Cownose Rays in the Chesapeake Bay – What do we know?

October 22, 2015 Workshop

Hosted by the Chesapeake Bay Program's Sustainable Fisheries Goal Implementation Team

Chesapeake Bay Program
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Research Summary, Implications and Recommendations from the Scientists:

- Lyndell Bade, formerly East Carolina University
- Tobey Curtis, National Oceanic and Atmospheric Administration
- Drew Ferrier, Hood College
- Bob Fisher, Virginia Institute of Marine Science, Marine Advisory Services
- Dean Grubbs, Florida State University Coastal and Marine Laboratory
- Tom Ihde, ERT/National Oceanic and Atmospheric Administration
- Jan McDowell, Virginia Institute of Marine Science, Department of Fisheries Science
- Matt Ogburn, Smithsonian Environmental Research Center
- Howard Townsend, National Oceanic and Atmospheric Administration

Topic	Research Summary	Implications
Age, Growth and Reproduction	- Cownose rays are a K-selected species characterized by: o Late maturity – Males mature at 6-7 years; Females at 7-8 years o Long gestation periods – 11 months o Low reproductive potential – 1 pup per mature female per year - Maximum life span is at least 21 years. - Average disc width at maturity is about 85 cm for males and females. - Females give birth once a year. Right after giving birth, mating occurs and females become pregnant again. o Over a lifetime, a female cownose ray can produce a maximum of 15 pups. - Juvenile cownose rays (ages 2-4) are rarely observed in Chesapeake Bay studies. This may indicate that juveniles do not use the Chesapeake Bay habitat until they reach maturity.	- K-selected characteristics make cownose rays susceptible to overfishing. - When a female is removed from Chesapeake Bay, a new recruit is also removed from the population due to the almost year-round gestation of mature females. - Unknown juvenile habitat use and migrations is a gap in understanding the full life history. - More research is needed to better understand habitat use and movements of males throughout their life history.

This is an initial summary of the workshop published December 2015. A full report will be posted to the workshop web page in January 2016.
http://www.chesapeakebay.net/calendar/event/23141/

Population Dynamics	- Migrating schools of mature cownose rays enter the Chesapeake Bay in May each year to pup and to mate.
	  o Mature females entering the Bay are near the end of their gestation period and give birth in June-July. Mating occurs soon after birth.
	- Males leave the Bay in June-July right after mating occurs. Research indicates that males may spend some time in offshore waters. More information is needed on male movements when they leave the Bay.
	- Females remain in shallow-water habitats in the Bay until mid-October.
	  o Males and females migrate south together to their overwintering grounds off the Florida coast.
	- Unknown population size for the East Coast and Chesapeake Bay populations.
	- The cownose rays that use the Chesapeake Bay each summer are part of a larger cownose ray population along the U.S. East Coast. This population is distinct from cownose rays in the Gulf of Mexico.
	- Cownose ray populations have a very low intrinsic rate of population increase (minimal population growth from year to year).
		- After July, mature males are no longer present in the Chesapeake Bay, so all fishing gear interactions in late summer are with females.
		- Research is underway to determine if individual cownose rays return to the same tributaries within the Chesapeake Bay to pup and mate each year.
		- Cannot determine stock status or population trends without population estimates or abundance indices, respectively.
		- Cownose ray schooling behavior, especially large migratory schools along the coast, can affect aerial population estimates and influence public perception of an assumed prolific population.
		- Low rates of population increase suggest cownose ray populations are susceptible to overfishing.

Diet	- Cownose rays are opportunistic feeders.
	- Recent diet studies in Chesapeake Bay show that dominant prey items include softshell clams, Macoma clams and razor clams. Oysters and hard clams were not a significant part of their diet.
	  o Diet composition is site-specific. Cownose rays sampled near on-bottom aquaculture areas had a higher percentage of oysters and/or hard clams.
	- Their mouths and jaws are designed to crush shellfish, but predation is limited by the bite force and jaw gape size.
		- Diet composition of individual cownose rays can depend on the sampling location and method.
		  - Fishery independent samples tend to minimize the loss of stomach content (due to regurgitation) and more accurately represent natural prey items.
		- Ongoing research includes development of genetic techniques to identify partially digested materials found in diet samples that were previously unidentifiable.

Shellfish Industry Interactions	- Historical and recent concerns of cownose ray predation on valuable shellfish resources are prevalent in the Chesapeake Bay region, especially in Virginia.
	- Although recent diet studies have shown that oysters and clams were not found to be significant portions of their diets, localized and intensive feeding on oysters or clams can occur.
	  o It takes more energy for cownose rays to feed on clustered oysters (i.e. spat-on-shell) than on single oysters.
	  o Cownose ray predation is limited by bite force and gape size, so larger shellfish may be less susceptible to predation.
	- Researchers and industry in Virginia have been working to test various cownose ray predation deterrent devices.
		- Ray-shellfish interactions can be a localized threat to shellfish restoration and aquaculture operations. These interactions need to be addressed.
		- Protection of smaller shellfish could help mitigate the threat of cownose ray predation.
		- Cownose ray predation deterrents can be costly. Some deterrents proved to be ineffective against cownose ray predation.

Fishing Pressure	- Cownose rays generally interact with shallow water gear types (e.g. pound nets, haul seines). - Cownose rays are caught in Chesapeake Bay as commercial bycatch and are targeted for recreational fishing (bow-hunting). o Subsidized commercial bycatch in Virginia from 2007-2014. - Potential gear interactions in offshore areas could include trawls, gill nets, and other gears.	- Unknown fishing effort and mortality. Some landings data available for commercial bycatch in Virginia. - Not possible to differentiate male and female cownose rays from the surface. - Rays that are caught recreationally are not being used.
Marketing	- VIMS Advisory Services staff affiliated with Virginia Sea Grant worked with industry to launch a comprehensive marketing effort over the past several years for cownose ray product. Efforts included exploring domestic and foreign markets as well as working with local chefs and seafood buyers. - 30-34% of cownose ray flesh is usable for human consumption. - The irregular shape makes cownose rays time-consuming and expensive to process. - Venomous spines make them hard to handle. - To date, continued marketing efforts are not feasible due to low demand and high processing cost.	- Low demand and unsuccessful long-term marketing efforts seem to indicate that a commercial fishery is not feasible at this time. - If cownose ray did become a high value fishery with increased demand in the future, there is potential for overfishing. - A reduction fishery for cownose rays is not an effective solution for shellfish predation concerns.

Recommendations from the Researchers

- Conduct outreach to address the misconceptions about cownose rays in the Chesapeake Bay and throughout their range along the East Coast. Promote coordinated messaging across the region to communicate that:
    - Cownose rays are a highly migratory species along the Atlantic Coast that enter estuaries like the Chesapeake Bay for pupping and mating each year.
    - Cownose rays are not invasive.
    - Cownose rays are not a species of skate.
    - Cownose rays are a slow-growing, slow to mature, and low fecundity species.
- Explore the possibility of working with commercial and recreational fisheries to develop citizen science efforts to support cownose ray research.
- Better characterize and quantify all sources of fishing mortality (commercial bycatch and discards, recreational effort and discards) for cownose rays in the Chesapeake Bay waters and throughout their range along the Atlantic Coast.
- Continue working with the shellfish industry to develop effective cownose ray predation deterrents and mitigating devices. Consider recent research on cownose ray predation limitation (jaw gape size ad bite force) for larger shellfish.
- Prioritize and support continued cownose ray research to address information gaps, including remaining life history questions and estimates of population size and abundance indices.
- Based on the range and movement of cownose rays along the Atlantic Coast, discuss cownose ray research and management at relevant fishery management forums and agencies on the U.S. East Coast.