wildlife. Such an act may include significant habitat modification or degradation that actually kills or injures fish or wildlife by significantly impairing essential behavioral patterns including breeding, spawning, rearing, migrating, feeding, or sheltering. Harass is defined by FWS as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited under the ESA provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are non-discretionary, and must be undertaken by ACOE so that they become binding conditions for the exemption in section 7(o)(2) to apply. ACOE has a continuing duty to regulate the activity covered by this Incidental Take Statement. If ACOE (1) fails to assume and implement the terms and conditions or (2) fails to adhere to the terms and conditions of the Incidental Take Statement through enforceable terms, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, ACOE must report the progress of the action and its impact on the species to the NMFS as specified in the Incidental Take Statement [50 CFR §402.14(i)(3)].

Amount or extent of take anticipated

Due to the proposed method of dredging and location to suitable sea turtle habitat, dredging activities in Anchorage Channel, Bay Ridge Channel, Port Jersey Channel, Kill van Kull, Arthur Kill, and Newark Bay channels are not expected to result in any lethal or non-lethal take of sea turtles. No incidental take level will be designated for dredging activities in these channels. However, dredging activities in Ambrose Channel do have the potential to encounter sea turtles and the proposed method of dredging (hopper dredge) has been found to entrain sea turtles. The allowable incidental take of sea turtles by injury or mortality for the dredging of Ambrose Channel in the Harbor Complex is two (2) loggerhead, one (1) green, one (1) Kemp's ridley, or one (1) leatherback sea turtle. This incidental take level is valid for only the proposed dredging of Ambrose Channel as outlined in The Feasibility Report for the New York and New Jersey Harbor Navigation Study. As stated in the preliminary working schedule in the Main Report for the New York and New Jersey Harbor Navigation Study, the length of time proposed for initial dredging of Ambrose Channel is approximately 3 years and the maintenance dredging is not expected to occur due to ongoing sandmining activities. Therefore, the incidental take level (2 loggerhead, 1 green, 1 Kemp's ridley or 1 leatherback sea turtle) is based on anticipated take of sea turtles during the initial dredging activities in the Ambrose Channel dredging project (estimated to completed within a three year period). Since maintenance dredging is not expected to occur, no additional take of sea turtles is anticipated beyond the initial period.

INACTIVE

Effect of the take
In the accompanying biological opinion, the NMFS determined that levels of anticipated take are not likely to result in jeopardy to the loggerhead, leatherback, green, or Kemp's ridley sea turtles.

Reasonable and prudent measures
The NMFS believes the following reasonable and prudent measures are necessary and appropriate to minimize impacts of incidental take of endangered and threatened sea turtles:

1. Between May 1 and November 15, hopper dredges shall be outfitted with state-of-the-art sea turtle deflectors on the draghead and operated in a manner that will reduce the risk of interaction with sea turtles which may be present in the dredge area.

2. ACOE must develop a system to accurately monitor the number of sea turtles taken by the dredge and record interactions with any protected species during dredging, transport, and release of material at the disposal site.

3. ACOE must develop and follow a system to provide timely reporting to the NMFS on any takes of protected species.

4. Personnel onboard dredge vessels must follow specific instructions on proper sea turtle handling and resuscitation techniques.

Terms and conditions
In order to be exempt from prohibitions of section 9 of the ESA, ACOE must comply with the following terms and conditions, which implement the reasonable and prudent measures described above and outline required reporting/monitoring requirements. These terms and conditions are non-discretionary.

1. If dredging occurs between May 1 and November 15, hopper dredges must be equipped with the rigid deflector draghead as designed by the ACOE Waterways Experimental Station (WES), or if that is unavailable, a rigid sea turtle deflector attached to the draghead. Deflectors should be checked and/or adjusted by a designated expert prior to a dredge operation to insure proper installment and operation during dredging. The deflector should be checked after every load throughout the dredge operation to ensure that proper installation is maintained. Since operator skill is important to the effectiveness of the WES-developed draghead, operators must be properly instructed in its use.

2. If a hopper dredge is used to accomplish dredging during the period of May 1 through November 15, the ACOE must adhere to the attached "Monitoring Specifications for Hopper Dredges" with trained NMFS-approved sea turtle observers, in accordance with the attached "Observer Protocol" and "Observer Criteria" (Appendix A). The New York District ACOE shall ensure that all contracted personnel involved in operating hopper dredges receive thorough training on measures of dredge operation that will minimize takes of sea turtles. Training shall include measures discussed in Appendix A. Each hopper dredging contractor

INACTIVE

should follow operating procedures proven to be effective in reducing turtle/dredge interactions during hopper dredging in other regions.

3. A final report summarizing the results of the dredging and any takes of listed species must be submitted by the ACOE to NMFS (at the address specified in Appendix A, Item II-C) within 30 working days of completion of each cycle of the project. At this time, the ACOE may request that NMFS evaluate whether further observer coverage is necessary based on observed takes, changes in project plans, and new information that may become available.
4. It is unlikely that sea turtles will survive entrainment in a hopper dredge, as the turtles found in the dragheads are almost always dead, dying, or dismantled. However, a few turtles have escaped hopper dredges without apparent injuries. A sub-adult loggerhead was removed from dredge gear unharmed in Savannah, Georgia and an occasional small green turtle has been known to survive (Slay 1995, Magnuson et al. 1990). The procedures for handling live sea turtles are outlined in case the unlikely event should occur. All permit holders must follow the sea turtle handling techniques specified in Appendix A-II-E and Appendix B.

NMFS anticipates that no more than 2 loggerhead, 1 green, 1 Kemp's ridley or 1 leatherback sea turtle will be incidentally taken as a result of the initial 3 year Ambrose Channel deepening project. Since maintenance dredging in the Ambrose Channel is not expected, no additional take is anticipated beyond the initial dredging activity. The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize the potential for and impact of incidental take that might otherwise result from the proposed action. If, during the course of the action, the level of incidental take is exceeded, such incidental take represents new information requiring reinitiation of consultation and review of the reasonable and prudent measures provided. When the incidental take has been reached/exceeded, the ACOE must immediately provide an explanation of the causes of the taking and review with the NMFS the need for possible modification of the reasonable and prudent measures.

INACTIVE

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA directs Federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. NMFS has determined that the New York/New Jersey Harbor Navigation Project as proposed is not likely to jeopardize the continued existence of endangered and threatened sea turtles located in the project area. To further reduce the adverse effects of the dredging project on listed species, NMFS recommends that ACOE implement the following conservation measures.

1. Dredging operations will ideally be conducted within the time period when sea turtles are not likely to be found in northeastern waters. Where weather/sea conditions permit, dredging should be conducted from November 15 to May 1, when sea turtles are the least likely to be encountered in the Harbor Complex. The BA recommended dredging during the time window of October 26 to May 1, but the recommended November 15 start date would protect any turtles occurring in the area later than normal. While the migration patterns of sea turtles are relatively predictable, uncertainties in distribution remain as exemplified by the high numbers of cold stunned turtles in Massachusetts in January 2000. Additionally, Shoop and

Kenney (1992) found that loggerheads and leatherbacks were both rare or absent in Northeast U.S. waters in November through April.

The areas where sea turtles are least likely to occur (Kill van Kull, Newark Bay channels, Arthur Kill, Port Jersey Channel) could be dredged at any time during the year. During the period when turtles are not expected to be in the area (November 15-May 1), dredging could occur in those areas where turtles are more likely to be present: Ambrose Channel, Anchorage Channel, and Bay Ridge Channel. While these time of year restrictions would best protect endangered and threatened sea turtles, dredging during the winter and spring may not be possible due to the presence of other fish (e.g., winter founder, striped bass).

2. The operation of hopper dredges has resulted in more incidental takes of sea turtles than any other type of dredge. Hopper dredging is proposed for Ambrose Channel and while turtles are relatively uncommon in the Harbor Complex, they are most likely to occur in this channel given the proximity to suitable sea turtle habitat and areas of known sea turtle abundance. If feasible, another dredging technique would be preferable over hopper dredging in Ambrose Channel in order to effectively protect sea turtles.

3. ACOE should support future research to identify the timing, occurrence, distribution, and the ecology of sea turtles in the Harbor Complex. The Harbor Complex is the site of intense human activity, so similar dredging activities will most likely be needed in the future. Knowledge of the distribution of turtles in the harbor area will assist ACOE in planning future dredging projects by predicting where, when, and if sea turtles are inhabiting these waters. A more accurate assessment of sea turtle abundance within the Harbor Complex would also help to adequately protect endangered and threatened sea turtles.

4. To facilitate future management decisions on listed species occurring in the action area, ACOE should maintain a database mapping system to: 1) create a history of use of the geographic areas affected; and, 2) document endangered/threatened species presence/interactions with project operations.

5. ACOE should support future biological monitoring to determine the composition and/or density of benthic fauna. The ACOE would be able to use these data on the benthic environment to establish the recolonization rate of the disturbed areas, and the functional use of the area by higher-trophic level populations. Loggerhead and Kemp's ridley sea turtles forage primarily on crabs and mollusks, and are found to take up residence in areas of very abundant benthic invertebrates. This biological monitoring data could be used to help predict the habitat suitability of a particular area for sea turtles. Benthic data for the area would also provide a baseline for evaluating the recovery of the benthic community.

6. ACOE should support research to evaluate the effects of dredging on sea turtles in the Northeast. Most of the information on hopper dredging and sea turtles is derived from the southeastern U.S. While hopper dredges in the Northeast have the potential to invoke similar threats to turtles due to the same operating techniques, the abundance, distribution, and ecology of turtles is different in northeastern waters and the impacts of hopper dredging on the population could vary.

INACTIVE

REINITIATON OF CONSULTATION

This concludes formal consultation on the actions outlined in the Main Report and FEIS found within The Feasibility Report for the New York and New Jersey Harbor Navigation Study. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of taking specified in the incidental take statement is exceeded; (2) new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered; (3) the identified action is subsequently modified in a manner that causes an effect to listed species or critical habitat that was not considered in this biological opinion; or (4) a new species is listed or critical habitat designated that may be affected by the identified action. In instances where the amount or extent of incidental take is exceeded, the ACOE must immediately request initiation of formal section 7 consultation.

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Appendix A.

MONITORING SPECIFICATIONS FOR HOPPER DREDGES

I. EQUIPMENT SPECIFICATIONS

A. Baskets or screening

Baskets or screening must be installed over the hopper inflows with openings no smaller than 4 inches by 4 inches to provide 100% coverage of all dredged material and shall remain in place during all dredging operations between May 1 and November 15 of any calendar year. Baskets/screening will allow for better monitoring by observers of the dredged material intake for sea turtles and their remains. The baskets or screening must be safely accessible to the observer and designed for efficient cleaning.

B. Draghead

The draghead of the dredge shall remain on the bottom **at all times** during a pumping operation, except when:

1) the dredge is not in a pumping operation, and the suction pumps are turned completely off;

2) the dredge is being re-oriented to the next dredge line during borrow activities; and

3) the vessel's safety is at risk (i.e., the dragarm is trailing too far under the ship's hull).

At initiation of dredging, the draghead shall be placed on the bottom during priming of the suction pump. If the draghead and/or dragarm become clogged during dredging activity, the pump shall be shut down, the dragarms raised, whereby the draghead and/or dragarm can be flushed out by trailing the dragarm along side the ship. If plugging conditions persist, the draghead shall be placed on deck, whereby sufficient numbers of water ports can be opened on the draghead to prevent future plugging.

Upon completion of a dredge track line, the drag tender shall:

1) throttle back on the RPMs of the suction pump engine to an idling speed (e.g., generally less than 100 RPMs) **prior to** raising the draghead off the bottom, so that no flow of material is coming through the pipe into the dredge hopper. Before the draghead is raised, the vacuum gauge on the pipe should read zero, so that no suction exists both in the dragarm and draghead, and no suction force exists that can impinge a turtle on the draghead grate;

2) hold the draghead firmly on the bottom with no flow conditions for approximately 10 to 15 seconds before raising the draghead; then, raise the draghead quickly off the bottom and up to a mid-water column level, to further reduce the potential for any adverse interaction with nearby turtles;

INACTIVE

3) re-orient the dredge quickly to the next dredge line; and

3) re-position the draghead firmly on the bottom prior to bringing the dredge pump to normal pumping speed, and re-starting dredging activity.

C. Floodlights

Floodlights must be installed to allow the NMFS-approved observer to safely observe and monitor the baskets or screens.

D. Intervals between dredging

Sufficient time must be allotted between each dredging cycle for the NMFS-approved observer to inspect and thoroughly clean the baskets and screens for sea turtles and/or turtle parts and document the findings. Between each dredging cycle, the NMFS-approved observer should also examine and clean the dragheads and document the findings.

II. OBSERVER PROTOCOL

A. Basic Requirement

A NMFS-approved observer with demonstrated ability to identify sea turtle species must be placed aboard the dredge(s) being used; starting immediately upon project commencement to monitor for the presence of listed species and/or parts being entrained or present in the vicinity of dredge operations.

B. Duty Cycle

One NMFS-approved observer is to be onboard for the first week of dredging beginning May 1 and subsequent shifts would proceed one week on and one week off duty until project completion or November 15, whichever comes first. While onboard, observers shall provide the required inspection coverage on a rotating basis of six hours on and six hours off each day. Combined monitoring periods would then represent 50% of total dredging time through one dredging cycle with 25% of total dredging time having actually been monitored by observers. After the first cycle of dredging, ACOE may request that NMFS evaluate the observer data to determine if the same level of monitoring is necessary for the next cycle of dredging.

C. Inspection of Dredge Spoils

During the required inspection coverage, the trained NMFS-approved observer shall inspect the galvanized screens and baskets at the completion of each loading cycle for evidence of sea turtles. The Endangered Species Observation Form shall be completed for each loading cycle, whether sea turtles are present or not (Appendix C). If any whole turtles (alive or dead) or turtle parts are taken incidental to the project(s), Carrie McDaniel (978) 281-9388 or Mary Colligan (978) 281-9116 must be contacted within 24 hours of the take. An incident report for sea turtle take (Appendix D) should also be completed by the observer and sent to Carrie McDaniel via

INACTIVE

FAX (978) 281-9394 within 24 hours of the take. Every sea turtle incidental take (alive or dead) should be photographed. Weekly reports, including all completed load sheets, photographs, and relevant incident reports, as well as a final report, are to be submitted to the attention of Carrie McDaniel, NMFS, Protected Resources Division, One Blackburn Drive, Gloucester, MA 01930-2298; and the Regulatory Branch of the New York District ACOE within seven days of completion of each observation period.

D. Information to be Collected

For each sighting of any endangered or threatened marine species (including whales as well as sea turtles), record the following information on the Endangered Species Observation Form (Appendix C):

1) Date, time, coordinates of vessel
2) Visibility, weather, sea state
3) Vector of sighting (distance, bearing)
4) Duration of sighting
5) Species and number of animals
6) Observed behaviors (feeding, diving, breaching, etc.)
7) Description of interaction with the operation

E. Disposition of Parts

If any whole turtles (alive or dead) or turtle parts are taken incidental to the project(s), Carrie McDaniel (978) 281-9388 or Mary Colligan (978) 281-9116 must be contacted within 24 hours of the take. All whole dead sea turtles or turtle parts should be photographed and described in detail on the Incident Report of Sea Turtle Mortality (Appendix D). The photographs and reports should be submitted to Carrie McDaniel, NMFS, Protected Resources Division, One Blackburn Drive, Gloucester, MA 01930-2298. Any dead **Kemp's ridley** sea turtles shall be photographed, placed in plastic bags, labeled with location, load number, date, and time taken, and placed in cold storage. Dead turtles or turtle parts will be further labeled as recent or old kills based on evidence such as fresh blood, odor, and length of time in water since death. Disposition of dead sea turtles will be determined by NMFS. Other sea turtle species (loggerhead, leatherback, or green turtles) taken either whole or in parts should be disposed of (after a photograph is taken and a reporting form has been completed) by attaching a weight to the turtle or turtle parts and dumping the specimen at the dredge spoil disposal site. If the turtle is unidentifiable or if there are entrails that may have come from a turtle, the subject should be photographed, placed in plastic bags, labeled with location, load number, date and time taken, and placed in cold storage. Dead Kemp's ridley or unidentifiable turtles or turtle parts will be collected by NMFS or NMFS-approved personnel (contact Carrie McDaniel at (978) 281-9388).

Live turtles (both injured and uninjured) should be held onboard the dredge until transported as soon as possible to the appropriate stranding network personnel for rehabilitation (Appendix B). No live turtles should be released back into the water without first being checked by a qualified veterinarian or a rehabilitation facility. In New York, the stranding network contact is Kim Durham, Riverhead Foundation for Marine Research, 431 East Main Street, Riverhead, NY

INACTIVE

(631-369-9829), and New Jersey contacts include Bob Schoelkopf at the Marine Mammal Stranding Center, P.O. Box 773, Brigantine, NJ (609-266-0538).

III. OBSERVER REQUIREMENTS

Submission of resumes of endangered species observer candidates to NMFS for final approval ensures that the observers placed onboard the dredges are qualified to document takes of endangered and threatened species, to confirm that incidental take levels are not exceeded, and to provide expert advice on ways to avoid impacting endangered and threatened species. NMFS does not offer certificates of approval for observers, but approves observers on a case-by-case basis.

A. Qualifications

Observers must be able to:

1) differentiate between leatherback (*Dermochelys coriacea*), loggerhead (*Caretta caretta*), Kemp's ridley (*Lepidochelys kempi*), and green (*Chelonia mydas*) sea turtles and their parts;

2) handle live sea turtles and resuscitate them according to accepted procedures;

3) correctly measure the total straight and curved length and width of live and whole dead sea turtle species; and

4) observe and advise on the appropriate screening of the dredge's overflow, skimmer funnels, and dragheads for turtles.

B. Training

Ideally, the applicant will have educational background in marine biology, general experience aboard dredges, and hands-on field experience with the species of concern. For observer candidates who do not have sufficient experience or educational background to gain immediate approval as endangered species observers, we note below the observer training necessary to be considered admissible by NMFS. We can assist the ACOE by identifying groups or individuals capable of providing acceptable observer training. Therefore, at a minimum, observer training must include:

1) instruction on how to identify sea turtles and their parts;

2) instruction on appropriate screening of hopper dredges for the monitoring of sea turtles (whole or parts);

3) demonstration of the proper handling of live sea turtles incidentally captured during project operations. Observers may be required to resuscitate sea turtles according to accepted procedures prior to transporting to a rehabilitation facility;

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4) instruction on standardized measurement methods for sea turtle lengths and widths; and

5) instruction on dredging operations and procedures, including safety precautions onboard a vessel.

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APPENDIX B.

SEA TURTLE HANDLING AND RESUSCITATION

It is unlikely that sea turtles will survive entrainment in a hopper dredge, as the turtles found in the dragheads are usually dead, dying, or dismantled. However, the procedures for handling live sea turtles follow in case the unlikely event should occur.

Please photograph all turtles (alive or dead) and turtle parts found during dredging activities and complete the Incident Report of Sea Turtle Take (Appendix D).

Dead sea turtles

The procedures for handling dead sea turtles and parts are described in Appendix A-II-E (page 38).

Live sea turtles

When a sea turtle is found in the dredge gear, observe it for activity and potential injuries.

- **If the turtle is actively moving**, it should be retained onboard until evaluated for injuries by a permitted rehabilitation facility. Due to the potential for internal injuries associated with hopper entrainment, it is necessary to transport the live turtle to the nearest rehabilitation facility as soon as possible, following these steps:
    1) Contact the nearest rehabilitation facility to inform them of the incident. If the rehabilitation personnel cannot be reached immediately, please contact Dana Hartley, NMFS Northeast Region Stranding Coordinator, at (508) 495-2090 or Carrie McDaniel at (978) 281-9388.
    2) Keep the turtle shaded and moist (e.g., with a water-soaked towel over the eyes, carapace, and flippers).
    3) Contact the crew boat to pick up the turtle as soon as possible from the dredge (within 12 to 24 hours maximum). The crew boat should be aware of the potential for such an incident to occur and should develop an appropriate protocol for transporting live sea turtles.
    4) Transport the live turtle to the closest permitted rehabilitation facility able to handle such a case.

  Do not assume that an inactive turtle is dead. The onset of rigor mortis and/or rotting flesh are often the only definite indications that a turtle is dead. Releasing a comatose turtle into any amount of water will drown it, and a turtle may recover once its lungs have had a chance to drain.

- **If a turtle appears to be comatose** (unconscious), contact the designated stranding/rehabilitation personnel immediately. Once the rehabilitation personnel has been informed of the incident, attempts should be made to revive the turtle at once. Sea turtles have been known to revive up to 24 hours after resuscitation procedures have been followed.

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Place the animal on its bottom shell (plastron) and elevate the hindquarters at least 6 inches for a period of one up to 24 hours. The degree of elevation depends on the size of the turtle; greater elevations are required for larger turtles.

- Keep the turtle shaded and moist (e.g., with a water-soaked towel over the eyes, carapace, and flippers) and observe it for up to 24 hours.
- If the turtle begins actively moving, retain the turtle on board until the appropriate rehabilitation personnel can evaluate the animal.
- Turtles that fail to move within several hours (up to 24) must be handled in the manner described in Appendix A-II-E.

Stranding/rehabilitation contacts

- *New York*: Kim Durham, Riverhead Foundation for Marine Research, 431 East Main Street, Riverhead, NY (631-369-9829).
- *New Jersey*: Bob Schoelkopf, Marine Mammal Stranding Center, P.O. Box 773, Brigantine, NJ (609-266-0538).

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APPENDIX C.

ENDANGERED SPECIES OBSERVER FORM
NY/NJ Harbor Navigation Project

Daily Report

Date: _____ _____ _____
Geographic Site: _____
Location: Lat/Long _____ Vessel Name _____

Weather conditions: _____
Water temperature: Surface _____ Below midwater (if known) _____

Condition of screening apparatus: _____
_____
_____
_____
_____

Incidents involving endangered or threatened species? (Circle) Yes No
(If yes, fill out Incident Report of Sea Turtle Mortality)

Comments (type of material, biological specimens, unusual circumstances, etc:)
_____
_____
_____
_____
_____
_____

Observer's Name: _____
Observer's Signature: _____

BRIDGE WATCH SUMMARY

Species	# of Sightings	# of Animals	Comments

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APPENDIX D.

Incident Report of Sea Turtle Take – NY/NJ Harbor Navigation Project

Species _____ Date _____ Time (specimen found) _____ _____
_____

Geographic Site _____
Location: Lat/Long _____
Vessel Name _____ Load # _____
Begin load time _____ End load time _____
Begin dump time _____ End dump time _____

Sampling method _____
Condition of screening _____
_____
Location where specimen recovered _____
_____
_____
Draghead deflector used? YES / NO Rigid deflector draghead? YES / NO
Condition of deflector _____

Weather conditions _____
_____
_____
Water temp: Surface _____ Below midwater (if known) _____

Sea Turtle Information: *(please designate cm/m or inches)*

Head width _____ Plastron length _____
Straight carapace length _____ Straight carapace width _____
_____
Curved carapace length _____ Curved carapace width _____
_____
Condition of specimen/description of animal (please complete attached diagram) _____
_____
_____
_____

Turtle tagged: YES / NO *Please record all tag numbers.* Tag # _____
Photograph attached: YES / NO
(please label *species, date, geographic site* and *vessel name* on back of photograph)__

Comments/other (include justification on how turtle was identified) _____
_____
_____
_____

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Observer's Name _____

Observer's Signature _____

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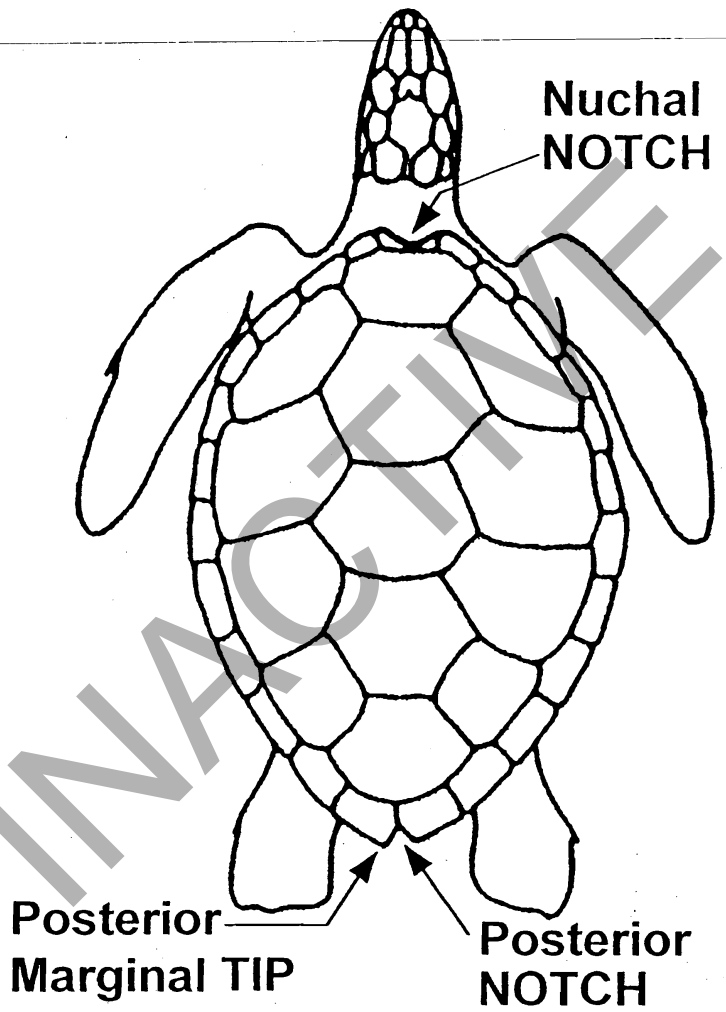
Incident Report of Sea Turtle Take – NY/NJ Harbor Navigation Project

Draw wounds, abnormalities, tag locations on diagram and briefly describe below.



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Description of animal: