References and selected abstracts on red drum hook mortality

Aguilar, R. 2003. Short-term hooking mortality and movement of adult red drum (Sciaenops ocellatus) in the Neuse River, North Carolina. (Under the direction of Peter S. Rand). NC State University Masters Thesis. **SEDAR 18-RD43**

Tables 2.1, 2.7 & 2.9 from Aguilar, 2003

TABLE 2.1. – Summary of key parameters and observed mortality rates in post-hooking mortality studies of red drum (Adapted from Muoneke and Childress 1994).

Size TL(mm)	N	Days	Con	Temp	Htype	Hsize	Bait	Gear	%mort	GHM	WLHM	Inj	Hab	State	Year	Ref.
~ 548[a, b]	146	0		25.0-30.5	3	8/0	1	2	0				2	TX	1985-1986	Martin et al. 1987a
278-740[a]	968	2	1	12-31	3	8/0	1	2	0.2			4	2	TX	1985	Martin et al. 1987b
<508 - >762	38	3	1	25-34	1, 4		2	1	44.7			3	1	TX	1988	Childress 1989
199-355[a]	513	14	1	28-30	1	4 to 3/0	1	1	16	+[f]	+	4	2	GA	1988-89	Jordan and Woodward 1992
429-837	121	3	1	27.6-30.3	6	6[a]	2	1	4.1	-			2	TX	1989-90	Matlock et al. 1993
<406 - > 406	743	3-7	2	13-28	6		2	1	3.5	+		4	2	LA	1993-1995	R. G. Thomas, *pers. comm.*
1032[b]	64	3-7	2		1,3	7/0, 13/0	1	1	5.0	-		4	2	LA	1996	R. G. Thomas *pers. comm.*
186-730	80	2, 17	1,2	23-29	1	#1	1	1	2.8			4	2	FL	1996	R. F. Heagley *pers. comm.*
972-1260[c]	17	3	3	21-29	1, 3	7/0, 16/0	1	1	5.9				2	NC	2000	This volume
	191	3	1	16.6-27.6	1, 4		2	1	6.8[d]		+	4[e]	2	NC	2000-2001	Gearhart 2002
880-1250[c]	104	3	1	23.6-29.9	1,3	7/0, 16/0	1	1	6.7	-	+	4	2	NC	2001	This volume

Note: Size: Total length; Con: Confinement, 1 = pens, 2 = laboratory confinement, 3 = not confined (ultrasonic telemetry); Temp: Celsius; Htype: hook type, 1 = single, 2 = treble, 3 = circle, 4 = single lures, 5 = treble lures, 6 = natural and lure, single and treble; Hsize: hook size; Bait: 1 = baited, 2 = baited and unbaited; Gear: 1 = recreational hook and line, 2 = trotline; %mort: overall mortality; GHM: mortality significantly correlated with gear type, + = yes, - = no; WLHM: wound location significantly related to mortality, + = yes, - = no; Inj: anatomical location associated with most injury; 1= mouth, 2= gill, 3 = esophagus, 4 = gut region 5 = other; Hab: habitat captured from, 1 = freshwater, 2 = marine/estuarine

[a] Measurement type unspecified
[b] Mean
[c] Fork length
[d] calculated from data
[e] Number 6 treble hook, single hook size unstated
[f] postulated; see Jordan and Woodward 1992

TABLE 2.7 – Number of fish shallow hooked and deep hooked by hook type for adult red drum angled with recreational hook and line gear, summer and fall 2001 (percentages by hook type in parentheses).

Hook type	Shallow hooked	Deep hooked	Total
J-style	42 (47.73)	46 (52.27)	88
Circle	23 (95.83)	1 (4.17)	24
Total	65	47	112

TABLE 2.9. - Mortality rates of adult red drum caught with recreational hook and line gear, summer and fall 2001 by hook position and hook type. Parentheses indicate the number of fish utilized to obtain each mortality rate.

Hook Type	Shallow hooked	Deep hooked	Total
J-style	0 (39)	16.28 (43)	8.54 (82)
Circle	0 (21)	0 (1)	0 (22)
Total	0 (60)	15.91(44)	6.73 (104)

Bartholomew, A. & Bohnsack, J.A. 2005. A Review of Catch-and-Release Angling Mortality with Implications for No-take Reserves. Reviews in Fish Biology and Fisheries, 15: 129-154.

Abstract (part of): We reviewed 53 release mortality studies, doubling the number of estimates since Muoneke and Childress (1994) reviewed catch and release fishing. A meta-analysis of combined data (n=274) showed a skewed distribution of release mortality (median 11%, mean 18%, range 0–95%). Mortality distributions were similar for salmonids, marine, and freshwater species. Mean mortality varied greatly by species and within species, anatomical hooking location was the most important mortality factor. Other significant mortality factors were: use of natural bait, removing hooks from deeply hooked fish, use of J-hooks (vs. circle hooks), deeper depth of capture, warm water temperatures, and extended playing and handling times. Barbed hooks had marginally higher mortality than barbless hooks. Based on numbers of estimates, no statistically significant overall effects were found for fish size, hook size, venting to deflate fish caught at depth, or use of treble vs. single hooks.

Childress, W. M. 1989. Hooking mortality of white bass, striped bass, white bass x striped hybrid bass and red drum. Final Report F-31-R-15, Texas Parks and Wildlife Department.

Duffy, J. 1999. Catch and release mortality studies of spotted seatrout and red drum in coastal Alabama. National Symposium on Catch and Release in Marine Recreational Fisheries, Virginia Beach, Virginia. Alabama Department of Conservation and Natural Resources, Dauphin Island, Alabama.

Gearhart, J. 2002. Hooking mortality of spotted seatrout (*Cynoscion nebulosus*), Weakfish (*Cynoscion regalis*), red drum (*Sciaenops ocellatus*), and southern flounder (*Paralichthys lethostigma*) in North Carolina. Interstate Fisheries Management Program Implementation for North Carolina. Completion Report for Cooperative Agreement No. NA 87FG0367/2. Documentation and Reduction in Bycatch in North Carolina, Job 3. **SEDAR 18-RD38**

Table 3 from Gearhart (considers mouth-hooked as controls)

Table 3. Number of individuals (n), observed mortality, pen/handling mortality, adjusted mortality (observed – pen/handling), mean water temperature (ºC), dissolved oxygen (DO mg/l), and salinity (ppt) by location for red drum release mortality trials conducted in Core, Roanoke, and Pamlico Sounds, North Carolina during the 2000 and 2001 fishing seasons.

Location	Trial	Dates	n	Observed Mortality	Control Mortality	Adjusted Mortality	Mean H_2O Temp	Mean DO	Mean Salinity
Outer Banks High Salinity	1	25-Jun-00 - 25-Jun-00	42	2.4	0.0	2.4	26.6	6.4	25.0
	2	30-Aug-00 - 20-Sep-00	26	3.8	3.8	0.0	26.1	6.1	26.6
	3	10-Oct-00 - 11-Oct-00	19	0.0	0.0	0.0	16.6	7.5	12.3
			Mean	**2.3**	**1.7**	**0.6**	**23.7**	**6.6**	**22.3**
River Low Salinity	1	26-Jul-00 - 19-Sep-00	22	28.6	16.7	11.9	27.6	7.0	11.6
	2	9-Apr-01 - 4-Sep-01	28	14.3	4.8	9.5	26.8	6.3	10.2
	3	6-Aug-01 - 22-Aug-01	54	1.9	1.9	0.0	24.2	6.9	13.5
			Mean	**10.9**	**6.1**	**4.8**	**26.7**	**6.9**	**13.0**

Jordan, S. R., and A. G. Woodward. 1992. Survival of hook-caught red drum. Proceedings of the Annual Conference of Southeastern Association of Fish and Wildlife Agencies, 46:337-344.

Martin, J. H., L. W. McEachron, J. F. Doerzbacher, K. W. Rice, and J. M. Mambretti. 1987aComparison of trotline catches on four bait types in the Laguna Madre during June-August 1985. Management Data Series Number 124. Texas Parks and Wildlife Department. Coastal Fisheries Branch.

Martin, J. H., K. W. Rice, and L. W. McEachron. 1987b. Survival of three fishes caught on trotlines. Comparison of trotline catches on four bait types in the Laguna Madre during June-August 1985. Management Data Series Number 111. Texas Parks and Wildlife Department. Coastal Fisheries Branch.

Matlock, G. C., L. W. MacEachron, J. A. Dailey, P A. Unger, and P. Chai. 1993. Shortterm hooking mortalities of red drums and spotted seatrout caught on single-barb and treble hooks. North American Journal of Fisheries Management, 13:186-189.

Vecchio & Wenner, 2007. Catch-and-Release Mortality in Subadult and Adult Red Drum Captured with Popular Fishing Hook Types. North American Journal of Fisheries Management 27:891–899, 2007. **SEDAR RD-31**.

Abstract.—Saltwater anglers along the entire coast of the southeastern United States target red drum *Sciaenops ocellatus* more frequently than any other recreational fish species. The frequency of catch-andrelease angling has increased dramatically for this species in the past two decades, but little is known about the survival of released fish. This study demonstrates that catch-and-release mortality rates for subadult and adult red drum differed significantly among the most popular types of fish hooks in each fishery. To investigate the effect of hook type on anatomical hooking location and short-term (48-h) mortality, we captured subadults (339–825

mm total length [TL]) by use of 2/0 J-hooks (n ¼ 57 fish), 4/0 nonoffset circle hooks (n ¼ 58 fish), and 4/0 offset circle hooks (n ¼ 57 fish). Nonoffset circle hooks penetrated shallow regions of the body (jaw, tongue, or inside of mouth) significantly more frequently (90%) than did J-hooks (60%) or offset circle hooks (80%). Nonoffset circle hooks also resulted in the lowest rate of subadult mortality (2%). Adults (660–1,138 mm TL) were captured on bottom longline gear with 7/0 J-hooks (n¼60) and 9/0 nonoffset circle hooks (n¼107). The frequency of deep hooking in adults was significantly higher for J-hooks (30%) than nonoffset circle hooks (3%). Only deep hooked fish were monitored for 48-h survival. Adult mortality after 48 h was lower for nonoffset circle hooks (1.9%) than for J-hooks (3.3%). These mortality rates should be considered in future red drum stock assessments.

Table 1 from Vecchio & Wener

TABLE 1.—Numbers of red drum in Charleston Harbor estuary, South Carolina, that were shallow or deep hooked on different hook types and their fate at the end of a 48-h holding period used to monitor mortality. Subadults were angled with small (2/0 J, 4/0 nonoffset circle, and 4/0 offset circle) hooks in shallow (<2 m) areas of the estuary. Adults were captured on bottom longline gear with large (7/0 J, 9/0 nonoffset circle) hooks in deep (9–15 m) areas near the harbor's entrance. Shallow hooking involved the jaw, inside of mouth, or tongue; deep hooking involved the gills, esophagus, or stomach.

		Subadult hook type			Adult hook type	
Hook location	Result	2/0 J	4/0 nonoffset circle	4/0 offset circle	7/0 J	9/0 nonoffset circle
Shallow	Survived	34	52	46	43	102
	Died	0	0	0	N/A	N/A
Deep	Survived	19	5	5	15	1
	Died	4	1	6	2	2