

available at www.sciencedirect.comjournal homepage: www.elsevier.com/locate/biocon

Species loss and shifting population structure of freshwater turtles despite habitat protection

Constance L. Browne¹, Stephen J. Hecnar*

Department of Biology, Lakehead University, 955 Oliver Road, Thunder Bay, Ontario, Canada P7B 5E1

ARTICLE INFO

Article history:

Received 28 April 2006

Received in revised form

8 May 2007

Accepted 22 May 2007

Available online 12 July 2007

Keywords:

Turtle

Age structure

Sex ratio

Population decline

Predation

Road mortality

ABSTRACT

Changes to population and community structure can have important ecological consequences and raise conservation concerns when causes are anthropogenic; however, signs of stress may not always be apparent. Turtles are long-lived and presence of adults may suggest healthy populations when lack of recruitment is actually threatening persistence. We observed and captured turtles for two years in Point Pelee National Park, Ontario, Canada, and compared our results with those collected 30 years earlier to determine if (1) species relative abundance, (2) sex ratios, and (3) age structure changed over three decades. Extirpation of the spotted turtle since 1972–1973 has altered the park's species assemblage. Evidence also suggests that Blanding's turtles have declined. Sex ratios were similar between time periods for all species except for the painted turtle which has become significantly more male-biased. Size structure for Blanding's and snapping turtles shifted towards larger and presumably older age classes. Our results suggest that limited juvenile recruitment caused the size shift. Heavy predation on turtle nests from a dense raccoon population appears to be the main factor limiting recruitment. Despite protecting a sizable fragment of turtle habitat for a century, Point Pelee has lost one species and only one other species has a large healthy population. Our study illustrates that habitat protection provides no guarantee for species persistence when multiple threats exist and highlights the necessity for monitoring populations of long-lived species.

© 2007 Elsevier Ltd. All rights reserved.

1. Introduction

The structure of populations has important ecological and conservation implications and can ultimately affect the structure of communities. For example, skewed sex ratios can result in smaller effective population size and can thus lower recruitment and alter the age structure of a population (Primack, 1998; Smith and Smith, 2001). In general, broad-based age structure pyramids indicate growing populations whilst top-heavy pyramids indicate insufficient recruitment and declining populations (Bodenheimer, 1958; Alexander, 1958; Smith and Smith, 2001). Collectively, altered population struc-

ture or species losses translate to changes in community structure (i.e. richness, evenness: see Smith and Smith, 2001). Although populations can be naturally dynamic, changes occurring because of human actions are of conservation concern (Meffe and Carroll, 1997; Primack, 1998). Populations of some species may be more vulnerable to anthropogenic change because of their life histories (Congdon and Dunham, 1997; Klemens, 2000).

Turtles (Class: Testudines) are considered to be of particular conservation concern because their life history includes low reproductive output, late maturity, and habitat requirements of wetlands and terrestrial environments (Congdon

* Corresponding author. Tel.: +1 807 343 8250; fax: +1 807 346 7796.

E-mail addresses: cbrowne@ualberta.ca (C.L. Browne), shecnar@lakeheadu.ca (S.J. Hecnar).

¹ Present address: Department of Biological Sciences, University of Alberta, Edmonton, Alberta, Canada T6G 2E9.

0006-3207/\$ - see front matter © 2007 Elsevier Ltd. All rights reserved.

doi:10.1016/j.biocon.2007.05.008

and Gibbons, 1996; Klemens, 2000). However, serious declines may easily go unnoticed because adult turtles can live many decades after recruitment problems start, thereby masking impending local extinctions with their presence (Klemens, 2000). Conservationists therefore must be vigilant of suspected problems and detect evidence of decline before populations are at serious risk of extirpation (Gibbons, 1997). It is generally considered that important threats to turtles include habitat loss, population isolation, subsidized predators, road mortality, collection as pets, interactions with exotic species, human recreation, disease, and effects of contaminants (Garber and Burger, 1995; Klemens, 2000).

Habitat protection is the cornerstone of biological conservation (Meffe and Carroll, 1997; Primack, 1998). Although managing fragments of natural areas as preserves may provide habitat for the faunas they initially support, species persistence may continue to be threatened through species relaxation, isolation effects, and from other external and internal threats (Janzen, 1983, 1986; Primack, 1998; Rivard et al., 2000).

Point Pelee National Park was once the location of greatest turtle species diversity in Canada (Table 1). However, there are concerns that turtle populations in the park may be declining. Although these populations are protected from additional habitat loss because they are in a National Park, this alone does not protect them from other threats. We examined the status of freshwater turtle populations in Point Pelee National Park by comparing our trapping data from 2001–2002 with those collected in 1972–1973 (Rivard and Smith, 1973a,b). We used the same basic methods, measurements, and trapped in the same general locations as did Rivard and Smith (1973a,b) to facilitate comparison. Rivard and Smith (1973a) were concerned that high levels of predation on turtle nests (primarily by raccoons, *Procyon lotor*) and the park's isolation might threaten its turtle populations.

We also focussed special attention on Blanding's turtle (*Emydoidea blandingii*) because it is now considered a 'species at risk' in many parts of its range and observations within the park suggest that it may be declining in numbers (warden

records). Blanding's turtle juveniles were also under-represented in the park in 1972–1973 (Rivard and Smith, 1973a). Other studies on Blanding's turtles have noted under-representation of juveniles (Gibbons, 1968; Graham and Doyle, 1977; Kofron and Schreiber, 1985; Congdon et al., 1993; Herman et al., 1995; Joyal et al., 2000; Rubin et al., 2004). All of these studies except for Herman et al. (1995) and Rubin et al. (2004) suggested the lower numbers of juveniles observed were likely because they were not detected. However, McMaster and Herman (2000) noted that juvenile Blanding's tend to be more visible than adults, and young juveniles are more visible than older juveniles and subadults.

Our general goal was to determine if population and community structure of turtles changed over three decades at Point Pelee National Park. Our specific objectives were to compare species occurrence, relative abundance, sex ratios, and population size structure between 2001–2002 and 1972–1973 (Rivard and Smith, 1973a,b). Considering the longevity of turtles and continuing conservation concerns in the park we expected changes in species relative abundance and possible species loss. If heavy predation by raccoons on turtle nests is limiting juvenile recruitment we expect a shift in size structure to larger and older turtles.

2. Methods

2.1. Study site

Point Pelee National Park in southwestern Ontario (42° 10'N, 82° 30'W) is a small (16 km²) heavily used (up to 500,000 visitors/y) protected area. The park forms the southernmost portion of Canada's mainland and acts as a functional 'island' because 80% of its perimeter is surrounded by water (Lake Erie) and the other 20% by agricultural land. Point Pelee is highly isolated from other natural areas because its setting is within one of the most densely populated (by humans) and heavily altered landscapes in eastern North America. The park contains one of the few remaining sizable fragments of Carolinian forest in Canada (15.9% of park) and one of the few remaining large deep freshwater coastal marshes in the Great Lakes (43.2% of park). The marsh is recognised as a wetland of international importance (Ramsar, 2002). Turtles use ponds in the marsh, swamp thicket/forest, wet meadows, and artificial canals within the park, and nest in beaches, old fields, and along roadsides. The park has a cool (long-term daily average 9.2 °C), moist (908 mm annual total precipitation), temperate climate which is strongly moderated by Lake Erie. Point Pelee has been a protected site for nearly a century.

2.2. Data collection and analyses

We conducted extensive visual surveys from 29 April to 21 June 2001 and 1 April to 31 May 2002. Based on visual surveys, we selected 14 trapping sites. Turtles were captured during surveys or trapping sessions between 5 May and 24 August 2001 and 1 April and 22 August 2002. We used a variety of methods (hoop, basking, and wire cage live traps; and hand captures) to reduce potential trapping bias (Ream and Ream, 1966; McKenna, 2001; but see Gibbs and Steen, 2005). Traps were checked every one to two days. We also included a small

Table 1 – List of turtle species recorded in Point Pelee National Park

Scientific name	Common name	Conservation status
<i>Chrysemys picta</i>	Painted turtle	
<i>Graptemys geographica</i>	Northern map turtle	Special concern ^{a,c}
<i>Emydoidea blandingii</i>	Blanding's turtle	Threatened ^{a,b,c}
<i>Clemmys guttata</i>	Spotted turtle	Endangered ^{a,c}
<i>Glyptemys insculpta</i>	Wood turtle	Special concern ^{a,d}
<i>Sternotherus odoratus</i>	Stinkpot	Threatened ^{a,c}
<i>Chelydra serpentina</i>	Snapping turtle	
<i>Apalone spinifera</i>	Spiny softshell	Threatened ^{a,c}
<i>Terrapene carolina</i>	Eastern box turtle	Data deficient ^a
<i>Trachemys scripta</i>	Pond slider	Introduced

a COSEWIC, 2005.

b Endangered in Nova Scotia and Threatened in Ontario.

c Status tracked in Ontario by the OMNR-NHIC.

d Introduced to Point Pelee, but special concern in Canada.

Download English Version:

<https://daneshyari.com/en/article/4387166>

Download Persian Version:

<https://daneshyari.com/article/4387166>

[Daneshyari.com](https://daneshyari.com)