ENVIRONMENTAL PROTECTION

NATURAL AND HISTORIC RESOURCES

DIVISION OF FISH AND WILDLIFE

Marine Fisheries

Terrapin Regulations

Proposed Amendment: N.J.A.C. 7:25-21.1

Proposed Repeals: N.J.A.C. 7:25-21.2 and 21.3

Authorized By: Bob Martin, Commissioner, Department of Environmental

Protection.

Authority: N.J.S.A. 13:1D-1 et seq., 23:2B-1 et seq.

Calendar Reference: See Summary below for explanation of exception to calendar

requirement

DEP Docket Number: 03-16-04

Proposal Number: PRN 2016 -

A public hearing concerning this proposal will be held on Monday, June 13, 2016 at 6:00

P.M. at:

Stafford Township Municipal Building

260 East Bay Ave.

Manahawkin, NJ

NOTE: THIS IS A COURTESY COPY OF THIS RULE PROPOSAL. THE OFFICIAL

VERSION WILL BE PUBLISHED IN THE MAY 16, 2016, NEW JERSEY REGISTER.

SHOULD THERE BE ANY DISCREPANCIES BETWEEN THIS TEXT AND THE

OFFICIAL VERSION OF THE PROPOSAL, THE OFFICIAL VERSION WILL GOVERN.

Submit comments by (60 days after publication) electronically at

http://www.nj.gov/dep/rules/comments.

The Department of Environmental Protection (Department) encourages electronic

submittal of comments. In the alternative, comments may be submitted on paper to:

Alice A. Previte, Esq.

Attn.: DEP Docket No. 03-16-04

Department of Environmental Protection

Office of Legal Affairs

Mail Code 401-04L

PO Box 402

401 East State Street, 7th Floor

Trenton, NJ 08625-0402

Written comments may also be submitted at the public hearing. It is requested (but not

required) that anyone providing oral testimony at the public hearing provide a copy of any

prepared text to the stenographer at the hearing.

This rule proposal may be viewed or downloaded from the Department's web site at

http://www.nj.gov/dep/rules.

The agency proposal follows:

Summary

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As the Department has provided a 60-day comment period on this notice of proposal, this notice is excepted from the rulemaking calendar requirement pursuant to N.J.A.C. 1:30-3.3(a)5.

N.J.A.C. 7:25-21 is promulgated under the Marine Fisheries Management and Commercial Fisheries Act, N.J.S.A. 23:2B-1 et seq., and governs the harvest of diamondback terrapins in the State. The diamondback terrapin is a medium-sized aquatic turtle that inhabits the Atlantic coast of the eastern United States. The existing rules establish a terrapin season, limit the methods of harvest, and establish a minimum size for harvested terrapins. However, the rules permit an unlicensed, largely unrestricted, and completely unreported commercial harvest during a time of year when, as explained below, the diamondback terrapin is most susceptible to harvest pressure. The Department proposes to amend and repeal sections of N.J.A.C. 7:25-21, in order to prohibit the taking, catching, possession, exposure for sale, or attempt to catch or take diamondback terrapin.

New Jersey is one of the last remaining states on the Atlantic coast that authorizes a commercial diamondback terrapin fishery. The Department is proposing to close the diamondback terrapin season due to the significant increase in the export of diamondback terrapins to other states and foreign countries, and the inherent vulnerability of diamondback terrapin populations to harvest of adults. The Department has determined that diamondback terrapin populations in New Jersey are under duress. The harvest of adult diamondback terrapins reduces populations that are already at risk due to predation, motor vehicle mortality, and habitat alteration. Therefore, closing the diamondback terrapin season will help to curtail the excessive adult mortality to which diamondback terrapin populations are extremely sensitive. The closure

of the season will allow the Department an opportunity to study the populations of diamondback terrapins in the State, and determine whether a sustainable harvest of diamondback terrapins can be achieved in the future.

Specifically, the Department proposes to close the season for diamondback terrapin by removing the season dates of November 1 through March 31 set forth in N.J.A.C. 7:25-21.1.

The proposed amended rule identifies the species as "diamondback terrapin," rather than the existing rule's identification as "diamondbacked terrapin," and refers to the species by the correct Latin name, Malaclemys terrapin, rather than Malaclemys palustris. In order that the heading of the subchapter is consistent with the amended rule, the Department proposes to amend the heading to include "diamondback." The Department also proposes to repeal N.J.A.C. 7:25-21.2 and 21.3, which regulate the manner in which diamondback terrapins may be taken and impose size limits on terrapins taken; the sections become unnecessary if there is no season for harvesting terrapin. The Department proposes to move existing language prohibiting the taking or destruction of diamondback terrapin eggs from N.J.A.C. 7:25-21.3 to proposed amended N.J.A.C. 7:25-21.1, and expand the prohibition to include attempts to take or destroy diamondback terrapin eggs.

Terrapin Life History

Diamondback terrapins inhabit salt marshes, lagoons, tidal creeks, and estuaries in small, linearly distributed, and isolated populations ranging from Cape Cod south to the Florida Keys and west along the Gulf of Mexico coast into Texas (Hart and Lee 2006). (For a map of the

diamondback terrapin range, see http://maps.iucnredlist.org/map.html?id=12695.) New Jersey populations inhabit coastal salt marshes, estuaries, tidal creeks, and ditches of the Delaware Bay, the Atlantic coast, the tidal salt marshes of Raritan Bay, the Newark Bay north to the lower Hackensack River, and the Hudson River (www.conservewildlifenj.org/species/fieldguide/). The diamondback terrapin is believed to be the only turtle in the world that lives exclusively in brackish water (water containing some salt, but not as saline as ocean water). Although diamondback terrapins live in tidal marshes, estuaries and lagoons, their preferred nesting sites are sandy beaches. Diamondback terrapins often exhibit high "site fidelity" by remaining in the same home range. Adult females have been known to return to specific nesting beaches annually (Gibbons et al. 2001).

Like other turtle species, diamondback terrapins grow and mature at a slow rate. In the populations located from Cape Cod to the Chesapeake Bay, it may take a decade for a female to reach reproductive maturity. Males in these populations reach maturity when they are five to eight years old (Brennessel 2006). Typical of a slow-growing and late-maturing species, diamondback terrapins possess long lifespans, with some documented to be as long as 20 years. Researchers believe that individuals could live for more than 40 years. (Hildebrand 1932, Brennessel 2006).

Mating generally takes place in the early spring, with nesting extending through midsummer. Females lay two to three clutches of eggs annually (Hildebrand 1932). To lay their eggs, females move from the relative safety of the water to nesting sites on sandy beaches and other upland gravel areas that are above the high tide line. Egg and clutch sizes vary based upon

geography. Researchers have observed a general correlation between the size of the female and the size of the clutch, with larger females having larger clutches. Diamondback terrapins in Cape May produced between eight and 12 eggs, while a studied population in the Edwin B. Forsythe National Wildlife Refuge produced a mean clutch size of 9.76 ±2.61. At Island Beach State Park and North Sedge Island, the average clutch size was 12.7 eggs (Wnek 2014). On average, eggs from New Jersey nests hatch after 90 days of incubation time, depending on the season and weather (Carr 1952, Burger 1977).

Diamondback terrapins generally have a very low birth rate (natality) and a low rate of survival to adulthood (recruitment) (Gibbons et al. 2001, Tucker et al. 2001, Haramis et al. 2011 as cited in Egger 2016). One researcher noted that as few as 20 percent of hatchlings successfully complete their journey from their nesting site to their salt marsh habitat (Brennessel 2006). The nesting success rate can be low in a given year due to predation from raccoons, foxes, gulls, and crows (Burger 1977). Nesting in locations that are subject to repeated tidal inundation, and infiltration of the nests from the roots of plants also place nests in jeopardy. Terrapin hatchlings are subject to overheating, drying out (desiccation), and being hit by motor vehicles as they attempt to reach the water.

During the winter months diamondback terrapins bury themselves in the mud substrate of tidal estuary creek bottoms, in ponds or banksides (Coker 1906, Carr, 1952, Ernst and Barbour 1972, Yearicks et al. 1981, Seigel 1984, Outerbridge 2013 as cited in Egger 2016). In the northern part of their range (from Cape Cod to Cape Hatteras and encompassing New Jersey), diamondback terrapins enter brumation (a reptilian state that is analogous to hibernation in

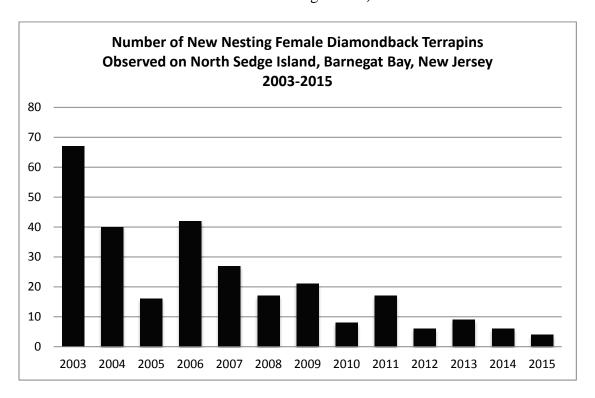
mammals) in November or December and emerge between April and May. Diamondback terrapins in brumation remain completely submerged and inactive throughout the winter, at shallow depths, as has been observed in New Jersey where terrapins were documented in the intertidal zone or at the upper limit of the tides in the bankside of estuaries, and lagoons, or at the bottom of salt marsh creeks 1.5 to 2.5 meters in depth at low tides (Yearicks et al. 1981 as cited in Egger 2016). Further, the diamondback terrapins brumate in large clusters, and have been found in densely populated aggregations of more than 1,000 individuals (Haramis et al. 2011).

Terrapin Population

No Statewide or regional assessments have been conducted by the Department or others to determine overall diamondback terrapin population size and trends, and the Department does not have accurate population and harvest data for the State's diamondback terrapins. However, studies of local populations using mark and recapture over many years in New Jersey and other eastern states indicate significantly declining populations. (Avissar 2006, Sornborger 2015 as cited in Egger 2016). The US Fish and Wildlife Service (USFWS) in its 2013 proposal to the Convention on International Trade in Endangered Species of Wild Fauna and Flora Conference of the Parties 16 (CITES 2013), reported that populations have declined considerably in many parts of its geographic range.

In 2002, 104 nesting female diamondback terrapins were marked at North Sedge Island, part of the Sedge Island Marine Conservation Zone, an ecologically sensitive tidal marsh and shallow marine ecosystem located in Barnegat Bay at the southern end of Island Beach State

Park. In each subsequent year through 2015, researchers marked previously unmarked nesting females, thereby tracking the number of additions to the adult female population (new recruits). In 2015, there were 63 previously marked female nesting terrapins remaining at North Sedge Island, and fewer than 10 new recruits. (Egger 2016, citing personal communication). This decline in the number of nesting females, combined with the low recruitment of new nesting females, could indicate a future decline in the overall population at North Sedge Island. (See chart below for observations from 2003 through 2015.)



(Egger 2016)

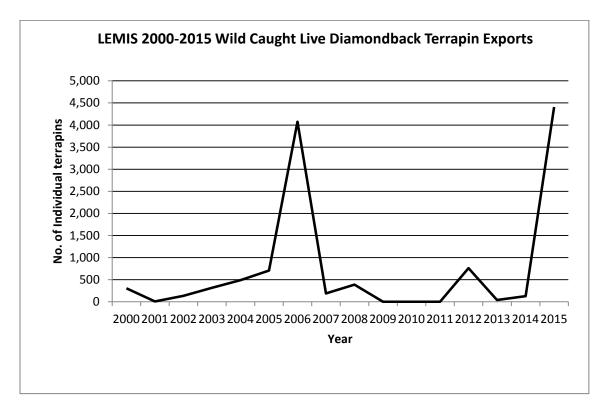
A similar decline was observed in a population in Spizzle Creek at Island Beach State Park (Wnek 2014).

Current Threats to Diamondback Terrapin Populations

Diamondback terrapin nests are subject to depredation from foxes, raccoons, bald eagles, and other predators including Norway rats and feral cats (Brennessel 2006). Egger (2016, citing personal communication) notes that 21 percent of the diamondback terrapin population at North Sedge Island bore scars indicating injuries from boats. New Jersey's diamondback terrapins have suffered sizable mortality from motor vehicles as females move from estuarine areas to suitable nesting sites in sand dunes or scrub vegetation on ocean beaches (Wood and Herlands 1997, Avissar 2006). Diamondback terrapin populations could also face the loss of critical nesting and basking habitat. Nesting terrapins can suffer from competition for access to the shoreline as estuarine properties become increasingly developed or subjected to the construction of bulkheads; changes to the coastal landscape (through erosion or other means) may completely alter terrapin habitat, presenting a further long-term threat (Roosenberg 1991, Wood and Herlands 1995, Brennessel 2006).

The commercial harvest of diamondback terrapins remains a significant threat to their numbers (Haramis et al. 2011 as cited in Egger 2016). Large aggregates of adult diamondback terrapins spend their brumation in easily accessible estuarine bays. As a result, adult diamondback terrapins are especially vulnerable to overharvesting during winter months, which coincides with New Jersey's current commercial harvest season of November through March under existing N.J.A.C. 7:25-21.1. Harvests such as allowed under the existing rules can be devastating to local diamondback terrapin populations (Carr 1952, Ernst and Lovich 2009), since it is possible for harvesters to severely reduce or even remove a local adult population in a short period of time (Haramis et al. 2011 as cited in Egger 2016).

Terrapins are a delicacy in some Asian cuisines. The Department has become increasingly aware of the negative impacts on the State's terrapin populations as a result of the unrestricted harvest of diamondback terrapins for sale as food, first in Asian communities such as those in New York (Garber 1990), then in Asian countries (Pfau and Roosenberg 2010). As these countries deplete their native turtle populations, the number of diamondback terrapins exported from the United States for food or the populating of turtle farms in Asia has risen. Export data compiled by the US Fish and Wildlife Service (USFWS), Law Enforcement Management Information System (LEMIS), indicate that there were 754 shipments of diamondback terrapins from the United States during the period 2000 through 2015. The chart below illustrates the export of wild caught diamondback terrapins during this period. Nearly 80 percent of the wild caught shipments were exported to the Hong Kong Special Administrative Region of the People's Republic of China, followed by 7.7 percent to Taiwan and five percent to Japan (LEMIS 2015 as cited in Egger 2016).



(Egger 2016)

In light of the commercial demand for diamondback terrapins, illegal harvest is also a concern. In 2014, the Division of Fish and Wildlife learned of a number of individuals in New Jersey who harvested diamondback terrapins using methods that violated the Department's rules. Division conservation officers stopped individuals from harvesting diamondback terrapins using crab dredges, which have teeth that rake the bottom of the bed and sweep the catch into nets or bags. Existing N.J.A.C. 7:26-21.1 prohibits harvest by means of a trap, pot, fyke, seine, weir, or net of any kind, making the use of crab dredges illegal whether the season is open or closed. The conservation officers seized more than 500 diamondback terrapins from those individuals and

returned them to the brumation site where they were captured, in an effort to maximize their chances of survival.

Regulatory Status

The diamondback has been classified as "near threatened" by the International Union for Conservation of Nature (IUCN). The IUCN is the largest professional conservation network in the world, with more than 1,200 member organizations, including more than 200 governmental and 900 non-governmental organizations. The IUCN Red List of Threatened Species is widely recognized as the most comprehensive, global approach for evaluating the conservation status of plants and animals. The main purpose of the Red List is to catalogue and highlight those plants and animals that are facing a higher risk of global extinction. The classification of the diamondback terrapin as "near threatened" by the IUCN means that it may be considered threatened with extinction in the near future, although it does not currently qualify for the threatened status. The diamondback terrapin is also listed as an Appendix II species under the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), a wildlife conservation and trade treaty to which the United States is a signatory. CITES is a multilateral treaty designed to ensure that international trade in specimens of wild plants and animals does not threaten species' survival in the wild. Specimens listed in Appendix II are species that are not necessarily threatened with extinction, but may become so unless trade in specimens of such species is subject to strict regulation in order to avoid utilization incompatible with the survival of the species in the wild. This characterization applies to the diamondback terrapin.

The diamondback terrapin is not afforded any formal protection under the Federal Endangered Species Act, 16 U.S.C. § 1531 et seq., or other Federal law. Moreover, the estuarine habitat of the diamondback terrapin is within the various states' marine waters (zero to three nautical miles from shore) and not Federal waters (three to 200 nautical miles from shore). The diamondback terrapin has been listed as endangered, threatened or a "species of special concern" by other state regulatory agencies or as a "species of greatest conservation need" within their respective State Wildlife Action Plans (SWAP). A SWAP sets forth the steps needed to conserve wildlife and habitat before they become too rare or costly to restore, and collectively the SWAPs represent a national framework for preventing wildlife from becoming endangered.

The Department notes that nearly every state that borders the Atlantic Ocean either limits the number of terrapins that a person may harvest per day, or altogether prohibits the commercial harvest of diamondback terrapin. Massachusetts, Rhode Island, Connecticut, Maryland, Virginia, North Carolina, South Carolina, and Georgia prohibit all harvest of diamondback terrapins. Florida allows a personal harvest of only one terrapin per day (a person may possess two at any time), and Delaware places a limit of four terrapins per day during the designated season. On January 13, 2016, the New York Department of Environmental Conservation (NYDEC) published notice that it anticipates proposing to close the current open season for harvesting the diamondback terrapin in that state. The NYDEC notes that it "lacks data to verify that harvest of the turtle is sustainable," and observes that "all other states in the region have already closed their seasons" (New York State Register, January 13, 2016, page 78, http://docs.dos.ny.gov/info/register/2016/january13/regulatoryagenda.pdf).

The USFWS informed the Department's Commissioner by letter dated January 28, 2015, that 3,522 wild adult diamondback terrapins that had been caught in New Jersey were sold in December 2013 to an aquaculture facility in Maryland. In August 2014 the Maryland facility exported more than 14,000 offspring of those New Jersey terrapins to Asia. The USFWS stated that this level of harvest in New Jersey is of serious conservation concern, and urged the State to immediately close the season for taking diamondback terrapin and begin to develop a longer term solution. In a January 28, 2015, letter to the Department, the New Jersey Marine Fisheries Council advised that it unanimously supported an immediate closure of the commercial diamondback terrapin season through March 31, 2016, and requested that the Department implement such a closure to help protect terrapin populations in the State. Therefore, the Commissioner issued Administrative Order 2015-02 (signed on March 1, 2015) immediately closing the diamondback terrapin season, which would have otherwise continued through March 31, 2015. This year, by Administrative Order 2016-02 (signed on January 20, 2016), the Commissioner closed the diamondback terrapin season that would have otherwise continued until March 31, 2016. At the same time, the Commissioner directed the Department to work with the Marine Fisheries Council to recommend regulations to ensure the continued sustainability and protection of the diamondback terrapin in New Jersey. The Commissioner also directed staff of the Division of Fish and Wildlife to review scientific literature and information provided by outside experts on diamondback terrapins in New Jersey, as well as in other areas. This review informed both his decision to close the diamondback terrapin season, and the decision to proceed with the proposed rules.

With this proposal, the Department is taking an additional step beyond the administrative orders of temporary duration cited above by amending and repealing sections of N.J.A.C. 7:25-21 in order to prohibit the taking, catching, possession, exposure for sale, or attempt to catch or take diamondback terrapin, thereby effectively closing the diamondback terrapin fishery. As discussed above, the diamond back terrapin's life cycle (delayed reproductive maturity, low birth rate, and low recruitment) combined with the available population data, threats such as predation and human settlements, and the ease of harvest, do not support a determination that continued harvest of diamondback terrapins in New Jersey is sustainable at this time. The proposed rules will allow the Department to study the terrapin population and, if found supportable, make future adjustments to the rules to allow an appropriate harvest.

Social Impact

The proposed amendments and repeals will have a positive social impact. Diamondback terrapins contribute to the diversity of the State's plant and animal species, and constitute an integral component of the salt marsh ecosystem. The loss of biodiversity should the diamondback terrapin be extirpated because of unrestricted harvest, could result in a loss to the structure, composition and function of a key natural ecosystem. Such a loss is a harbinger of broader environmental degradation, with resultant negative societal impacts.

The protection and management of the State's native fauna and conservation of the State's biological diversity are essential to maintaining a healthy and stable human environment,

will ultimately contribute to a higher quality of life for New Jersey residents of all ages, and will enhance the experience for visitors to the State.

Economic Impact

The proposed amendments and repeals will have a negative impact on participants in the diamondback terrapin fishery in New Jersey, since the proposed amendments will prohibit any person from taking, catching, possessing, exposing for sale, or attempting to catch or take diamondback terrapins. The Department cannot specifically calculate the potential economic loss to harvesters, since the existing rules do not require harvesters to report their harvest of diamondback terrapins.

The USFWS estimated in 2013 that diamondback terrapins sold for between \$35.00 and \$100.00 each, with an average price of \$80.00 each (CITES 2013). The USFWS also reported that individual diamondback terrapin hatchlings sold in Hong Kong pet markets for between \$50.00 and \$100.00. Based on the average price of \$80.00 in 2013, the retail value of the more than 500 illegally harvested diamondback terrapins that Department conservation officers seized in 2014 was in excess of \$44,000.

The Department believes that it is unlikely that any New Jersey resident derives his or her income or subsistence solely from the capture and sale of diamondback terrapins; however, any income from the harvest will be lost as a result of the proposed rules.

Environmental Impact

The proposed amendments and repeals are expected to have a positive environmental impact. As discussed in the Summary above, the USFWS has advised the Department that the level of harvest of diamondback terrapins in New Jersey is of serious conservation concern, and has asked the Department to close the season. Because it lacks accurate population and harvest data, the Department is not able to gauge whether the current scale of commercial harvest is sustainable, or whether it might result in the extirpation of the diamondback terrapin from New Jersey. The proposed amendments prohibiting the harvest will allow the Department to more comprehensively study the State's terrapin population and, if found supportable, make future adjustments to the rules to allow an appropriate harvest.

Diamondback terrapins play an important ecological role in their habitat by maintaining nutrient and energy pathways. They have an impact on land-based ecosystems insofar as during the nesting season female diamondback terrapins move nutrients and calories from water to land in the form of eggs; eggs and emerging hatchlings are in turn eaten by a variety of predators. Nutrients from eggs that are not eaten by vertebrate predators are often absorbed by plant roots for growth in an otherwise nutrient-poor environment.

As stated in the Social Impact above, diamondback terrapins contribute to the diversity of the State's plant and animal species and constitute an integral component of the salt marsh ecosystem. Adult diamondback terrapins eat primarily mollusks, especially periwinkles, and crustaceans. They also eat blue crabs, green crabs, marine worms, fish, and carrion.

Diamondback terrapins have been shown to be among the species that regulate salt marsh invertebrate populations (Tucker et al. 1995). Adult diamondback terrapins occupy the top of the

salt marsh food web, and help keep populations of other animals from growing destructively large. For example, periwinkles destroy excessive amounts of Spartina grass, the dominant vegetation of a salt marsh, thereby degrading habitat that benefits the human population and surrounding ecosystems by sheltering coasts from erosion and filtering nutrients and sediments from the water column. By feeding on periwinkles, diamondback terrapins reduce the damage that an overpopulation of periwinkles could cause. The disappearance of diamondback terrapins is believed to contribute to the decline of salt marsh habitat by allowing overgrazing of grasses that form a crucial part of this environment (Brennessel 2006). The Department anticipates that prohibiting the harvest of diamondback terrapins will help improve the salt marsh habitat.

Federal Standards Statement

Executive Order No. 27 (1994) and N.J.S.A. 52:14B-1 et seq. require State agencies that adopt, readopt, or amend State regulations that exceed Federal standards or requirements to include in the rulemaking document a comparison with Federal law. The proposed rules are not promulgated under the authority of or in order to implement, comply with or participate in any program established under Federal law, or under a State statute that incorporates or refers to a Federal law, Federal standards or Federal requirements. Accordingly, no Federal standards analysis is required.

Jobs Impact

The Department anticipates that the proposed amendments and repeals will not have an impact on job creation or retention in the State. Because the Department does not have accurate population and harvest data for the State's diamondback terrapins, it is not able to estimate the number of jobs that may be affected by the proposed closure of the harvest of diamondback terrapins; however, to the best of the Department's knowledge, there are no individuals whose sole employment is associated with the harvest of the species.

Agriculture Industry Impact

The Department does not anticipate that the proposed amendment and repeals, which prohibit the harvest of diamondback terrapins, will have any impact on the agriculture industry.

Regulatory Flexibility Analysis

In accordance with the New Jersey Regulatory Flexibility Act, N.J.S.A. 52:14B-16 et seq., the Department has reviewed the proposed amendment and repeals for reporting, record-keeping, or other compliance requirements on small businesses. The proposed rules impose no reporting, recordkeeping or other compliance requirements. The impact of the proposed rules on small businesses is as discussed in the impact statements above.

In proposing the rules, the Department has balanced the expected economic impacts of the rules upon small businesses against the need to protect the environment. The Department has determined that exempting small businesses from the proposed ban on harvesting diamondback

terrapins would endanger the environment by exposing the diamondback terrapin to potential extirpation in this State. Therefore, no exemption from the rule is provided for small businesses.

Housing Affordability Impact Analysis

In accordance with N.J.S.A. 52:14B-4, as amended effective July 17, 2008, by P.L. 2008, c. 46, the Department has evaluated this rulemaking to determine the nature and extent of the proposed amendments on the impacts to housing affordability. The proposed amendments apply solely to the marine fishing industry and will have no impact on the average costs associated with housing.

Smart Growth Development Impact Analysis

In accordance with N.J.S.A. 52:14B-4.1b, the Department has evaluated the proposed amendment and repeals to determine their impact, if any, on housing production within Planning Areas 1 or 2, or within designated centers, under the State Development and Redevelopment Plan. The proposed rules are not expected to impact the residential sector; rather, they relate solely to the marine fishery industry. Therefore, the proposed rules will not evoke a change in housing production in Planning Areas 1 or 2, or within designated centers.

References:

Avissar, N. G. 2006. Changes in population structure of diamondback terrapins (Malaclemys terrapin terrapin) in a previously studied creek in southern New Jersey. Chelonian Conservation and Biology 5:154-159. http://www.dtwg.org/Bibliography/Publications/Avissar%202006.pdf
Brennessel, Barbara. 2006. Diamonds in the Marsh. 1st ed. Hanover, NH. University Press of New England.

Burger, J. 1977. Determinants of hatching success in the diamondback terrapin, Malaclemys terrapin. American Midland Naturalist 97:444-464.

http://www.dtwg.org/Bibliography/Publications/Burger%201977.pdf

Carr, Archie. 1952. Handbook of Turtles: The Turtles of the United States, Canada and Baja California. 1st ed. Ithaca, NY. Cornell University Press, pp. 162-174.

Coker, R.E. 1906. The natural history and cultivation of the diamond-back terrapin, with notes on other forms of turtles. N.C. Geol. Surv. Bull.14:1-67.

Convention on the International Trade in Endangered Species, Sixteenth Conference of the Parties, Bangkok (Thailand) 3-14, March 2013. U.S. Fish and Wildlife Service. [accessed September 8, 2015]. http://www.fws.gov/international/cites/cop16/cop16-proposal-appendix-ii-listing-of-diamondback-terrapin.pdf

Egger, Stephanie. 2016. Diamondback terrapin populations, demography and life-history with respect to New Jersey harvest regulations. Unpublished manuscript.

Ernst, C.H. and R.W. Barbour. 1972. Turtles of the United States. University Press of Kentucky, Lexington, KY. 347 pp.

Ernst, C.H., and J.E. Lovich. 2009. Turtles of the United States and Canada. 2nd ed. Baltimore, MD. Johns Hopkins University Press.

Garber, Steven W. 1990. The Ups and Downs of the Diamondback Terrapin. The Conservationist. NYSDEC. May-June 1990. 64-66.

http://128.121.13.244/awweb/main.jsp?flag=browse&smd=2&awdid=4

Gibbons, J.W., Lovich, J.E., Tucker, A.D., Fitz Simmons, N.N., and Greene, J.L. 2001. Demographic and ecological factors affecting conservation and management of the diamondback terrapin (Malaclemys terrapin) is South Carolina. Chelonian Conservation and Biology 4(1): 66 - 74. http://sbsc.wr.usgs.gov/files/pdfs/gibbons.pdf

Haramis, G.M., Henry, P.P.F, and D.D. Day. 2011. Using scrape fishing to document terrapins in hibernacula in Chesapeake Bay. Herpetological Review 42(2): 170-177.

Hart, Kristen M. and Lee, David S. 2006. The Diamondback Terrapin: The Biology, Ecology, Cultural History, and Conservation Status of an Obligate Estuarine Turtle. Studies in Avian Biology 32:206-213.

Hildebrand, S. F. 1932. Growth of diamond-back terrapins size attained, sex ratio and longevity. Zoologica. 9:231-238. http://www.dtwg.org/Bibliography/Publications/Hildebrand-1932.pdf

Outerbridge, M. 2013. Recovery Plan for the Diamondback Terrapin, Malaclemys terrapin, in Bermuda Prepared in Accordance with the Bermuda Protected Species Act 2003. 46 pp.

Pfau, B. and W. M. Roosenburg. 2010. Diamondback terrapins in Maryland: research and conservation. Radiata 19:2-34.

 $\underline{http://www.dtwg.org/Bibliography/Publications/PFau\%20 and \%20 Roosenburg\%202010.pdf}$

Roosenburg, W. M. 2000. Diamonds in the rough: diamondback terrapins in peril. Reptilia 23:34-38.

Roosenberg, W.M. 1990. The diamondback terrapin: population dynamics, habitat requirements, and opportunities for conservation. In: New Perspectives in the Chesapeake System: A Research and Management Partnership. Proceedings of a Conference, Dec. 4-6, 1990. Baltimore, MD. Chesapeake Research Consortium Publication No. 137:227-234.

Roosenburg, W. M. 1991. The diamondback terrapin: Habitat requirements, population dynamics, and opportunities for conservation. New Perspectives in the Chesapeake System: A Research and Management and Partnership. Proceedings of a Conference. Chesapeake Research Consortium Pub. No 137. Solomons, Md. pp. 237 - 234.

Roosenberg, W. M. 2010. 2010 United States Fish and Wildlife Service Workshop on the Trade and Conservation of Turtles. The history of commercial exploitation of the Diamondback Terrapin (Malaclemys Terrapin): Lessons for turtle conservation. https://www.fws.gov/international/pdf/archive/workshop-terrestrial-turtles-history-of-commercial-exploitation-of-the-diamondback-terrapin.pdf

Seigel, R.A. 1984. Parameter of two populations of the diamondback terrapin (Malaclemys terrapin) on the Atlantic coast of Florida. Pages 77-87. in R.A. Seigel, L.E. Hunt, J.L. Knight, L. Malaret, and N.L. Zushlag (eds.) Vertebrate Ecology and Systematics - A Tribute to Henry S. Fitch. Museum of Natural History, University of Kansas, Lawrence, Kansas.

Sornborger, C. 2015. Diamondback terrapin population study 2015, Rayner Refuge, Barrington, Rhode Island, 26th year report.

Tortoise & Freshwater Turtle Specialist Group 1996. Malaclemys terrapin. The IUCN Red List of Threatened Species. Version 2015.2. [accessed August 28, 2015]. www.iucnredlist.org.

Tucker, A. D., N. N. Fitzsimmons, J. W. Gibbons. 1995. Resource partitioning by the estuarine turtle Malaclemys terrapin: trophic, spatial and temporal foraging constraints. Herpetologica 51:167-181.

 $\frac{http://www.bio.davidson.edu/people/midorcas/research/Terrapins/DBTreprints/Tucker\%20et\%2}{0al\%20-\%201995\%20-\%20Resource\%20partitioning\%20in\%20terrapins\%20-}$

%20Heretologica.pdf

Wood, R. C. and R. Herlands. 1997. Turtles and tires: the impact of road kills on northern diamondback terrapin, Malaclemys terrapin terrapin, populations on the Cape May peninsula, southern New Jersey. J. Van Abbema editor. Proceedings: Conservation, Restoration, and Management of Tortoises and Turtles -- An International Conference. New York Turtle and Tortoise Society, New York, USA. 46-53.

http://www.dtwg.org/Bibliography/Publications/Wood%20and%20Herlands%201997.pdf

Wnek, J. 2014. Assessment of diamondback terrapin populations at North Sedge Island and along southern Island Beach State Park, New Jersey. A brief summary of diamondback terrapin research conducted at North Sedge Island and Island Beach State Park, New Jersey from 2002 – 2013.

Yearicks, E.F., R.C. Wood, and W.S. Johnson. 1981. Hibernation of the northern diamondback terrapin, Malaclemys terrapin terrapin. Estuaries 4:78-80.

Full text of the proposal follows (additions indicated in boldface **thus**; deletions indicated in brackets [thus]):

SUBCHAPTER 21. **DIAMONDBACK** TERRAPIN REGULATIONS

7:25-21.1 [Designation of terrapin season] **Prohibition on the taking of diamondback terrapin**No person shall take, catch, possess, expose for sale or attempt to catch or take any Malaclemys [palustris] **terrapin**, commonly known as [diamondbacked] **diamondback** terrapin[, except between November 1 and March 31], **nor shall any person take or destroy or attempt to take or destroy the eggs of any diamondback terrapin**.

[7:25-21.2 Taking of terrapin

No person shall catch, take or attempt to catch or take any terrapin from any of the waters of this State by means of a trap, pot, fyke, seine, weir or net of any description.

7:25-21.3 Size requirement

No person shall take, catch, or possess any terrapin less than five inches long, measured lengthwise along the under shell, nor take or destroy the eggs of any terrapin.]