

**2008 RED DRUM ASSESSMENT
ALABAMA MARINE RESOURCES DIVISION**

Executive summary

Red drum continues to be an important species in the coastal recreational fishery of Alabama. Shore, pier, private boat and charter boat anglers catch red drum. The current regulation allows for the daily harvest of 3 red drum (16 to 26 inches total length), with the exception of one of the three fish may exceed the maximum length of 26 inches. Review of the Marine Recreational Statistics Survey indicates over one-third of red drum harvested are greater than 26 inches in total length. Analysis of the age structure of the recreational catch indicates that 99% of all red drum in the slot limit are 4 years or less in age. Forty-three percent of red drum greater than 26 inches ranged in age from 1 to 4. Alabama continues to meet the National Marine Fisheries Service mandate that escapement rates for red drum through age 4 (2003 year class) equal or exceed 30%. The five-year trend shows a downward trend, but this may be due to annual variations. Commercial harvest remains prohibited in state and federal waters, therefore improvements in escapement rates can only be realized through regulatory changes in the recreational fishery. The Marine Resources Division is considering the implementation of a tag and fee for the harvest of red drum over the slot limit. This action would curtail harvest of spawning stock and help maintain the required escapement rate.

Introduction

Red drum (*Sciaenops ocellatus*) begins life as larvae adrift in the Gulf of Mexico destined for an estuary by currents from neritic spawning grounds. Based on the presence of larvae in Alabama waters, Van Hoose (1987) reported spawning occurred from mid-August to early October. Young red drum can settle out in grass beds, salt marsh edge and oyster reefs, which provide refuge as well, forage grounds of small invertebrates, which are a principle component of their diet. Additionally, young red drum can be found along almost any shoreline. Fish lengths are capable of reaching 19 inches during the first year and 30 – 36 inches in total length are not uncommon for the first three years of the fish's life.

Sometime between ages 2 and 4 red drum will migrate out of the estuary to the coastline or Gulf of Mexico and create or join adult aggregations. Half of all red drum are sexually mature by age 4 and all males and females are mature by ages 5 and 6, respectively (Wilson and Nieland 1994). Adults typically remain offshore, but will venture into estuaries post-spawn. Red drum is one of the largest members of the drum family in the Gulf region. It is the longest member with lengths approaching 4 feet in length and only surpassed by the black drum in weight.

As large populations of adults reside in federal waters and under federal jurisdiction, it is difficult for state managers to estimate the adult stock that will be contributing to the recruits that will be entering state waters. However, because red drum use state waters as nursery grounds it has been mandated by National Marine Fisheries Service (NMFS) that

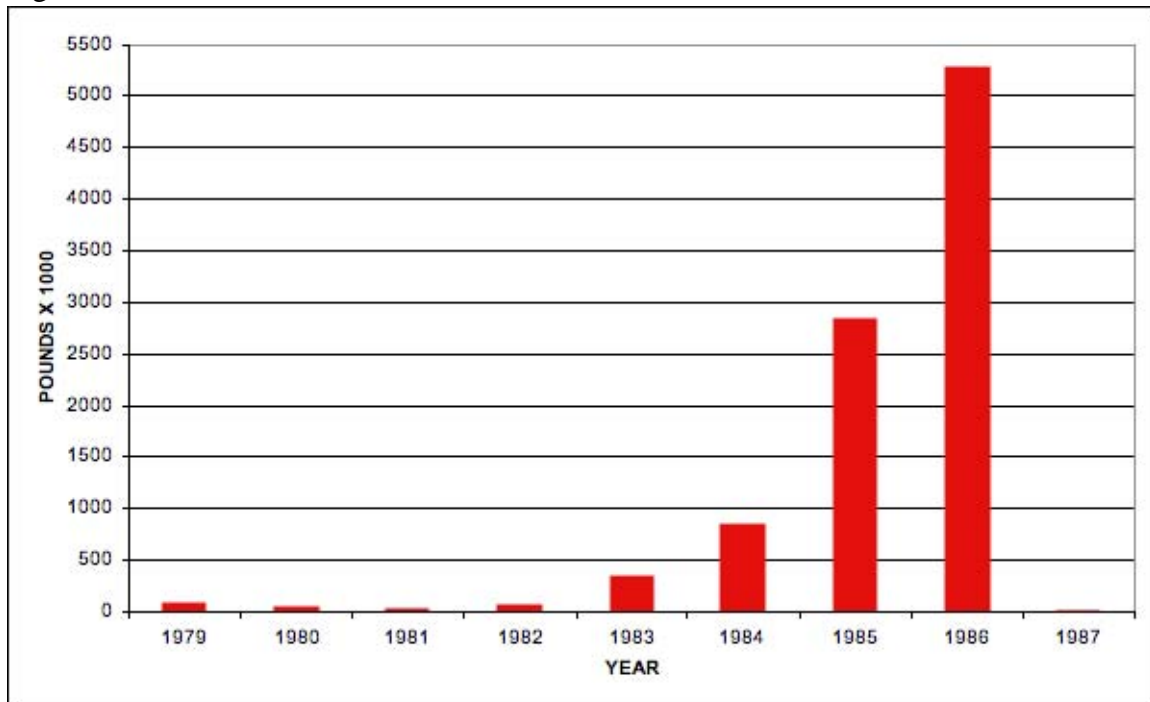
each state to ensure 30% or more of the red drum to escape to the adult population from that state's waters. Therefore, for this assessment emphasis will be placed on the escapement of inshore juvenile fish to the offshore adult fish. This assessment covers fishing years 2003-2007 utilizing fishery dependent data from the recreational fishery and fishery independent data collected by the Alabama Marine Resources Division (MRD).

Fishery Dependent

Commercial

Historically, red drum was considered an undesirable commercial species and worth very little in the fish markets (Swingle 1977). Blackening the flesh caused demand and subsequent landings for the fish to skyrocket from an annual average of sixty-one thousand pounds from 1979-1982 to over five million pounds in 1986 (Figure 1, NMFS unpublished data). The large schools of adults in the Gulf of Mexico became the first target of commercial fishermen. In the latter part of 1983, Alabama passed a regulation prohibiting the harvest of red drum in state waters with the intent to sell and in 1985 declared red drum a game fish prohibiting them from being sold or purchased when caught in state waters (Appendix 1). Additionally, Alabama law (9-12-113 i) prohibits the harvest of any game fish taken by nets or seines and red drum were therefore excluded from any commercial harvest. Federal waters were closed to harvest of red drum in 1986 ending the commercial red drum fishery and the fishery remains closed to this day.

Figure 1. Commercial harvest of red drum landed in Alabama 1979-1987.

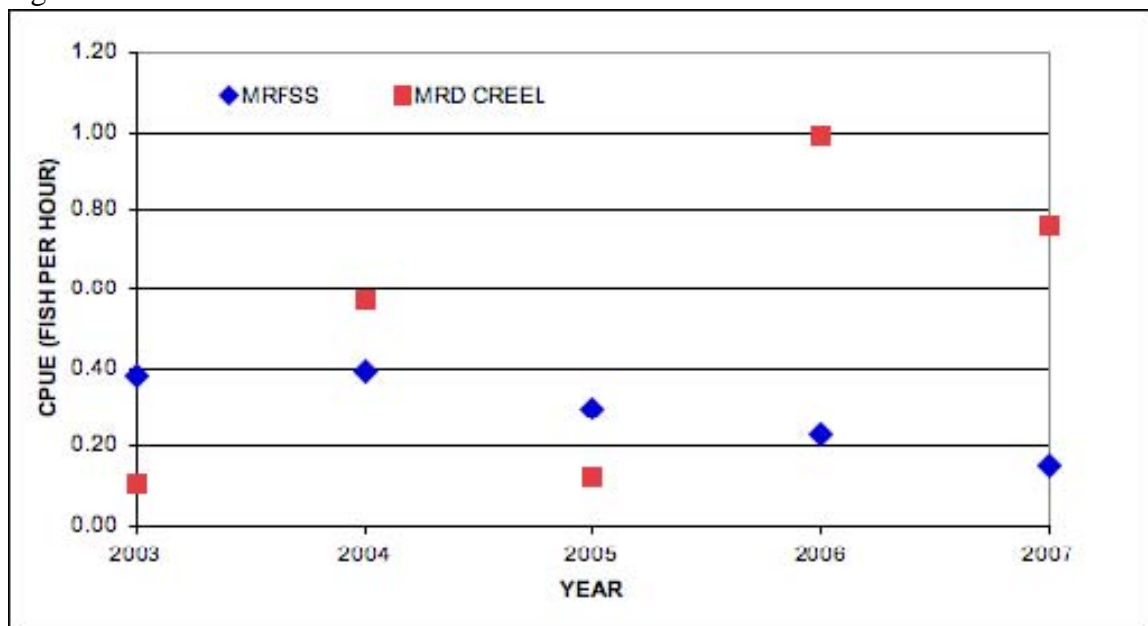


Recreational

Red drum has been an important species among the recreational fishermen for many years (Wade 1977). Regulations concerning the harvest of red drum have varied over the years (Appendix 1). Undersized and oversized fish have been harvested in conjunction with a slot limit. Lengths for harvest ranged from a minimum of 14 inches to a maximum of 36 inches. The daily creel limit has decreased from 25 fish per day in 1978 to our current creel. The current regulation allows for the daily harvest of 3 red drum (16 to 26 inches total length), with the exception of one of the three fish may exceed the maximum total length.

Currently, the monitoring of the recreational sector of red drum is accomplished through three separate programs. MRD roving creel survey collects effort and catches from anglers while they are still fishing, providing incomplete trip information. This survey may intercept anglers that launch from their private waterfront access. The Marine Recreational Fisheries Statistical Survey (MRFSS) collects angler effort and catch from completed trips at ramps and marinas. Additionally, the Biological Sampling Program (Otoliths) collects length, weight, sex and otoliths from the catch to assess age structure.

Figure 2. Estimated catch rates of red drum from Alabama waters 2003 – 2007.

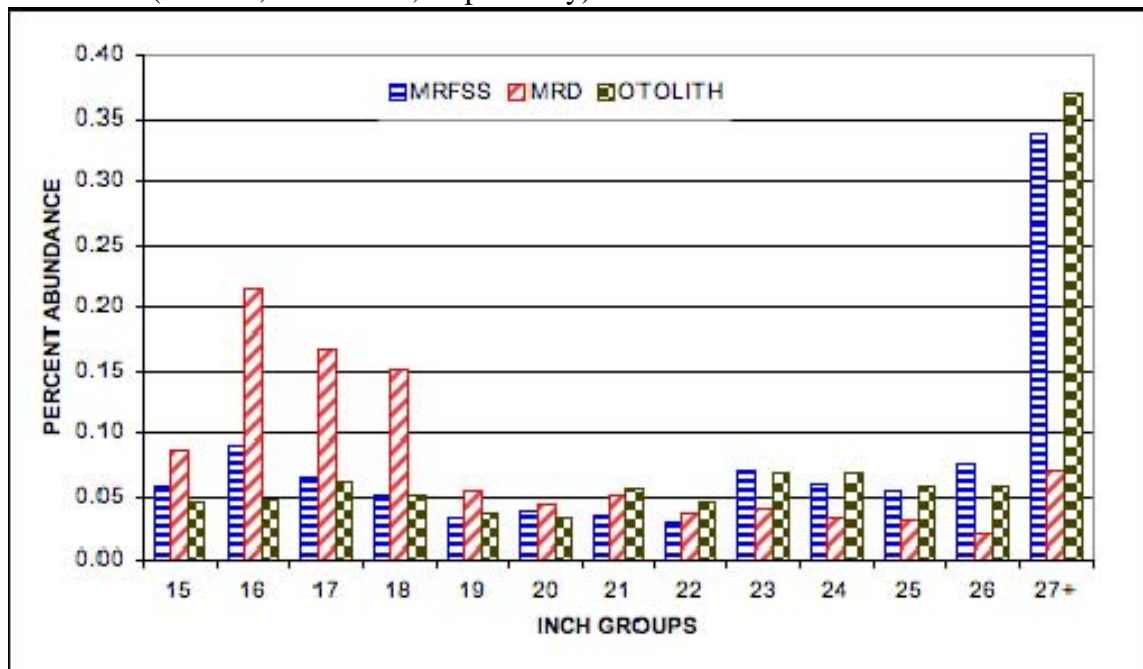


Results of the MRFSS survey (N=447), from 2003-2007, indicate that approximately 11% of saltwater anglers are targeting red drum. Percent of anglers targeting red drum has been very consistent over the five years with a range of 10 to 12.2%. For those anglers targeting red drum, they were successful 24% of the time in catching a fish. Only 1.5% of surveyed anglers during the five-year period were successful in keeping the daily creel limit of three fish. Catch rates of red drum from the MRFSS survey indicate a decline over the past 5 years (Figure 2). Results from the MRD creel (N=668) demonstrate a lot of variation in the catch over the five-year period and an increase in

catch rates over the past two years. Data collected during 2005 were affected due to the numerous tropical storms and hurricanes.

Length frequencies from MRFSS and otolith surveys indicate fish greater than 26 inches comprise a large percentage of the catch, 34% and 37%, respectively (Figure 3). The otolith survey collects otoliths with lengths as well as just additional lengths. Results from the MRD creel survey indicate that fish from 16 to 18 inches comprise the majority of the catch. As the MRD creel survey is conducted in inshore waters only, red drum anglers fishing in state territorial seas are not intercepted and larger specimens are not as abundant as along the immediate coastline. The age structure from the otolith survey (N=250) shows that 73% (N=183) of all the red drum harvested were ages 0 to 4. Ninety-nine percent of fish less than 26 inches were comprised of ages 0 to 4, compared to 43% for fish greater than 26 inches.

Figure 3. Red Drum length frequency from MRFSS, MRD creel and otolith surveys for 2003-2007 (N= 643, 298 & 358, respectively).

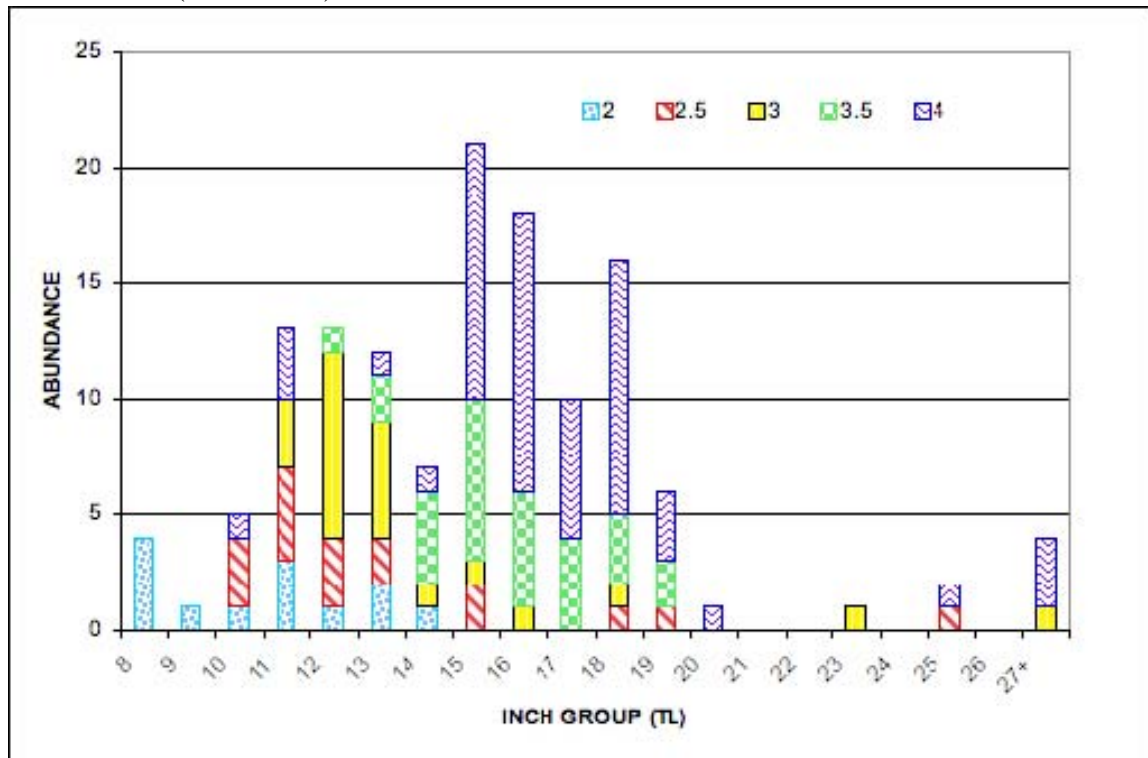


Fishery Independent

Fishery independent sampling utilizes two experimental gillnet configurations, that can be combined into one theoretical net. The small mesh net begins with a two-inch stretch mesh and increases by half-inch increments to a four-inch stretch mesh. The large mesh net begins with a four and half-inch stretch mesh and increases to a six-inch stretch mesh by half-inch increments. Each panel is 150 feet in length as measured along the float line. These nets are set monthly in equal numbers following a stratified random protocol either parallel or perpendicular to the shore in waters less than the maximum depth of the net (8 feet).

The four-inch mesh was the most successful in capturing red drum 15 to 20 inches in total length. Length frequency of the small mesh net indicated the gear was not sufficient to capture red drum larger than 20 inches in total length (Figure 4). Therefore, the larger mesh net was employed to capture larger red drum as well as other larger and deep-bodied fishes.

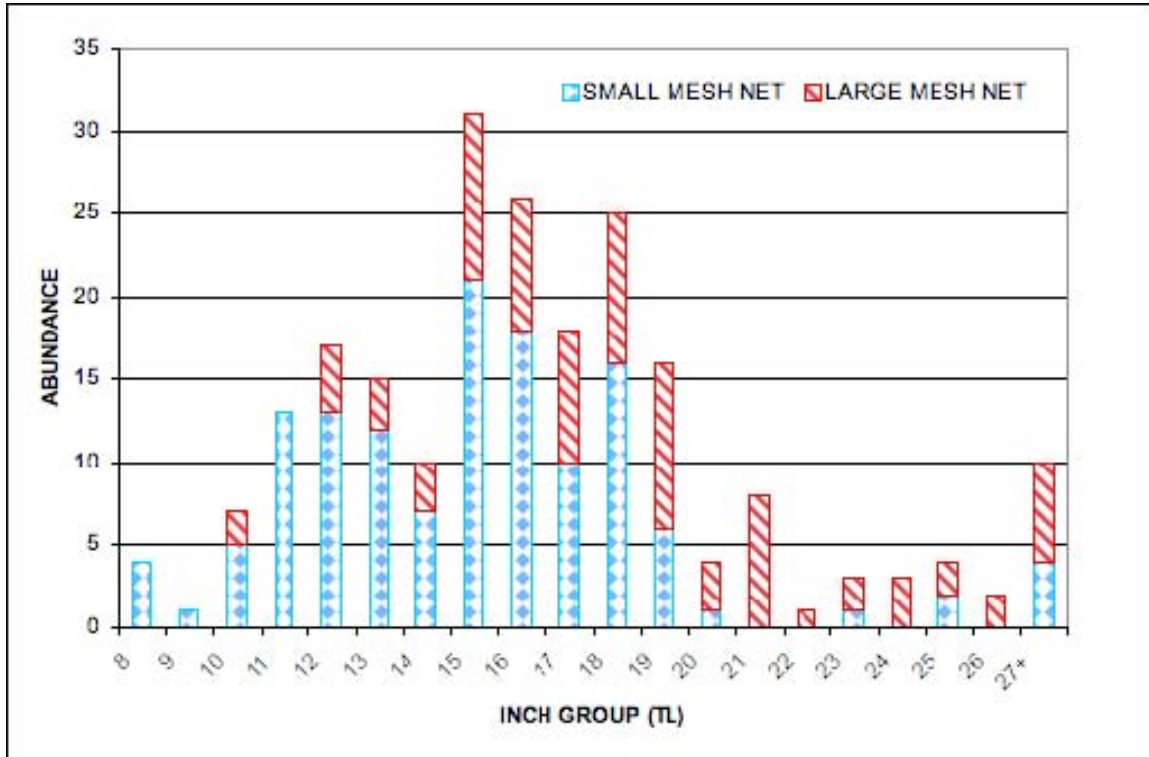
Figure 4. Red drum length frequency showing length at capture from stretch mesh sizes 2 to 4 inches (2003-2007).



The larger mesh net did a slightly better job at collecting red drum greater than 20 inches in total length, but was also efficient on the 15 to 21 inch groups (Figure 5). The absence of larger fish from the nets indicates the larger fish are moving to different habitats (i.e. deeper water or offshore). Regardless of mesh size, both nets are highly selective to red drum 15 to 20 inches in length. Red drum of any size have a tendency to get a bar of the mesh caught in their jaw and subsequently entangle themselves rather than becoming gilled (personal observation).

A T-test was conducted between catch rates for nets set parallel or perpendicular to the shoreline. In both net configurations, small and large mesh nets, parallel sets had non-significant higher catch rates. Mean CPUE (#red rum/ net set) was 1.84 and 2.04 for the perpendicular and parallel sets of the small mesh net, respectively. Mean CPUE was 1.47 and 2.49 for the perpendicular and parallel sets of the small mesh net, respectively. The large mesh net had more variation in its catches with an annual mean CPUE ranging from 1.0 to 4.3 fish per hour. Annual mean CPUE for the small mesh net ranged from 1 to 2.5 fish per hour.

Figure 5. Red drum length frequency comparing length at capture from small mesh net to meshes from the large mesh net (2003-2007).



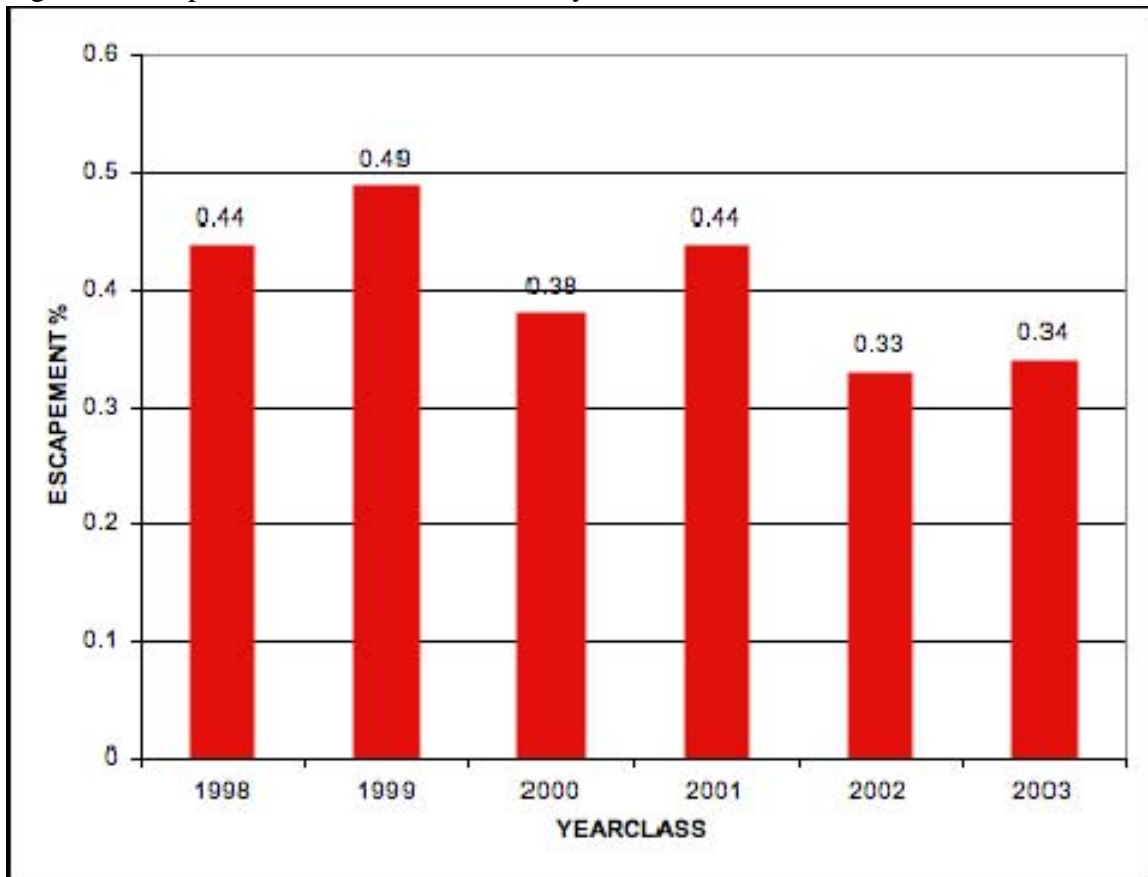
Growth of red drum is greatest during the first year of life, with some fish reaching 19 inches in total length (unpublished MRD). They continue to grow rapidly until age 4 when growth rates slow down and most fish become sexually mature. Von Bertalanffy growth coefficients were estimated for red drum less than five years of age and then for five years of age and greater. The growth coefficient was calculated at 0.5755 for fish less than five years of age and decreased to 0.1205 for the older fish. Mean length-at-age are represented below (Table 1), indicating fish differ about three inches a year between ages 1 to 4 and an inch or less for ages 5 and 6.

Table 1. Mean, minimum and maximum length (inches) of red drum from otolith survey for ages 0 to 6 (2003-2007).

AGE	N	LENGTH	MIN	MAX
0	11	16.5	14.6	19.0
1	71	19.6	13.0	27.0
2	57	24.8	20.7	29.6
3	30	27.3	22.9	32.7
4	14	29.0	25.2	37.7
5	8	30.0	25.1	32.7
6	6	30.6	29.6	31.6

Escapement as defined by the NMFS is a measure of the intensity of fishing on the inshore population of red drum. It is the ratio, expressed as a percent, of the number of fish present at age 4 from a year class, divided by the number of age 4 fish that would be present if there were no fishery. For these escapement estimates, an overall instantaneous natural mortality of 0.2 was used. Most of the natural mortality for red drum occurs from age 0 to 1 and is estimated at 0.6 (Porch 1999). Based upon this prior assumption, the abundance of age 0's was estimated to meet this assumption. Ages and abundance of year classes were determined by direct ageing of the otoliths. NMFS has mandated that escapement be equal to or exceed 30%. It was assumed that fish were captured in relation to the relative abundance regardless of the method of capture and fish collected along the coastline were recent emigrants from Alabama estuarine bays. Data used for the escapement estimate was pooled from MRD fishery independent gillnet survey, MRFSS, MRD creel and otolith sampling for fishing years up to 2007, but are reported as year classes that have reached age 4 (Figure 6). Escapement estimates indicate sufficient numbers of red drum are reaching age 4 and subsequently becoming part of the offshore adult population.

Figure 6. Escapement rates for 1998 – 2003 year classes of red drum in Alabama.



Discussion

Current management of red drum has been appropriate for sustaining the NMFS mandated escapement rate. Directed effort toward this species is not substantial, but very consistent over the past five years. Our regulations are comparable to the other Gulf States in relation to available habitat and supplemental stocking such as Texas conducts (Appendix 2). Florida having the most restrictive creel limit in the Gulf region.

Differences in the length frequencies observed from the MRFSS and otoliths compared to MRD survey may be attributed to several factors. First the MRD creel survey does not cover the Gulf of Mexico, as the assumption was that red drum ages 0 to 4 still inhabit the estuarine waters. Secondly, it is assumed that samplers are following random protocols for angler interviews and for sampling of the fish. Anglers are particularly proud of large fish and seek out affirmation of these catches at ramps and marinas. Subsequently, they may be more willing to participate in surveys when they have a large fish compared to an average catch and skewing the results. Additionally, these surveys are allocated by activity and sites along the immediate coast receive a lot of activity. Finally, Baldwin County has several charter boats that target red drum along the coast on a regular basis. Thus, abundance of larger fish in coastal survey sites may be inadvertently higher due to the current thought that red drum, around age 2, have migrated out of the estuary to near shore coastal waters.

Age structure data indicate that most of the fishery is catching red drum between 0 to 4 years in age. This may be an artifact of our current sampling protocols or due to our current regulations as anglers are discarding larger and possibly older fish.

Requiring a tag and fee to harvest a red drum over 26 inches in length will serve to protect the adults and potentially reduce harvest of age 1 to 4 fish. If effort continues to increase toward red drum then, measures such as a 'red drum tag' or reduction in the creel or size limit will need to be taken to ensure the 30% escapement rate.

Research

Selectivity of gillnets was high due to entangling issues. MRD will collect information on the method of capture for each fish to accurately determine gear size selectivity for red drum. An analysis of our existing data to examine length frequency by areas should help determine the utilization of the estuary by differing sizes of red drum. We also recommend asking additional questions of anglers to determine if discards were due to size or creel limits and how many fish in each category. This would help identify caveats of fishery dependent age structure.

A tagging study of red drum 15 to 20 inches in length will help in refining estimates of escapement rates. Additionally, this project could help determine the size or timing of the migration to the Gulf of Mexico as well as prove or disprove the current assumption that red drum along the Alabama coast emigrated out of our bays. Involving local fishing associations and conservation groups in the tagging and return of information relevant to our study would prove to be beneficial.

References

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- Wade, W., 1977. Survey of the Alabama Marine Recreational Fishery. Alabama Marine Resources Bulletin 12:1-22.
- Wilson, C.A. and D.L. Nieland. 1994. Reproductive biology of red drum, *Sciaenops ocellatus*, from the neritic waters of the northern Gulf of Mexico. Fishery Bulletin 92:841-850.

Appendix 1. History of red drum regulations.

	Regulation #
14 to 36-inch TL slot, not more than 2 over 36 inches and 25 fish / day	1978-MR-10
5% allowance of undersized fish permitted	1982-MR-1
14 to 36-inch TL slot, not more than 2 over 36 inches and 15 fish / day	1983-MR-11
No harvest with intent to sell	1983-MR-12
Game fish declaration with annual renewal	1985-MR-2
14 to 32-inch TL slot, not more than 2 over 32 inches and 15 fish / day	1986-MR-4
Game fish (no annual renewal)	1986-MR-5
14 to 32-inch TL slot, and 5 fish / day	1987-MR-1
16 to 26-inch TL slot, one undersized and none oversized, 3 fish / day	1988-MR-3
Keep two fish over maximum size if they bear tags registered with MRD	1989- MR-9
16 to 26-inch TL slot, one oversized, 3 fish / day	1994-MR-6

Appendix 2. Red drum regulations by Gulf of Mexico states from state websites (2008).

STATE	LENGTH LIMIT	CREEL LIMIT	SPECIAL RESTRICTIONS
AL	16 – 26” TL, 1 over 26”	3/person/day	
FL	18 – 27” TL	1/person/day	Gig, spear, snatching prohibited
LA	16 – 27” TL, 1 over 27”	5/person/day	
MS	18 – 30” TL, 1 over 30”	3/person/day	
TX	20 – 28” TL, 1 over 28”	10/person/day	1 over 28” with red drum tag, in addition to daily creel limit

AL_RED DRUM

- ASSUMPTIONS
- 1) $M = .6$ from age 0 TO 1, age 0 abundances are estimates to meet assumption
 - 2) Overall natural mortality rate ages 0 to 4 would be $M = 0.2$ in the absence of fishing

	YEARCLASSES			
AGES	2000	2001	2002	2003
0	625	733	573	765
1	250	293	229	306
2	184	181	139	130
3	95	137	79	100
4	38	51	30	41