50-219

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

SEP 21 1995

Dennis M. Crutchfield
Associate Director
for Advanced Reactors and License Renewal
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

Dear Mr. Crutchfield:

Enclosed is the Biological Opinion regarding the Oyster Creek Nuclear Generating Station (OCNGS). This Biological Opinion concludes that continued operation of this plant may adversely affect listed sea turtles, but is not likely to jeopardize their continued existence.

The project area is not known to be a high-use area for turtles, and no sea turtles were observed at the OCNGS during the first 23 years of operation. Turtles were also not observed in station-related sampling surveys of the Forked River, Oyster Creek, or Barnegat Bay or in surveys conducted by the State of New Jersey. In addition, few turtle strandings have been recorded for Barnegat Bay and the associated inshore waterways over the last 10 years by the Northeast Sea Turtle Stranding and Salvage Network. However, since June 1992, 9 sea turtle impingements (including one recapture) have occurred at the cooling water intake trash racks.

This Biological Opinion sets the following Incidental Take Allowance: 10 per year with up to 3 mortalities for loggerhead turtles; 3 per year with up to 1 mortality for Kemp's ridley turtles; and 2 per year with up to 1 mortality for green turtles. This Incidental Take Allowance extends for a period of five years from the date of the attached biological opinion. Reinitiation of consultation is required if, during any one year, twelve turtles are taken and/or there is a lethal take of one Kemp's ridley OR one green turtle.

This Biological Opinion considers the Biological Assessment prepared by OCNGS and received by the National Marine Fisheries Service (NMFS) on January 25, 1995 as well as additional sources of new information. If you have any questions, please call Kim Thounhurst at (508) 281-9138 or Karen Salvini at (301) 713-1401.

Sincerely,

William W. Fox, Jr., Ph.D.
Director
Office of Protected Resources

Attachment

ENDANGERED SPECIES ACT

SECTION 7 CONSULTATION

BIOLOGICAL OPINION

Agency:	Nuclear Regulatory Commission
Activity:	Consultation in accordance with Section 7(a) of the Endangered Species Act of 1973 (ESA) regarding continued operation of the Oyster Creek Nuclear Generating Station in the Forked River and Oyster Creek, Barnegat Bay, New Jersey.
Consultation Conducted By:	National Marine Fisheries Service Northeast Regional Office
Date Issued:	9-21-95

BACKGROUND:

The Oyster Creek Nuclear Generating Station (OCNGS) began commercial operation in 1969, prior to the authorization of the ESA. Therefore no consultation had been conducted in accordance with Section 7(a) of the ESA by the National Marine Fisheries Service (NMFS) with the Nuclear Regulatory Commission (NRC) on the operations of the OCNGS in the Forked River, Barnegat Bay, New Jersey. No observed takes of endangered species occurred at the OCNGS prior to 1992.

Though sea turtles are known to use New Jersey's coastal waters, no turtles were taken at the plant during the first 23 years of operation, and none were observed in Barnegat Bay in 20 years of sampling conducted by the OCNGS through 1992. Incidental captures of sea turtles at the OCNGS Circulating Water System (CWS) and Dilution Water System (DWS) cooling water intakes were documented (in June of 1992) by the OCNGS Environmental Controls personnel and reported to NMFS according to reporting procedures established through informal consultation conducted between the OCNGS, NRC, and NMFS.

Subsequent to the 1992 takes of sea turtles at the OCNGS, NMFS notified the OCNGS (in a letter dated September 14, 1992) that formal consultation under Section 7 of the ESA was necessary. Through further discussion under informal consultation, it was decided that formal consultation was not necessary at the time,

provided that certain mitigation measures (increased vigilance of plant personnel and awareness of reporting requirements, reporting of takes to NMFS and NRC, and transfer of turtles to the stranding network for rehabilitation and/or release) were implemented.

Between June 1992 and July 1994, 9 sea turtle impingements occurred at the OCNGS intake trash bars, including 5 loggerheads (4 individuals, 1 recapture), and 4 Kemp's ridleys. Two of the loggerheads and 3 of the Kemp's ridleys were recovered dead. Cause of death could not be determined in all cases.

In a letter dated November 2, 1993, NMFS stated that formal consultation was now necessary due to additional takes of threatened and endangered sea turtles. In a letter dated November 19, 1993, the NRC requested formal consultation. A Biological Assessment was prepared by the OCNGS, reviewed by the NRC, and received by NMFS on January 25, 1995.

PROPOSED ACTIVITIES:

The proposed activity is the continued operation of the Oyster Creek Nuclear Generating Station.

The Oyster Creek Nuclear Generating Station is located near the town of Forked River, midway between the south branch of the Forked River and Oyster Creek, New Jersey. The Forked River and Oyster Creek empty into Barnegat Bay. When the plant is operational, the flow direction in the south fork of the Forked River is reversed, and all of the flow goes into the OCNGS. The resultant warmed water is discharged via Oyster Creek into Barnegat Bay.

Water used to cool the condensers and associated systems is drawn into the OCNGS from the south fork of the Forked River through 6 intake bays at the Circulation Water System (CWS) and 6 intake bays at the Dilution Water System (DWS) when additional cooling is necessary. The intake at each bay is screened by trash racks, which extend from the bottom of each intake bay to several feet above the water. The average water depth is 18 feet.

The dimensions and structures at the CWS are nearly identical to those of the DWS. The major difference is that the intake velocity at the DWS is much higher and would therefore pose a greater threat to sea turtles than current velocity effects at the CWS. The intake velocity at the CWS is 0.56-0.66 ft/sec when all four pumps are operating and all six intake bays are open. By contrast, the intake velocity at the DWS is 2.4 ft/sec when both pumps are operating. The DWS is only operational in the summer and fall when temperatures are high enough to warrant

additional cooling in the condensers. This period coincides with the times when turtles are likely to use the area.

LISTED SPECIES LIKELY TO OCCUR IN THE PROJECT AREA:

Project activities are known to affect endangered Kemp's ridley sea turtles and threatened loggerhead sea turtles. Listed species under the jurisdiction of NMFS that may occur in Barnegat Bay and associated waterways and may be affected by the proposed activities include the following:

Threatened -

Loggerhead turtle (Caretta caretta)

All continental shelf waters and large bays from Virginia to Massachusetts from June through November.

Endangered -

Green turtle (Chelonia mydas)

Occasionally found in nearshore waters from Massachusetts to Virginia from June through October.

Kemp's ridley turtle (Lepidochelys kempii)

Inshore bay and estuarine habitat -- north to Massachusetts from July through October.

ADDITIONAL BIOLOGY AND DISTRIBUTION OF THE SPECIES:

Loggerhead turtle (Caretta caretta)

The loggerhead turtle is the most abundant species of sea turtle occurring in U.S. waters. Aerial surveys indicate that loggerheads occur pelagically, but are most common in waters less than 50 meters in depth (Shoop, et. al. 1981; Fritts et. al. 1983). They are known to inhabit coastal areas as juveniles and adults, and often enter bays, lagoons, and estuaries (Ernst and Barbour 1972). Different theories exist on why juvenile sea turtles use northeastern U.S. waters, but it has been demonstrated that these areas are important developmental habitat for loggerheads, as well as other chelonid turtles (Morreale and Standora 1994).

Their primary food sources are benthic invertebrates including mollusks, crustaceans, and sponges (Mortimer 1982). Although they are known to eat fish, clams, oysters, sponges, and

jellyfish, the loggerhead's preferred prey in Atlantic embayments appear to be various species of crabs (Musick et. al. 1987, Morreale and Standora 1994). Stomach content analysis of stranded specimens in Massachusetts showed that crabs were the major component of the diet there as well, along with clams, quahogs, moon snails, and squid (Prescott 1982).

Loggerhead populations are under stress from human-induced sources such as boat strikes, pollution, marine habitat degradation, development of nesting beaches, and incidental captures in fishing gear, in addition to a number of natural causes. Crouse et. al. (1987) published information indicating that the stability of loggerhead populations may be more sensitive to changes in the status of juveniles than pressures on other developmental stages. Stranding data indicates that the majority of loggerheads found off the Northeast U.S. are juveniles. Cumulative stresses on the animals in this area, then, may be impeding the recovery of this population.

Green turtle (Chelonia mydas)

Green turtle populations in the U.S. are listed as endangered if they are from the Florida breeding population and threatened if they belong to other populations. NMFS/Northeast Region considers them to be endangered unless the natal beach of the turtle is known.

Green turtles are more tropical in distribution than loggerheads and are generally found in waters between the northern and southern 20°C isotherms (Hirth 1971). They are occasionally encountered in pound nets as far north as Long Island Sound in New York, and strandings have been reported as far north as Cape Cod Bay, Massachusetts (Prescott 1982).

A 38-cm green turtle captured, tagged, and released in New York was recaptured almost one year later only 13 km from the original capture site. This suggests that, during developmental stages, the turtles may return to the same productive areas of the northwest North Atlantic for several years before establishing residency as adults in more tropical seagrass beds (Morreale and Standora 1994).

Most of the green turtles reported in U.S. waters are immature (Thompson 1988). Adult green turtles do not migrate from their regular habitat except to visit the nesting beaches (Agardy, unpubl.). Green turtle nesting in the U.S. occurs mainly on the Atlantic coast of Florida (Ehrhart 1979). More extensive nesting occurs on more southerly beaches of the western Atlantic.

Adult green turtles are herbivorous, feeding mainly on sea grasses and algae (Cymodocea, Thelassia, Zostera, Sagittaria, and

Vallisneria) (Babcock 1937; Underwood 1951; Carr 1954, 1952; Neill 1958; Mexico 1966). Immature turtles go through an omnivorous stage (1-3 years) and may be feeding on different food items than the preferred vegetation consumed by adults (Morreale and Standora 1994). Known feeding habitats in the U.S. include shallow lagoons and embayments in Florida. Similar inshore feeding areas are believed to occur elsewhere along the Atlantic coast.

Green turtles are subject to the same threats mentioned above for loggerheads. Incidental catch in commercial fisheries has the largest impact, along with trade in the animals and their products.

Kemp's ridley turtle (Lepidochelys kempii)

The Kemp's ridley turtle is probably the most severely endangered species of sea turtle in the world. The population decline of this species is one of the most dramatic ever recorded (USFWS and NMFS 1992). The only major nesting beach for Kemp's ridleys is a single stretch of beach near Rancho Nuevo, Tamaulipas, Mexico (Carr 1963, Hildebrand 1963). Virtually the entire world population of adult females nests annually in this single location (Pritchard 1969). The total number of adults in 1988 was estimated to be 1,580 to 1,750 individuals (Marquez, 1990).

While adult Kemp's ridleys may occur almost exclusively in the Gulf of Mexico, a significant number of hatchlings may be transported north along the Atlantic coast of the U.S. Kemp's ridleys have been caught offshore in commercial fishing gear as far north as northeast Georges Bank, Massachusetts (Parsons, pers. comm.). Pritchard and Marquez (1973) speculate that these young turtles feed and grow rapidly during passive transport until they are large enough to actively swim into embayments as far north as New England. These embayments apparently serve as important foraging habitats for single year classes of Kemp's ridleys. Morreale et. al. (1989) reported increases in weight of over 500 grams per month for juvenile Kemp's ridleys tracked in the Long Island Sound. As with the loggerhead turtle, juvenile Kemp's ridleys use northeastern waters as developmental habitat, foraging throughout the summer until decreasing temperatures send them south in the fall (Morreale and Standora 1994).

Reported prey of Kemp's ridleys includes benthic crustaceans (such as Polyonchus, Hepatus, Callinectes, Panopeus, Ovalipes, Calappa, Portunas, Araneus), fish (Lutjanus, Leiostomus), and mollusks (Noculana, Corbula, Mulinia, Nassarius) (Dobie, et. al. 1961; Pritchard and Marquez 1973). All of these genera are common along the eastern coast of the United States. Morreale and Standora (1992) determined that Kemp's ridleys feed primarily on crabs in New York waters. Analysis of stomach contents of

Kemp's ridleys stranded in Cape Cod Bay, Massachusetts, indicated that they are feeding on fish, sand dollars, bay scallops, and blue mussels in those waters (Prescott 1982).

From tracking studies, Morreale and Standora (1994) determined that Kemp's ridleys are sub-surface animals that frequently swim to the bottom while diving. The generalized dive profile showed that the turtles spend 56% of their time in the upper third of the water column, 12% in mid-water, and 32% on the bottom. In water shallower than 15 m (50 ft), the turtles dive to depth, but spend a considerable portion of their time in the upper portion of the water column. In contrast, turtles in deeper water dive to depth, spending as much as 50% of the dive on the bottom.

Evidence presented in Crouse et. al. (1987) illustrating the importance of juveniles to the stability of loggerhead populations may have important implications for Kemp's ridleys as well. The vast majority of Kemp's ridley occurrences along the Atlantic Coast of the U.S., largely identified from strandings, have been juveniles. Sources of mortality in this area include boat strikes, pollution, marine habitat degradation, and incidental captures in fishing gear, as well as a number of natural causes. Therefore, loss of animals in the Atlantic may be impeding the recovery of this population.

ASSESSMENT OF IMPACTS:

This assessment is based on a review of the Biological Assessment (BA) prepared by OCNGS Environmental Affairs, pertinent information submitted by the OCNGS, and other biological information referred to in Appendices.

The two major threats to sea turtles at the OCNGS are impingement at the cooling water intakes and possible cold stunning. Turtles may be attracted to the thermal effluent from the discharge canal that warms Oyster Creek, and could be cold-stunned when leaving the creek and returning to the colder water in Barnegat Bay in the late fall.

Impingements of Sea Turtles

Most sea turtles likely to occur in the project area are large enough that they would not pass through the intake screens, which are constructed with 2.6-inch wide openings. The BA states that any small turtles that would pass through the CWS intake trash bars would be transported safely and returned to the water via the same system that returns entrained fish and other small organisms. The DWS intake trash bars are not equipped with travelling screens to return entrained organisms to the water. It is unlikely that hatchling sea turtles would be in the area,

although at least one nest has been documented for New Jersey by the Sea Turtle Stranding and Salvage Network (STSSN)(Schoelkopf, pers. comm.).

Little information exists about the swimming behavior of turtles which can be used to make predictions about behavior at intake gratings or the ability to swim against various current velocities. One of the turtles which was eventually impinged was first sighted apparently trying to swim away from the intake bay, but being pulled back. The ability of a given turtle to swim against the current at either the CWS or DWS intake would depend on the species, size, and relative health of each individual. A turtle weakened by disease or injured by a boat strike would be more susceptible to impingement if the velocity at the intake is a factor in the likelihood of impingement. In addition, sea turtles are known to be less active at night, so there may be increased likelihood of impingement at night.

There is no information on the relative effects of suction at the trash racks on a turtle-shaped object for different current velocities. It may be much more difficult for a turtle to remove itself from a position parallel to the trash rack than from a perpendicular position at the surface.

A turtle that swims or drifts on the surface toward the OCNGS intakes may be turned away by the floating wooden debris/ice barrier. It is unclear, however, that this is an effective barrier to live turtles, since there are gaps on either end which a turtle could easily swim through. Since the barrier only extends 2 feet below the surface, a healthy turtle could easily swim under as well. The purpose for the barrier is to divert floating debris away from the CWS toward the DWS. The orientation of the barrier may result in turtles at the surface being funneled toward the DWS when that system is operating.

Debris is cleaned from the intake screens by a trash rake which is moved on a track from one bay to the next. The rake, a horizontal array of large curved tines, is lowered down into the bay to remove debris from the intake gratings. When the rake reaches the desired depth, the tines are deployed, curving downward to penetrate through the grate before the rake is raised. This process could cause serious injury to a turtle.

Debris floating on the surface could make it more difficult to spot a turtle below, particularly if the turtle was flush against the grating. A small amount of debris may not be enough to block the flow and necessitate use of trash rakes, but could hide a turtle. In addition, visibility at the intake bays, which are 15 (DWS) to 18 (CWS) feet deep, is only 2-3 feet. Although at least one of the impinged turtles was found alive with its head out of water, a turtle that is impinged at depth could remain out of sight until the trash rake was lowered to it. Detailed

information regarding behavior and orientation of each turtle when impinged and when discovered has not been collected for each of the impingements at the OCNGS. It is possible that a turtle could swim into the intake bay, encounter the grating, and swim down along the grating to a depth below the view of surface observers. If a turtle is feeding on the bottom of the intake canal, its first encounter with the intake grating could be at depth.

It is possible that a turtle could be caught up against the grate underwater by the current long enough to cause suffocation. Plant personnel estimated that the turtles that were taken had been impinged for up to 8 hours. In some natural situations, turtles may remain submerged for several hours. However, stress dramatically decreases the amount of time a turtle can stay submerged. For example, trawl times for shrimpers in the southeast are limited by regulation to 55 minutes in the summer months and 75 minutes in the winter months, due to the fact that turtles are known to suffocate in shrimp trawls in very short time periods. Additionally, turtles may suffocate more readily in the summer months due to higher body temperature and metabolism. Other factors, such as the activity of the turtle and whether or not it has food in its stomach, may also affect the length of time it may stay submerged.

Previous Impingements at Oyster Creek Nuclear Generating Station

There have been 9 incidental captures of sea turtles associated with operations at the OCNGS (4 at the CWS intake trash bars and 5 at the DWS intake trash bars) between September 9, 1992, and June 19, 1994 (Table 1). These include 4 Kemp's ridley captures and 5 (4 individuals, 1 recapture) loggerhead captures.

Operation of the OCNGS has not changed appreciably since 1969, suggesting that the onset of turtle captures is due to higher numbers of sea turtles in the project area, or lack of knowledge of the impacted turtles.

The diversion of the south fork of the Forked River may have created conditions which attract turtles and therefore increase the likelihood of impingement. When the plant is operational, all flow in the south fork is diverted into the cooling water intakes, so it is possible that impingements of turtles at the OCNGS could be the result of routing the entire south fork rather than of an attraction at the intake screens. (The diversion also represents a reversal of flow in the south fork.) The possibility that the OCNGS is attracting or diverting turtles into the plant is sufficient enough that turtles that may have died before impingement should be included in the assessment of take, unless the cause of death is readily visible (such as a traumatic propeller injury) or is revealed through necropsy. Due

to the tentative nature of existing population estimates, comparison of incidental take numbers to total population sizes is not possible.

Size documentation of sea turtles taken by impingement at the OCNGS indicate that all of the sea turtles were juveniles. Identification of the sex of immature turtles is very difficult without the training of a qualified herpetologist. Misidentification of the sex of juvenile turtles is a chronic problem, since undifferentiated gonads are easily confused with ovaries. The only dead turtle from OCNGS for which sex was identified was reported as a female. Accurate identification of the sex of dead sea turtles should be ascertained.

Kemp's ridleys

Four Kemp's ridleys were reported impinged at the OCNGS intake trash bars between 1992 and 1994. Annual takes ranged from 1 to 2 Kemp's ridleys. Three of these turtles were recovered dead, with an average of 1.0 observed mortalities per year (range 0 to 2) observed in association with the OCNGS intake structures. Necropsy reports are not available for all the Kemp's ridley mortalities, so it is not possible to adjust this rate to reflect mortalities which may have occurred prior to impingement. Therefore the lethal take rate for Kemp's ridleys at the OCNGS is 1.0 turtles per year.

Loggerheads

A total of 5 loggerhead impingements occurred at the OCNGS intake trash bars between 1992 and 1994, with an ave e of 1.7 takes per year. Annual takes ranged from 0 to 3 (i. uding one recapture) loggerheads. Two of these turtles were recovered dead, with an average of 0.7 observed mortalities per year (range 0 to 1) observed in association with the OCNGS intake structures. Necropsy reports are not available for all the loggerhead mortalities, so it is not possible to adjust this rate to reflect mortalities which may have occurred prior to impingement. Therefore the lethal take rate for loggerheads at the OCNGS is 0.7 turtles per year.

Cold Stunning

Existing data from OCNGS and other power plants in the NMFS/Northeast Region does not support the concern that warm-water discharge may keep sea turtles in the area until surrounding waters are too cold for their safe departure. Cold-stunning, the comatose condition of sea turtles subjected to water temperatures lower than 8°C, is common in Atlantic

embayments (Meylan 1986; Ehrhart 1983). Data reported by the STSSN indicate that cold-stunning occurs around mid-November in New York waters. No incidental captures of sea turtles have been reported at the OCNGS later than October, suggesting that sea turtles may leave this site before cold-stunning would occur.

The thermal effluent discharged from the plant into Oyster Creek may represent an attraction for turtles. If turtles are attracted into Oyster Creek by this thermal plume, they could remain there late enough in the fall to become cold-stunned when they finally travel into Barnegat Bay. As stated in the BA, however, it may be unattractive for turtles to fight the current (2.1-3.1 ft/sec) long enough to remain in the warmest portions of the effluent. Although blue crab and horseshoe crab are found in the canal, it is unlikely that much forage is available during the colder months. Dr. Stephen Morreale noted, in the report of the necropsy performed on the Kemp's ridley impinged on October 17, 1993, that turtles may not be feeding at this time of the year due to a behavioral shift.

Other Habitat Considerations

Turtles could be attracted to the intake screens when prey items such as blue crabs and horseshoe crabs are gathered there. One loggerhead turtle was recaptured 2 days after it was released into the discharge canal. This suggests that the turtle was attracted either to the ambient conditions in the south fork of the Forked River or to the conditions at the intake trash racks.

Information on stomach contents of incidentally captured sea turtles recovered at the OCNGS is only available for two specimens at this time. One was impinged on October 17, 1993, and found to have no stomach contents, but this finding was attributed to the time of the year, when feeding is not expected. The other impingement occurred July 6, 1994, and the presence of blue crabs in both the esophagus and stomach suggest that this turtle was actively feeding prior to death. No quantitative diet study has been conducted and species listed on necropsy reports typically include only those most easily identified.

Attractive features may be associated with the discharge as well as the intake. The warm water discharge may increase the distribution of prey species to the area, and returns of live entrained organisms or dead fish and other material dumped from the trash racks may provide food for the turtles or scavenging prey species.

There have been changes in the hydrology of Barnegat Bay as well as changes in sea turtle distribution over the past ten years. There is a lack of information about the impact of these changes on the likelihood of impingement of turtles at OCNGS. If

maintenance dredging, which increases water volume, makes the bay more accessible to turtles, the frequency of impingements at OCNGS may increase after each dredging episode and decrease as the bay fills with sediment, suggesting a causal relationship. There is little information on food resources in the bay and no information on how turtles use the bay. If turtle populations recover appreciably, the rate of impingement at OCNGS may reflect a corresponding increase.

Environmental Sampling and Stranding Information

No turtles have been sighted in biological sampling efforts conducted by or for the OCNGS. However, the BA does not state time of year, specific locations, or what portions of the water column were sampled. Added to the fact that we do not know enough about how turtles use the bay, it is not possible to determine whether the sampling was representative of the time when turtles were likely to be in the area, or whether sampling efforts tracked the potential high-use areas and the appropriate portion of the water column.

Approximately 16,500 hours of impingement sampling (24-54 hours/week) was conducted by OCNGS from 1975-1985, with no turtles sighted. Trawl sampling and seine sampling, which consisted of roughly 3000 samples from 1975-1981, also resulted in no turtle captures. The BA does list one reference of a loggerhead caught in an otter trawl during a 5-year survey of Great Bay and Little Egg Harbor conducted by Rutgers University (K. Able, Tuckerton Marine Research Facility).

Any takes that occur during station-related sampling by OCNGS will be considered and included within the incidental take statement. It is not anticipated that biological sampling will result in lethal take.

Stranding data for the New Jersey coast in Ocean County suggests that the majority of strandings occur on the ocean side of the barrier beaches, not in the inshore areas (STSSN data reported by the Marine Mammal Stranding Center, Brigantine, New Jersey). The 1985-1994 data for Ocean County show that only 14% (n=12) of the 88 strandings for that time period occurred in inshore waters. Eleven of those 12 were in Barnegat Bay and associated waterways in Ocean County. One stranding which occurred just outside the north end of Barnegat Inlet was an animal which may have been feeding in the bay, struck by a boat, and then washed out through the Inlet. The data for the past 10 years shows 9 other strandings clumped in that same area, suggesting that strandings of dead animals with propeller scars in that area may be indicative of additional animals which are using Barnegat Bay.

CUMULATIVE EFFECTS:

Cumulative impacts from unrelated, non-federal actions occurring in Barnegat Bay may affect protected species and their habitats. The Marine Mammal Stranding Center in Brigantine, New Jersey, reports an increase in the number of turtles hit by boats in New Jersey inshore waters. STSSN data show that turtles found in other northeast embayments die of various natural causes, including cold stunning, and from human activities, such as boat hits, degradation of nesting habitat, incidental captures in fishing gear, and ingestion of or entanglement in debris. However, the cause of death of most turtles recovered by the STSSN is unknown.

CONCLUSION:

Based upon a review of the information available on the biology and ecology of the endangered and threatened species in the North Atlantic affected by the continued operation of the Oyster Creek NGS, NMFS concludes that the continued operation of this station may adversely affect, but is not likely to jeopardize the continued existence of the species listed above or result in destruction or adverse modification of their habitat. The following factors form the basis for this conclusion:

1. The maximum number of observed lethal takes, documented annually since 1992, is two Kemp's ridleys (average = 1.0 per year) and one loggerhead (average = 0.7). The mortality of any Kemp's ridley is significant but mortalities of less than two juvenile ridleys per year is conservative and consistent with takes allowed in similar operations.

2. The continued operation of the Oyster Creek NGS at the existing level is not expected to change the observed mortality levels.

3. Increased monitoring of the intake screens and consistent use of resuscitation techniques may decrease the observed mortality level.

REINITIATION OF CONSULTATION:

Reinitiation of formal consultation is required if: (1) the amount or extent of taking specified in the incidental take statement (Attachment 1) is exceeded, (2) new information reveals effects of the action that may affect listed species or critical habitat (when designated) 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 the Biological

Opinion, or (4) a new species is listed or critical habitat designated that may be affected by the identified action.

The Incidental Take Allowance extends for a period of five years from the date of this biological opinion. Reinitiation of consultation is required if, during any one year, twelve turtles are taken and/or there is a lethal take of one Kemp's ridley OR one green turtle.

CONSERVATION RECOMMENDATIONS:

The following conservation recommendations are suggested:

1. In conjunction with NMFS, develop a research program to determine whether the plant provides features attractive to sea turtles. This program should investigate habitat use, diet, and local and long-term movements. Use of existing mark/recapture and telemetry methods should be considered in Barnegat Bay and associated waterways.

2. Conduct underwater viewing or diving behavior telemetry studies of turtles at the intake bays, in the Forked River, in the Oyster Creek discharge canal, and in Barnegat Bay to determine how turtles use these waterways and their behavior in the intake bays.

3. Conduct distribution surveys for sea turtles in Barnegat Bay, Forked River, and Oyster Creek. Data recorded should include time of year, specific locations, and portions of the water column sampled.

4. Historical benthic survey data should be reviewed to identify prey density and distribution at various sites in the project area and associated waterways and clarify the potential for attractions of invertebrates to this site during times when turtles are likely to be in the area.

5. Meet with NMFS annually to review incidental takes, assess the status of sea turtles in the project area and associated waterways, and to reconsider these recommendations accordingly.

INCIDENTAL TAKE STATEMENT:

Section 7(b)(4) of the ESA requires that when an agency action is found to comply with Section 7(a)(2), NMFS will issue a statement specifying the impact of incidental taking of endangered species, provide reasonable and prudent measures necessary to minimize impacts, and set forth the terms and conditions with which the action agency must comply to implement the reasonable and prudent measures.

The significance of each Kemp's ridley turtle mortality is considered in determining an allowable incidental take. Therefore, we have established a take level of 3 Kemp's ridleys per year with 1 mortality, 2 green turtles per year with 1 mortality and 10 loggerheads per year with up to 3 mortalities. This take level is allowed provided the following reasonable and prudent measures necessary to minimize the impact on listed species are met through the terms and conditions stated below:

1. The new protocol for inspection of CWS and DWS cooling water intake trash bars (and immediate area upstream) at least once every 4 hours (twice per 8-hour shift) must be continued and implemented from June 1 through October 31.

Inspections are to follow a set schedule so that they are regularly spaced rather than clumped. The proposed schedule of 1-2 hours into each 8-hour shift and 5-6 hours into each 8-hour shift should be followed. Times of inspections, including those when no turtles were sighted, must be recorded.

2. An attempt to resuscitate comatose sea turtles must be made according to the procedures described in Appendix I. These procedures should be posted in appropriate areas such as the intake bay areas for both the CWS and the DWS, any other area where turtles would be moved for resuscitation, and the CWS and DWS operator's office(s).

3. Dip nets, baskets, and other equipment are to be available at both the CWS and the DWS and are to be used to remove smaller sea turtles from the OCNGS intake structures to reduce trauma caused by the existing cleaning mechanism.

4. The Oyster Creek Nuclear Generating Station's CWS and DWS (when operational) intake trash bars must be cleaned daily from June 1 to October 31.

   a. Cleaning must include the full length of the trash rack, i.e., down to the bottom of each intake bay. To lessen the possibility of injury to a turtle, the raking process must be closely monitored so that it can be stopped immediately if a turtle is sighted.

b. Personnel should be instructed to look beneath surface debris before the rake is used to lessen the possibility of injury to a turtle.

c. Personnel cleaning the racks are to inspect all trash that is dumped, particularly at night. Many horseshoe crabs are caught on the racks; these might be confused with turtles or turtle parts.

5. Lighting must be maintained at the intake bays to enable inspection personnel to see the surface of each intake bay and to facilitate safe handling of turtles which are discovered at night. Portable spotlights should be available at both the CWS and the DWS for times when extra lighting is needed.

6. Live sea turtles are to be inspected for signs of illness or injury. Any ill or injured turtle is to be given appropriate medical attention, and must not be released until its condition has improved. Turtles are to be handled according to the attached procedures (Appendix I).

7. Live turtles that exhibit no signs of illness or injury are to be taken to an authorized agent of the Sea Turtle Stranding and Salvage Network to be evaluated, tagged, and released.

8. Dead sea turtles are to be necropsied by qualified personnel. Identification of sex should be determined and stomach contents should be identified to determine whether waste products from the trash racks or aggregations at the trash racks are attracting sea turtles. Necropsy reports should be submitted to NMFS with the annual review of incident reports or, if not yet available, when completed.

9. The monitoring and reporting system must follow the items outlined in Appendix II. Information in Appendix III will assist in identification of species impinged. These reports are to be sent to NMFS/Northeast Region within 30 days of any incidental take.

10. An annual report of incidental takes must be submitted to NMFS. This report will be used to identify trends and further conservation measures necessary to minimize incidental takes of sea turtles. The report should include, as detailed above, all necropsy reports, and a record of when inspections of the intake trash bars were conducted.

11. This Incidental Take Allowance extends for a period of five years from the date of the attached biological opinion. Reinitiation of consultation is required if, during any one year, twelve turtles are taken and/or there is a lethal take of one Kemp's ridley OR one green turtle.

TABLE 1

SEA TURTLE IMPINGEMENTS AT OYSTER CREEK NUCLEAR GENERATING STATION
1992 through 1994

ID #	DATE	TIME	CWS/DWS	SPECIES	CONDITION	SIZE	REMARKS
92-A	06/25/92	12:50 PM	DWS	Cc	Dead	35.5 cm 9.6 kg	Possible propeller wounds. MMSC necropsy.
92-B	09/09/92	6:00 PM	CWS	Cc	Live	46.7 cm 19.1 kg	Released into discharge canal; returned to CWS two days later.
92-B(2)	09/11/92	2:00 PM	CWS	Cc	Live	46.7 cm 19.1 kg	Same turtle as above. Taken to MMSC, tagged, and released.
92-1	10/26/92	3:00 AM	CWS	Lk	Live	32.0 cm 5.7 kg	Possible propeller wounds. Tagged, released by MMSC.
93-1	10/17/93	12:00 PM	DWS	Lk	Dead	26.0 cm 3.0 kg	Fresh dead. Empty stomach.
94-1	06/19/94	1:30 PM	CWS	Cc	Live	36.8 cm 9.8 kg	Swimming, eventually impinged. Tagged, released by MMSC.
94-2	07/01/94	10:00 AM	DWS	Lk	Dead	27.7 cm 3.6 kg	Very decomposed. Sent to Cornell for necropsy.
94-3	07/06/94	6:40 AM	DWS	Cc	Dead	61.4 cm 40.4 kg	Healed propeller wounds. Full stomach.
94-4	07/12/94	10:40 PM	DWS	Lk	Dead	26.7 cm 3.3 kg	Sent to Cornell for necropsy.

REFERENCES

Agardy, T. Unpublished manuscript. Sea turtles of the U.S. Virgin Islands: Distribution, habitat requirements, and trends in population sizes. Brief summary report to the Woods Hole Oceanographic Institution, Woods Hole, MA. 6 pp.

Babcock, H.L. 1937. The sea turtles of the Bermuda Islands, with a survey of the present state of the turtle fishing industry. Proc. Zool. Soc. Lond. 107: 595-601.

Carr, A. F. 1952. Handbook of turtles. Ithaca, New York: Cornell University Press.

Carr, A. F. 1954. The passing of the fleet. A.I.B.S. Bull., 4(5): 17-19.

Carr, A. R. 1963. Panspecific reproductive convergence in Lepidochelys kempii. Ergebn. Biol. 26: 298-303.

Crouse, D. T., L. B. Crowder and H. Caswell. 1987. A stage-based model for loggerhead sea turtles and implications for conservation. Ecology 68(5): 1412-1423.

Dobie, J. L., H. Ogren, and J. F. Fitzpatrick, Jr. 1961. Food notes and records of the Atlantic ridley turtle (Lepidochelys kempii) from Louisiana. Copiea 1961 (1): 109-110.

Ehrhart, L. M. 1979. A survey of marine turtle nesting at Kennedy Space Center, Cape Canaveral Air Force Station, North Brevard County, Florida, 1-122. Unpublished report to Division of Marine Resources, St. Petersburg, Florida, Fla.

Ehrhart, L. M. 1983. Marine turtles of the Indian River lagoon system. 1983 Florida Sci. 46(3/4): 337-346. 1983.

Ernst, L.H., and R. W. Barbour 1972. Turtles of the United States. Univ. Kentucky Press, Lexington, KY.

Fritts, T. H., A. B. Irvine, R. D. Jennings, L. A. Collum, W. Hoffman, and M. A. McGehee. 1983. Turtles, birds and mammals in the northern Gulf of Mexico and nearby Atlantic waters. U.S. Fish and Wildlife Serv. Div. Biol. Ser., Washington, D.C.

Meylan, A. B. 1986. Riddle of the ridleys. Natural History Magazine, Amer. Mus. Nat. Hist. 11/86: 90-96.

Mexico. 1966. Instituto Nacional de Investigaciones Biologicao-Pesqueras. Programa nacional de marcado de tortugas marinas. Mexico, INIBP: 1-39.

Morreale, S.J., and E.A. Standora. 1992. Habitat use and feeding activity of juvenile Kemp's ridleys in inshore waters of the northeastern U.S. In: Proceedings of the Eleventh Annual Workshop on Sea Turtle Conservation and Biology. NOAA Tech. Mem. NMFS-SEFSC-302, pp. 75-77.

Morreale, S.J., and E.A. Standora. 1994. Occurrence, movement, and behavior of the Kemp's ridley and other sea turtles in New York waters. Final report for the NYSDEC in fulfillment of Contract #C001984. 70 pp.

Mortimer, J. 1982. Feeding ecology of sea turtles. pp. 103-109 In: Biology and conservation of sea turtles. K. A. Bjorndal (ed.) Smithsonian Institution Press, Washington, D.C.

Musick, J. A., S. A. Bellmund, R. C. Klinger, R. A. Byles, J. A. Keinath, and D. E. Bernard. 1987. Ecology of sea turtles in Virginia. Spec. Scientific Rep. No. 199. Vir. Inst. of Mar. Science, College of William and Mary, Gloucester Point, VA.

Neill, W. T. 1958. The occurrence of amphibians and reptiles in salt water areas, and a bibliography. Bull. Mar. Sci. Gulf Caribb. 8: 1-97.

Parsons, J. 1994. Personal communication.

Prescott, R.L. 1982. A study of sea turtle mortality in Cape Cod Bay. Final Report to the National Marine Fisheries Service in fulfillment of Contract No. NA-80-FA-C-00013.

Pritchard, P. C. H. 1969. The survival status of ridley sea turtles in American waters. Biol. Cons. 2(1): 13-17.

Pritchard, P. C. H., and R. Marquez. 1973. Kemp's ridley turtle or Atlantic ridley. I.U.C.N. Monograph No. 2, Morges, Switzerland.

Schoelkopf, R. 1994. Personal communication.

Shoop, C., T. Doty, and N. Bray. 1981. Sea turtles in the region between Cape Hatteras and Nova Scotia in 1979. pp. IX 1-85 In: A characterization of marine mammals and turtles in the mid- and north-Atlantic areas of the U.S. outer continental shelf: Annual report for 1979. Univ. Rhode Island, Kingston, RI.

Thompson, N.B. 1988. The status of loggerhead, Caretta caretta; Kemp's ridley, Lepidochelys kempii; and green, Chelonia mydas, sea turtles in U.S. waters. Marine Fisheries Review 50(3): 16-23.

U.S. Fish and Wildlife Service and National Marine Fisheries Service. 1992. Recovery Plan for the Kemp's Ridley Sea Turtle (Lepidochelys kempii). National Marine Fisheries Service, St. Petersburg, Florida. 40 pp.

Underwood, G. 1951. Introduction to the study of Jamaican reptiles. Part 5. Nat. Hist. Notes. Nat. Hist. Soc. Jamaica 46: 209-213.

APPENDIX I **(Handling and Resuscitation Procedures)**

Handling:

Do not assume an inactive turtle is dead. Pressing the soft tissue around the nose of a sea turtle may result in an eye reflex in a comatose (unconscious) turtle. The onset of rigor mortis is often the only definite indication that a turtle is dead.

Keep clear of the head.

Adult male sea turtles of all species other than leatherbacks have claws on their foreflippers. Keep clear of slashing foreflippers.

Pick up sea turtles by the front and back of the top shell (carapace). Do not pick up sea turtles by flippers, the head or the tail.

Resuscitation Procedures:

If a turtle appears to be comatose, attempts should be made to revive it immediately.

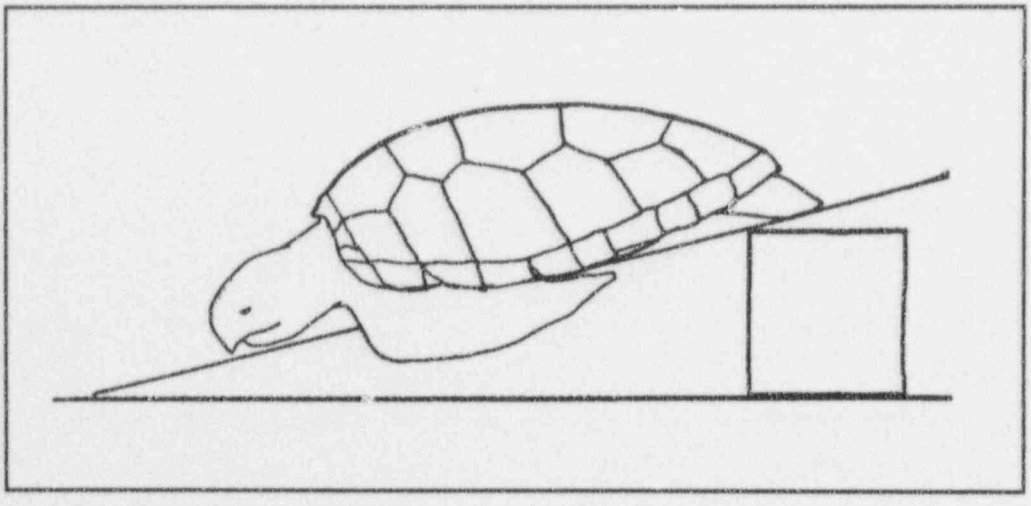
These procedures are designed to void the turtles' lungs of water by active pumping and passive drainage. Sea turtles have been known to revive up to 24 hours after these procedures have been followed:

1) Place the turtle on its back and gently pump the breastplate. This may stimulate the animal to breathe and allow water to drain.

2) Place the animal on its breastplate and raise the hindquarters. The degree of elevation depends on the size of the turtle; greater elevations are required for larger turtles.

4) Keep the turtle shaded and moist and observe for 24 hours.

5) When the turtle has revived, release in a manner that minimizes the chances of re-impingement.



Special Instructions for Cold-Stunned Turtles:

Comatose turtles found in water less than 10°C are probably "cold-stunned". This is most common in the fall and early winter. If a turtle appears to be cold-stunned, the following applies:

To increase blood flow, flap the flippers and rub the skin. Gradually, (over a period of six hours) move the turtle to a warmer area.

If possible, place the animal in a few inches of water that is warmer then the ocean. Do not cover the mouth or nostrils with water. It is not imperative that sea turtles be kept in water.

Dead sea turtles should be retained for necropsy.

APPENDIX II **(Reporting Requirements)**

Photographs should be taken and the information requested below should be collected in association with all protected species impingements. This documentation should be sent to the following address:

National Marine Fisheries Service
Habitat and Protected Resources Division
One Blackburn Drive
Gloucester, MA 01930-2298.

Protected Species Impingements at the Oyster Creek NGS

Observer's full name:_____

Reporter's full name:_____

Species Identification (Key attached):_____

Site of Impingement (CWS or DWS, Bay #, etc.):_____

Date and time impingement observed:_____

Date and time animal collected:_____

Tidal Stage at time of observation:_____

Date and time of last inspection of screen:_____

Water temperature at site and time of impingement:_____

Intake velocity at site and time of impingement (ft/sec):_____

Average percent of power generating capacity achieved per unit over the 48 hours previous to impingement:_____

Condition of animal:_____

Sea Turtle Measurements (indicate cm or in):

Carapace length - Curved:_____Straight:_____

Carapace width - Curved:_____Straight:_____

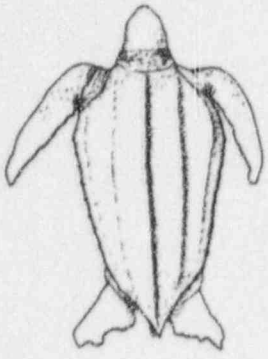
Tag number and location, if tagged:_____

Remarks (include behavior of animal):_____
_____
_____
_____
_____

Results of necropsy (include sex and stomach contents):_____
_____
_____
_____
_____

SEA TURTLES

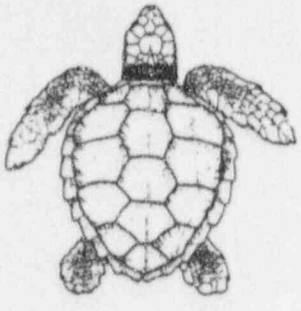
LBST



Leatherback -

Found in open water throughout the Northeast from spring through fall. Leathery shell with 5-7 ridges along the back. Largest sea turtle (4-6 feet). Dark green to black; may have white spots on flippers and underside.

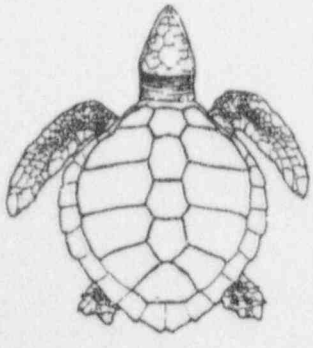
LGST



Loggerhead

Bony shell, reddish-brown in color. Mid-sized sea turtle (2-4 feet). Commonly seen from Cape Cod to Hatteras from spring through fall, especially in southern portion of range. Head large in relation to body.

RST

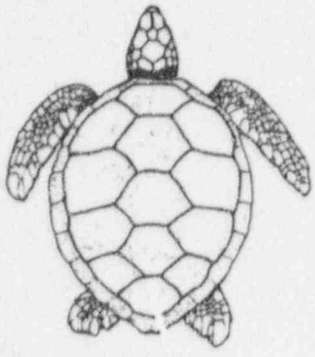


Kemp's ridley

Most often found in Bays and coastal waters from Cape Cod to Hatteras from summer through fall. Offshore occurrence undetermined. Bony shell, olive green to grey in color. Smallest sea turtle in Northeast (9-24 inches). Width equal to or greater than length.

SEA TURTLES (Cont'd.)

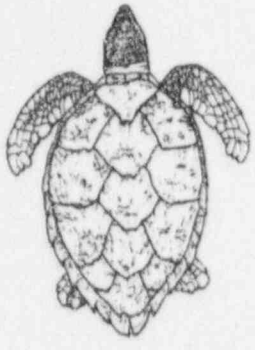
GST



Green turtle

Uncommon in the Northeast. Occur in Bays and coastal waters from Cape Cod to Hatteras in summer. Bony shell, variably colored; usually dark brown with lighter stripes and spots. Small to mid-sized sea turtle (1-3 feet). Head small in comparison to body size.

HST



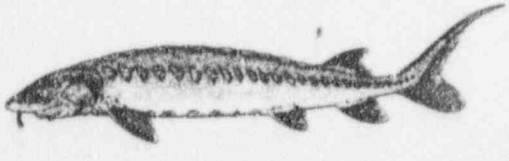
Hawksbill

Rarely seen in Northeast. Elongate bony shell with overlapping scales. Color variable, usually dark brown with yellow streaks and spots (tortoise-shell). Small to mid-sized sea turtle (1-3 feet). Head relatively small, neck long.

FISH

Shortnose sturgeon

SNS



Occur in the major river systems along the Atlantic seaboard. Found offshore only within a few miles of land. Shortnose have a wide mouth, short snout, and are brownish to black in color, with bony plates along the sides of the body. Rarely reach 4 feet.