Cannonball Jellyfish

Stomolophus meleagris

Cannonball jellyfish

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DESCRIPTION

Taxonomy and Basic Description

Cannonball, or cabbagehead, jellyfish (*Stomolophus meleagris*) (L. Agassiz 1860),are also known as jellyballs and belong to the class Scyphozoa and order Rhizostomeae. Agassiz (1860) described and illustrated the medusa of cannonballs using specimens collected from Wassaw Island, Georgia and Charleston, South Carolina. The hemisperical bell reaches 20 to 25 cm (8 to 10 in.) in size and is bordered with brown pigment. It has short, protruding oral arms with secondary mouth folds (scapulets) at the base of the bell covered with mucus for trapping small prey. *Stomolophus meleagris* means “many mouthed hunter.” The mucus is also thought to be a response to disturbance rather than for feeding (Phillips et al. 1969; Larson 1976).

Status

The cannonball jellyfish is not a state or federally listed species; however, cannonballs are ecologically important because they are the major prey base for the Endangered leatherback sea turtle (*Dermochelys coriacea*) and warrant conservation.

POPULATION SIZE AND DISTRIBUTION

Cannonball jellyfish have been reported in the western Atlantic from New England to Brazil (Kramp 1961; Larson 1976), in the eastern Pacific from southern California to Ecuador, and in the western Pacific from the Sea of Japan to the South China Sea (Kramp 1961; Omori 1978). They are one of the most abundant scyphomedusae along the Southeastern and Gulf Coasts of the United States (Mayer 1910; Kraeuter and Setzler 1975; Burke 1976; Calder and Hester 1978). Their success is based in part on their ability to grow rapidly and take advantage of ephemeral secondary production (Larson 1986).

Current distributions of most populations are undocumented. However, numerous reports of their occurrence in the Southeast exist. Mayer (1910) reported them as abundant during the winter and spring off the coast of Florida north to South Carolina. Brooks (1882) and Gutsell (1928) reported them in North Carolina as very abundant in June and July and common throughout the summer in the sounds and ocean. In South Carolina and Georgia, they are reported as the most common scyphomedusae, occurring sporadically year round (Kraeuter and Setzler 1975; Calder and Hester 1978).

The seasonal cycle of cannonball jellyfish is described by Rountree (1983) as the following:

> *"Small populations of large adults appear offshore in the spring and move inshore by early summer. The origin of these populations of adults has not been determined, but it seems likely that they are survivors from the previous season (Kraeuter and Setzler 1975). It is also possible that they are early spawned medusae from more southern waters which are carried north by prevailing spring ocean currents…Kraeuter and Setzler (1975) found the young medusae move out from estuarine waters into more saline waters as they grow. Two concurrent events are therefore hypothesized: 1) first generation populations move from offshore in the spring to inshore waters in the summer and finally into brackish waters in the fall; 2) second generation populations move out from estuarine waters beginning in the mid-summer and continuing through the fall."*

The South Carolina Department of Natural Resources (SCDNR) has been conducting surveys in the South Atlantic Bight since 1986 through a program called the Southeast Area Monitoring and Assessment Program – South Atlantic Shallow Water Trawl Survey (SEAMAP-SA). Tows were conducted each year in spring (April to May), summer (July to August), and fall (October to November) in shallow coastal waters from Cape Hatteras, North Carolina to Cape Canaveral, Florida. From 1989 to 2000, only the presence or absence of cannonball jellyfish was recorded on each individual tow. During this time, cannonballs were present in 43% of the tows during all three survey seasons. Beginning in 2001, total numbers of cannonballs per hectare were counted for each year (102 tows per season; J. Boylan and P. Webster, SCDNR, pers. comm.). These data are presented in the following bar graph (Hendrix and Boylan 2011). Since 2001, there has been an apparent steady decline in the relative abundance of cannonballs with very low catch rates observed in 2004 and 2009. The reason(s) for this decline are unknown; however, anomalously low summer water temperatures in the coastal waters in summer 2003 may be related to the low numbers in 2004. More recently, the relative abundance has increased (Hendrix and Boylan 2011).

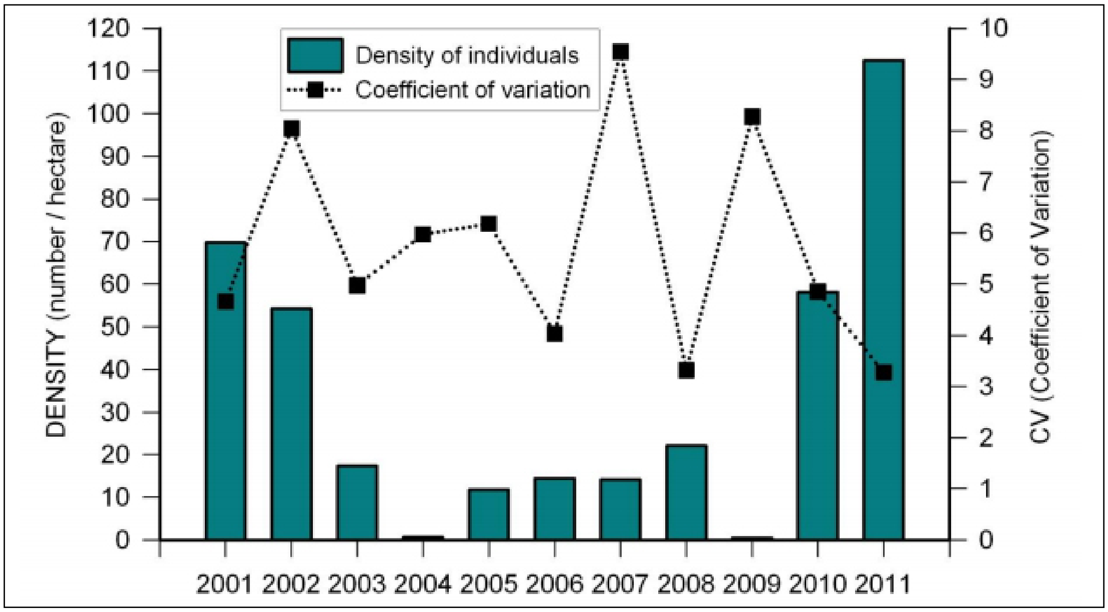

Figure 1: Total number of cannonball jellyfish per ha as counted each year from 2001-2011.

In another study (Murphy et al. 2006), density and distribution of leatherback sea turtles during aerial surveys were potentially associated with abundance and distribution of cannonball jellyfish. The number of leatherbacks observed for each sampling event in each year was related to the density of cannonball jellyfish observed from 2001 through 2009. These data are presented in the graph below (SEAMAP reports 2001–2009: http://seamap.org/trawlSurveys.html).

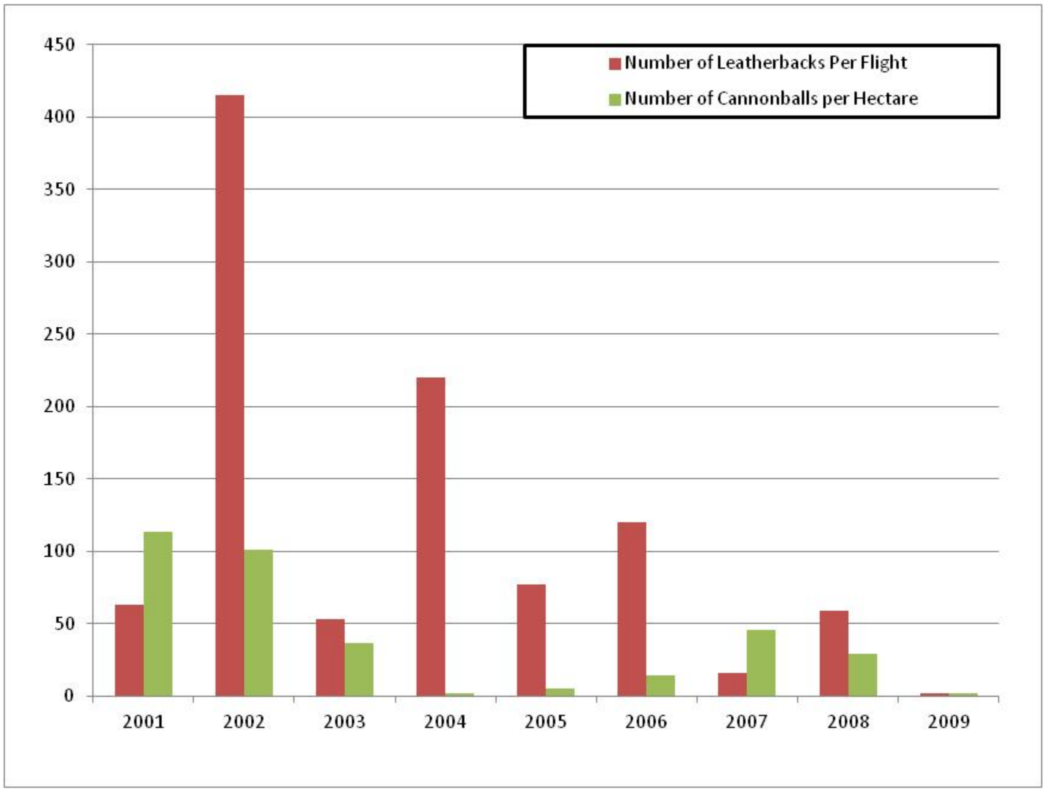

Figure 2: Annual shifts in abundance of leatherback and cannonball jellyfish observations, 2001 – 2009.

HABITAT AND NATURAL COMMUNITY REQUIREMENTS

Cannonball jellyfish are found in estuarine and saline waters. Temperature and salinity measured during the SCDNR SEAMAP-SA tows (unpub. data) indicate they are found in waters with an average temperature of 23.1°C (74°F) and in salinities from 17.7 to 36.5 parts per thousand (ppt) with an average of 33.8 ppt. Cannonballs feed on zooplankton, primarily bivalve veligers, a mollusk larval stage (Larson 1991). They have also been shown to prey on all stages of red drum larvae (Duffy et al. 1997). However, they do not sting humans (Calder and Prodgen 1977). Cannonballs are strong horizontal and directional swimmers (Shanks and Graham 1987). They are known for their symbiotic relationships with other marine species, specifically 10 species of fishes as well as juvenile longnosed spider crabs (*Libinia dubia*). These symbionts feed on both the zooplankton taken in by the jellyfish and on the host's medusae. Symbionts may also use the bell for protection (Corrington 1927; Gutsell 1928; Phillips et al. 1969; Rountree 1983).

CHALLENGES

Since cannonball jellyfish are dependent on the abundance of zooplankton in nearshore waters, any activity, marine or terrestrial, that could affect water quality, should be considered a detriment to this species. Such problems include harmful algal blooms, oil spills, and nonpoint source pollution. Also, cannonball jellyfish's dependence on bivalve veligers suggests a relationship with the health of bivalves.

The potential exists for cannonball jellyfish to be adversely affected by commercial fishing. Currently, South Carolina does not regulate a commercial cannonball jellyfish fishery. However, this fishery does exist in other portions of the cannonball's range. Japan imports 5,400 to 10,000 tons of jellyfish products valued at $25.5 million annually (Omori and Nakano 2001). Currently, Asian countries are developing fisheries management plans to conserve jellyfish because populations are unstable or declining due to pollution, overfishing, or climate change. Consequently, dealers are looking for new sources of jellyfish (Hsieh et al. 2001). Interest in cannonball jellyfish from the United States increased recently because of high consumer demand in Asia (Hsieh et al. 2001). A fishery in Florida has processed cannonball jellyfish since 1992 (Rudloe 1992), and a commercial trawl fishery for cannonball jellyfish in Georgia exists (M. Dodd, GADNR pers. comm.). Rising demand in Japan and Southeast Asia may create an international market for cannonball jellyfish from South Carolina coastal waters. Any development of commercial fisheries for cannonballs must consider its affect on this species' role in the food web of coastal ecosystems, as well as the affects on Endangered leatherback sea turtles through incidental mortality in trawls and reduction of their food resources. Life cycles of cannonball jellyfish involve federal and state waters; therefore, cannonballs should be managed on a regional scale (Murphy et al. 2006).

CONSERVATION ACCOMPLISHMENTS

In 1989, SCDNR began surveying cannonball jellyfish during SEAMAP-SA tows. These surveys have provided an index of relative abundance of cannonball jellyfish in coastal waters along the Southeastern United States, which has led to a better understanding of this species. In addition, current regulations requiring the use of turtle excluder devices (TEDs) in shrimp trawling nets has also provided protection to cannonball jellyfish. Although required to reduce incidental catch of turtles, TEDs also exclude cannonballs greater than 10 cm (4 in.), thus increasing survival. TEDs have been required for shrimp trawls since 1990.

CONSERVATION RECOMMENDATIONS

- Determine the distribution of cannonball jellyfish in state waters and how this species affects the distribution of leatherback sea turtles.
- Examine the basic life history and determine the source of the spring recruitment of cannonball jellyfish.
- Determine the effect of temperature, salinity, and rainfall on spring reproduction.
- Determine the Southeastern population structure through genetic analysis of cannonballs.

- Continue to monitor population trends through SCDNR SEAMAP-SA sampling of cannonballs.
- Determine the maximum sustainable yield for a harvest fishery.
- More fully examine the species' role in predator-prey dynamics.
- Encourage municipalities to adopt Best Management Practices (BMPs) that protect water quality and bivalve health by reducing nonpoint source runoff from highways, agricultural fields, and housing developments.
- Monitor the effectiveness of existing BMPs such as setbacks, retention ponds, and vegetated buffers for preventing nutrient and contaminant runoff into coastal waters.
- Examine the relationship between bivalve populations and cannonball reproduction.
- If a fishery develops in South Carolina for cannonball jellyfish, it should be monitored and regulated to avoid overexploitation, and appropriate harvest techniques should be identified that are protective of other marine species.
- Facilitate the development of a regional management plan for cannonballs.
- Develop an education program that stresses the importance of cannonball jellyfish to coastal ecosystems and that they are harmless to humans.

MEASURES OF SUCCESS

Determining the distribution, life history, habitat needs, and Southeastern population structure and trends would represent a measure of success for this species. Methods that protect water quality are also likely to protect cannonball jellyfish and associated predator/prey relationships. In the event that more protective BMPs are implemented, SEAMAP data can be used to indicate whether these measures have affected cannonball jellyfish populations. Producing a regional management plan for this species would greatly benefit the cannonball jellyfish throughout the Southeastern coastal area.

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