

Patuxent Wildlife Research Center Science Brief for Resource Managers

<http://www.pwrc.usgs.gov>

Date:
March 2003

Contact:
Paula F.P. Henry

Phone:
301-497-5728

Address:

USGS Patuxent Wildlife Research Center
11510 American Holly Dr.
Laurel, MD 20708-4017

The Diamondback Terrapin in the Chesapeake Bay



Description:

The northern diamondback terrapin (*Malaclemys terrapin terrapin*), once abundant in the Chesapeake Bay, may be at risk of significant decline in the face of deleterious environmental damages. These include: (1) loss of nesting habitat to waterfront development and erosion control practices; (2) decreased recruitment of juveniles as a result of reduced quality and abundance of marsh habitat; (3) adult mortality and morbidity from contact with increased numbers of commercial and recreational vessels; (4) by-catch mortality resulting from commercial and recreational fishing gear; (5) increased prevalence of predators; and (6) exposure to other factors such as diseases, pollution, and invasive species. The relative impacts each of these effects have on various stages of terrapin growth and development need to be better assessed in order to optimize management practices. Areas of rich submerged aquatic vegetation and predator free islands may have played a significant role in providing safe refuges and foraging habitats for terrapin during critical life stages. Major ecological changes in the Bay leading to degraded Bay grasses and island loss, for example, could be critical factors to consider in determining the current status of the diamondback.

Little genetic information exists on the fine-scale population structure, levels of gene flow, or geographic distribution of the terrapin. Within the Chesapeake Bay this is of special concern because recent exploitation may

have created relatively isolated populations. Identifying evolutionary significant lineages is fundamental to a management plan aimed at maintaining both genetic diversity and long-term population stability.

As a result of a special appeal by the State of Maryland, the Maryland Congressional Delegation supported appropriated funding for terrapin research in the Chesapeake Bay to be conducted by the USGS in 2002-2004. The Patuxent Wildlife Research Center (PWRC) convened a workshop attended by representatives from State and Federal agencies, educational institutions, and environmental and shoreline development firms. In response to research and management needs expressed, PWRC initiated a terrapin survey in May 2002. The first year's objectives were to:

- ▶ provide information on current habitat type and activities of the diamondback terrapin within the Maryland Chesapeake Bay
- ▶ evaluate the genetic relatedness, levels of gene flow and degree of isolation of populations of terrapin throughout the Bay

Progress to Date:

During the 2002 nesting season, investigators at Patuxent Wildlife Research Center surveyed approximately 3,138 km of the Maryland Chesapeake Bay's eastern and western shorelines. All areas open to the water and potentially available to terrapin nesting females were examined. Beaches were searched for terrapins, their tracks, and active and disturbed nests. Dominant vegetation, habitat type, and land use visible from beach sites were recorded. During the winter of 2002/03, hibernation sites where large numbers of terrapins are known to overwinter were located. Terrapins were caught, measured, and tagged with a unique identification mark before being released on site. Egg shards, blood samples, and other tissues were collected throughout the year for genetic screening. Polymorphic microsatellite DNA markers and population structure analyses are being conducted in collaboration with the USGS Leetown Science Center.

Although relatively pristine beaches are being used by terrapins, many nesting locations were found to be degraded by debris that had been washed up or dumped along the shoreline. Nests were also located in “marginal” areas, such as agricultural fields, roadways, industrial complexes, and in manicured landscaping, at times far removed from the water. All nests were identified primarily from the presence of egg shards.



Nesting locations and habitat characteristics are being integrated into an electronic map of the Chesapeake Bay to provide baseline information for effective monitoring of the diamondback terrapin in the coming years. Findings from the initial year’s field survey are being used to design the critical research needed to characterize vulnerable life stages, ecological requirements of the populations, and to weigh the impacts of human activities and catastrophic environmental events.

Future Directions:

Obtain demographic statistics and behavioral data from terrapin inhabiting different locations throughout the Bay and coastal regions.

Biological and ecological data are needed on populations in different regions within the Bay to confirm developmental stages most at risk, and address measures of protection most effective for maintaining or restoring terrapin population stability.

Assess relative impacts of predators, contaminants, and other factors on specific and critical life stages.

Numbers of predators are increasing with urban sprawl. Dramatic increases in the numbers of raccoons, foxes, cats, dogs, and avian predators, such as gulls, may significantly contribute to nesting failures. With the exception of major oil spills, there has been very little information on the sensitivity of terrapin to contaminants. Risk of exposure to contaminants directly through the food chain or indirectly through habitat degradation needs to be evaluated.

Develop monitoring protocols for assessing the distribution and abundance of terrapins in the Bay to determine long term population stability.

Protocols should be sufficiently flexible to incorporate the diversity of land use practices and habitats present throughout the Chesapeake Bay. Protocols need to be rigorous enough to evaluate the effectiveness of ongoing and future management plans, status of critical habitats, and changes in annual stock assessments.

Management Implications:

The results from this study will identify critical factors related to survival, recruitment, land use and individuals’ behaviors during growth and development, as well as data on population structure throughout their distribution. These findings should provide natural resource managers with the tools necessary for developing conservation plans, and protecting critical habitats, and for regulating the use of the Bay’s commercial and recreational resources. These collaborative efforts should help in the conservation of diamondback terrapin populations in the Chesapeake Bay.

Other Contacts:

G. Michael Haramis - co-investigator
USGS Patuxent Wildlife Research Center
Phone 301-497-5651
email: michael_haramis@usgs.gov

Dan Day - field monitoring
USGS Patuxent Wildlife Research Center
Phone 301-497-5708
email: dan_day@usgs.gov

William L. Kendall – population models
USGS Patuxent Wildlife Research Center
Phone 301-497-5868
email: william_kendall@usgs.gov

Timothy L. King – DNA analyses
USGS Leetown Science Center
Phone 304-724-8340
email: tim_king@usgs.gov

Mark J. Melancon - DNA and Chemistry
USGS Patuxent Wildlife Research Center
Phone 301-497-5710
email: mark_melancon@usgs.gov

For more information about Patuxent and our science, please visit our website at <http://www.pwrc.usgs.gov>