Juvenile Permit Habitat

BACKGROUND:

Little scientific information exists for permit, and most existing information is from Florida. The only scientific article published entirely on permit (published in 2001) focused on adults: age of maturity, growth rates and seasonality of spawning. The research reported here is the first study on permit at Turneffe Atoll, and one of few studies to reveal information on the types of habitats used by juveniles of this important recreational fish species.

We know very few specifics about the permit life cycle, but can paint a general picture. Like most marine game fish, permit has a complex life cycle. Adults spawn by 'broadcast spawning' – males and females 'broadcast' sperm and eggs into open water, where fertilization takes place. Where permit spawn is unknown but current theory (based on presence of ripe eggs in captured females in the Florida Keys) is that spawning takes place over deep reefs.

The eggs hatch, and small larvae emerge – the larvae float in the open water as plankton for weeks. As with most fish species, permit larvae look nothing like the adults – they are clear and shaped differently. The larvae then undergo a metamorphosis, changing into a miniature form of the adult, and switching from living as plankton to a bottom-associated life style.

Like most saltwater game fish, juvenile permit live in different habitats than adults, and then move to adult habitats as they grow. The purpose of this research was to determine what types of habitats were required by juvenile permit, and where these juvenile habitats were located (juvenile habitats are called nurseries). If the adult population of permit on Turneffe Atoll is to remain healthy, the nursery habitats must be identified and protected to ensure future generations.

RESEARCH METHODS

Results of research in Florida suggested that juvenile permit prefer sandy beaches as nursery habitats, but in most of these studies other habitat types were not sampled. Without comparison among habitats, it is difficult to demonstrate that one habitat is essential for juvenile permit. In this research, we used seine nets and snorkeling surveys to sample 5 primary habitats at Turneffe Atoll:

- Windward sandy beaches
- Leeward sandy beaches
- Windward mangroves
- Leeward mangroves
- Lagoon interior mangroves

All sampling was conducted between June 14 and June 28, 2003. Twenty juvenile permits were collected and their otoliths removed. Otoliths are 'ear bones' in fish, and are important for hearing and balance. Otoliths have growth rings that can be used to determine age. For juveniles, these are daily growth rings (for adults, the growth rings are annual). A microscope was used to count the daily growth rings on the otoliths to determine the date the fish were hatched. This information will assist future research efforts to determine where and when adult permit spawn

on Turneffe Atoll.

RESULTS

Medium-Energy Windward Beaches are Nursery Habitats for Juvenile Permit.

A total of 132 samples (98 seines and 34 snorkel surveys) at 41 locations were completed, and 281 juvenile permits were captured. With the exception of one juvenile found on a Leeward Beach, all juvenile permits were captured on medium-energy Windward Beaches (average of 4.8 juveniles per sample). Medium-energy windward beaches have a swath of sand bottom (20'-30' wide) between shore and sea grass beds (Turtle Grass), and are critical habitats for juvenile permit.

All Captured Permit were Young Juveniles

The juvenile permits collected in this study were between 12mm and 78mm long (measured as standard length – tip of the nose to base of the tail). Based on data collected from Florida Keys, permit reach approximately 140mm long at 1 year of age, so all the permit in this study were very young. In this study, otolith daily growth rings from permit between 16mm and 22mm long showed that these fish averaged approximately 19 days of age, so spawning took place in May.

FUTURE RESEARCH AND CONSERVATION NEEDS

- Establish protections for windward beaches as juvenile permit habitat
- Determine what juvenile permit are eating and if growth differs among locations
- Determine where adult permit are spawning
- Determine the length of spawning season (juvenile size range suggest a prolonged spawning season)
- Establish protection for spawning locations

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