Metadata for the Georgia Department of Natural Resources Division's Fishery Independent Red Drum Data 2002 – 2007 *(2007 Adult Red Drum Sacrifice also included)

Abstract:

A description of three of Georgia's red drum surveys is given. The first entitled Fall 02 Adult Sacrifice targeted large adult red drum in 2002 for length and age estimates. Two hundred and thirty four fish were caught using hook and line and longline with lengths and ages recorded. The second survey entitled Fall 07 Adult Sacrifice also targeted adult red drum for age-length with hook and line and longline gear. Finally, the Summer Gillnet Survey targets young of the year red drum to produce indices of relative abundance.

Fall 2002 Adult Sacrifice

<u>Hook & Line</u> (Activity Code 12, Gear Code 82)

Outline:

Survey Period: September – November 2002
Survey Area: Within three miles of shore from Cabretta Inlet Sapelo Island to 90° Bar east of St. Simons Island
Sampling Effort: Hook and line sampling was used to augment the experimental longline effort. Sampling occurred when environmental conditions were optimum and catch rates were expected to be high.
Gear: Hook & line, 20-lb high visibility main line, fish finder, 4oz pyramid weight, 80lb leader and a circle hook with a minimum of a 1/2 –inch gap between the point and the shank.
Soak Time: Variable, a sampling event was only terminated on ¼ hour intervals, gear attended
Bait: Natural baits (e.g. cut mullet & Atlantic Menhaden)
Primary Target Species: Adult Redfish ≥ 750mm (≥ 29.5")
Number to be Sacrificed: Including the experimental longline effort, a combined 300 fish

- ≤ 10 fish sacrificed per day from a specific area
- A specific area is defined as a bar complex or inlet (e.g. Pelican Spit, 90° Bar, Middle Bar, Cabretta Inlet, etc)

Sampling Platform: 17' – 19' outboard research vessels

Narrative:

Hook & line collection of adult redfish was a directed effort not employing any type of random selection of sampling stations. However, sampling was restricted to the same

specific areas within state waters targeted by the experimental longline effort. Sample locations were determined each day based on weather conditions and the best available information regarding red drum abundance. The first 10 redfish ≥ 750mm collected from a specific area on a given day were sacrificed. At time of capture, each fish was marked with a collection number comprised of the following: activity code (18), year, month, day, sampling event for that day (###), and specimen number (##). In addition to catch information, temporal, spatial (latitude/longitude), weather, hydrographic and physio-chemical data was collected during each sampling event.

Sacrificed redfish were returned to the Coastal Regional Headquarters and processed within 24 hours of capture. The following data was collected from each fish: fork length and standard length to the nearest millimeter, total weight to nearest .01 gram, and gender. Sagittal otoliths were removed and stored in a paper envelope marked with the sample number. Otoliths were then sectioned using a Buehler Isomet saw equipped with two Norton diamond wafering blades separated with a 0.4 mm spacer. Otoliths were examined using a Leica MZ-8 dissecting microscope with transmitted light and dark-field polarization at 1.6 times magnification. Age determination was based on the approved Gulf States Marine Fisheries Commission Protocol.

Experimental Longline (Activity Code 12, Gear Code 90)

Outline:

Survey Period: September – November 2002
Survey Area: Within three miles of shore from Cabretta Inlet Sapelo Island to 90° Bar east of St. Simons Island
Sampling Effort: Longline effort sampling was used to augment the hook and line effort and test the feasibility of the gear as a sampling tool for adult redfish. Sampling occurred when environmental conditions were optimum and catch rates were expected to be high.
Gear: Bottom-set longline 300' of ¼" nylon for the mainline, with 25 gangions made of 200-lb.monofilament attached to a Mustad13/0 circle hook. Gangions are approximately 36" length. Gangions are attached to the mainline via longline snaps.
Soak Time: Variable, a sampling event was terminated on ¼ hour intervals, gear attended
Bait: Natural baits (e.g. cut mullet & Atlantic Menhaden)
Primary Target Species: Adult Redfish ≥ 750mm (≥ 29.5")
Number to be Sacrificed: Including the hook and line effort, a combined 300 fish

- ≤ 10 fish sacrificed per day from a specific area
- A specific area is defined as a bar complex or inlet (e.g. Pelican Spit, 90° Bar, Middle Bar, Cabretta Inlet, etc)

Sampling Platform: 19' outboard research vessel

Narrative:

Longline collection of adult redfish was a directed effort not employing any type of random selection of sampling stations. However, sampling was restricted to the same specific areas within state waters targeted by the hook and line effort. Sample locations were determined each day based on weather conditions and the best available information regarding red drum abundance. The first 10 redfish ≥ 750mm collected from a specific area on a given day were sacrificed. At time of capture, each fish was marked with a collection number comprised of the following: activity code (90), year, month, day, sampling event for that day (###), and specimen number (##). In addition to catch information, temporal, spatial (latitude/longitude), weather, hydrographic and physio-chemical data was collected during each sampling event.

Sacrificed redfish were returned to the Coastal Regional Headquarters and processed within 24 hours of capture. The following data was collected from each fish: fork length and standard length to the nearest millimeter, total weight to nearest .01 gram, and gender. Sagittal otoliths were removed and stored in a paper envelope marked with the sample number. Otoliths were then sectioned using a Buehler Isomet saw equipped with two Norton diamond wafering blades separated with a 0.4 mm spacer. Otoliths were examined using a Leica MZ-8 dissecting microscope with transmitted light and dark-field polarization at 1.6 times magnification. Age determination was based on the approved Gulf States Marine Fisheries Commission Protocol.

Fall 2007 Adult Sacrifice

<u>Fall Adult Red Drum Longline Survey</u> (Activity Code 17, Gear Code 110)

Outline:

Survey Period: September - December
Survey Area: Within twelve miles of shore from Cabretta Inlet Sapelo Island to F Reef (Fig. 1)
Sampling Effort: Veritable; during fall of 2007, targeted 50 longline sets per month.
Gear: Bottom-set longline. 1/2 nautical mile of 600 lb. monofilament for the mainline, with 60 gangions made of 200-lb.monofilament attached to a 15/0 circle hook. Gangions are approximately ½ m in length. Gangions are attached to the mainline via longline snaps.
Soak Time: Gear is allowed to soak for 30 minutes after the first anchor is set.
Bait: Natural baits (Boston mackerel, squid, etc)
Primary Target Species: Adult redfish ≥ 750mm (≥ 29.5")
Number to be Sacrificed: Including the hook & line effort, a combined 100 fish

- ≤ 10 fish sacrificed per day from a specific area
- A specific area is not a longline station, it's defined as a bar complex or inlet (e.g. Pelican Spit, 90° Bar, Middle Bar, Cabretta Inlet, etc)

Survey Platform: R/V Marguerite (45' research vessel)

Narrative:

The primary purpose of this survey is to develop an index of abundance for adult red drum that complements other data collection processes within the Marine Sportfish Population Health Surveys. A sampling event consists of a single deployment of the longline at a predetermined sampling station within a ½ mile by ½ mile grid. Stations are randomly selected each month from a pool of 120 possible grids. Sampling effort will be stratified in space and time to optimize the chance of encountering adult red drum as they transition from occupancy on sandbar/shoal complexes to nearshore artificial reefs and live bottom areas. During September, 100% of the effort will be focused in the nearshore areas. In October the effort will shift to 75% in the nearshore, 25% at the offshore reefs. In November the effort will be 50-50% and December effort will be split to 25% in nearshore areas and 75% in the offshore. As the longline is retrieved, all catch is identified to species and counted. The first 10 redfish ≥ 750mm collected from a specific area (not sampling station) on a given day will be sacrificed. After collecting 10 adult redfish from a specific area, all additional redfish from that area will be tagged and released. At time of capture, each fish should be marked with a collection number comprised of the following: activity code (17), year, month, day, sampling event for that day (###), and specimen number (##). Two tags are utilized, a Hallprint dart tag and a PIT tag. In addition to catch information, temporal, spatial (latitude/longitude), weather, hydrographic and physio-chemical data will be collected during each sampling event.

Sacrificed redfish are returned to the Coastal Regional Headquarters and processed within 24 hours of capture. The following data is to be collected from each fish: centerline length to the nearest millimeter, total weight to nearest .01 gram, and gender. Sagittal otoliths will be removed and stored in a paper envelope marked with the sample number. Otoliths were then sectioned using a Buehler Isomet saw equipped with two Norton diamond wafering blades separated with a 0.4 mm spacer. Otoliths were examined using a Leica MZ-8 dissecting microscope with transmitted light and dark-field polarization at 1.6 times magnification. Age determination was based on the approved Gulf States Marine Fisheries Commission Protocol.

<u>Hook & Line</u> (Activity Code 18, Gear Code 82)

Outline:

Survey Period: September – November 2007
Survey Area: Within three miles of shore from Cabretta Inlet Sapelo Island to 90° Bar east of St. Simons Island
Sampling Effort: Hook and line sampling was used to augment the longline effort. Sampling occurred when environmental conditions were optimum and catch rates were expected to be high.
Gear: Hook & line, 20-lb high visibility main line, fish finder, 4oz pyramid weight, 80lb leader and a circle hook with a minimum of a 1/2 –inch gap between the point and the shank.

Soak Time: Variable, a sampling event was only terminated on ¼ hour intervals, gear attended
Bait: Natural baits and scented artificials (e.g. GULP)
Primary Target Species: Adult Redfish ≥ 750mm (≥ 29.5")
Number to be Sacrificed: Including the longline effort, a combined 100 fish

- ≤ 10 fish sacrificed per day from a specific area
- A specific area is not a longline station, it's defined as a bar complex or inlet (e.g. Pelican Spit, 90° Bar, Middle Bar, Cabretta Inlet, etc)

Sampling Platform: 17' – 19' outboard research vessels

Narrative: Hook & line collection of adult redfish was a directed effort not employing any type of random selection of sampling stations. However, sampling was restricted to the same specific areas within state waters targeted by the Fall Adult Red Drum Longline Survey. Sample locations were determined each day based on weather conditions and the best available information regarding red drum abundance. The first 10 redfish ≥ 750mm collected from a specific area on a given day were sacrificed. At time of capture, each fish was marked with a collection number comprised of the following: activity code (18), year, month, day, sampling event for that day (###), and specimen number (##). In addition to catch information, temporal, spatial (latitude/longitude), weather, hydrographic and physio-chemical data were collected during each sampling event.

Sacrificed redfish were returned to the Coastal Regional Headquarters and processed within 24 hours of capture. The following data was collected from each fish: centerline length to the nearest millimeter, total weight to nearest .01 gram, and gender. Sagittal otoliths were removed and stored in a paper envelope marked with the sample number. Otoliths were then sectioned using a Buehler Isomet saw equipped with two Norton diamond wafering blades separated with a 0.4 mm spacer. Otoliths were examined using a Leica MZ-8 dissecting microscope with transmitted light and dark-field polarization at 1.6 times magnification. Age determination was based on the approved Gulf States Marine Fisheries Commission Protocol.

A hand-sized portion of white muscle tissue approximately one-inch in thickness was removed from the area just ventral of the first dorsal fin and preserved for contaminate analysis. Contaminate samples will be processed according to the GA Environmental Protection Division protocol. A dime-size piece of the pectoral fin was removed and stored in a vial of preservative. Genetic samples will be processed following methods provided by Dr. Tanya Darden; SC DNR. Each sample was marked with the sample number assigned at time of capture. Data will be entered into the Marine Sportfish Population Health Surveys database.

<u>Summer Gill Net Survey</u>: (Wassaw Estuary Activity Code 13, Gear Code 108 & Altamaha Estuary Activity Code 11, Gear Code 108)

Outline:

Survey Period: June - August
Survey Area: Wassaw estuary, Altamaha estuary
Sampling Effort: minimum of 36 sampling events per month in each estuary
Gear: 300ft x 9ft gill net, 2.5in stretch mesh
Soak Time: variable, generally less than 30 minutes, gear attended
Primary Target Species: young of the year red drum
Secondary Target Species: recreationally important finfish species

Narrative:

From June through August, gill net surveys are conducted in Wassaw Sound and the Altamaha Sound Region. Sample Design: Random Stratified Design based on areas (QUAD) and strata (POOL). Strata are defined as FIXED (primary red drum and spotted seatrout habitat) or RANDOM (poor or unknown red drum and spotted seatrout habitat). Stations defined as ¼ x ¼ nautical mile grids. Ground truthing established initial strata designation for each station and provided sampling coordinated for appropriate deployment of nets. Initial designation of FIXED or RANDOM was based on observation, literature, institutional knowledge, and preliminary sampling. The design was such that changes to a station's stratum designation could be made as additional information is collected. In Wassaw, stations are selected and sampled each month from a pool of 415 total stations using a hybrid random stratified and fixed station design. In the Altamaha Region, stations are selected and sampled each month from a pool of 357 total stations using a similar hybrid random stratified and fixed station design. In a given survey month, each selected station is sampled one time. All sampling occurs during the last three hours of ebb tide and only during daylight hours. Station pools in both survey areas were determined by initial surveys, which identified locations that could be effectively sampled with survey gear.

Survey gear is a single panel gill net. The net is 300ft long by 9ft deep. The panel has 2.5in stretch mesh. The net has a 0.5in diameter float rope and a 75lb lead line. A 25lb anchor chain is attached to each end of the lead line, and a large orange bullet float is attached to each end of the float line.

A sampling event consists of a single net set. The net is deployed by boat starting at the bank following a semicircular path and ending back on the same bank. Net deployment is done against the tidal current. Immediately after deployment, the net is actively fished by making two to three passes with the boat in the area enclosed by the net. After the last pass is made, the net is retrieved starting with the end that was first set out. As the net is retrieved, catch is removed and put back into the water, inside a holding pen tied to the boat. After the net is fully retrieved, all catch is processed for information and released. All catch is identified to species and counted. All finfish specimens are measured,

centerline in millimeters. In addition to catch information, temporal, spatial, weather, hydrographic and physio-chemical data are collected during each sampling event.

Chronology of Adjustments to Summer Gill Net Survey:

You can find a table describing the allocation changes in the **ALTGillNetAlloc and WASGillNetAlloc** tabs for Altamaha and Wassaw region. Briefly:

Wassaw Sound:
The survey was designed with four QUADS for a total of eight strata. Sampling began in 2003 with an allocation of 36 sampling sites for month allocated as shown in Table. In 2006, sampling was doubled to 72 sites per month (with identical sampling allocations) to support red drum stocking studies being conducted in the sound system. Utilizing the first five years of data, station stratum designations were re-evaluated and adjusted accordingly. In addition, the sampling proportion was altered from the 25:75 (fixed:random) to a 50:00 allocation.

Altamaha Sound:
2003: The survey design designated 15 QUADS, 30 strata, (Hampton River-3, Altamaha Sound-6, Doboy Sound -6), although Doboy sampling did not begin until 2004. A total of 100 stations were sampled monthly.
2004: Doboy Sound Sampling begins. Quads 6-8 were discontinued in the Altamaha due to strong currents and river flow creating dangerous situations to set nets. Monthly Station allocation is altered to reflect the addition of Doboy Sound and the elimination of Quads 6-8 in Altmaha Sound.
2006: Due to a reduction in budget and staff (reduced to one field crew instead of two), monthly sampling was reduced to 50 sites. It was necessary to collapse strata to accommodate this and insure proper coverage within each strata. All quads within a give system were collapse providing a single fixed and random stratum for each sampling system (HAM, ALT, DOB). Stations were evaluated and those that could not be sampled were dropped. Catch at each station was also examined to determine if stations should be reassigned a different stratum.
2007: Additional budget cuts required addition sampling cuts to 36 sites per month. This mirrors what is done in Wassaw Sound. Strata allocations were adjusted accordingly.
2008: Utilizing the first five years of data, station stratum designations were re-evaluated and adjusted accordingly based on a set criteria of number red drum or spotted seatrout per net set.. In addition, the sampling proportion was altered from the 25:75 (fixed:random) to a 50:00 allocation.

Description of Georgia Department of Natural Resources Division's Fishery Independent Red Drum Data 2002 – 2007:

1. **Collection Number**: a unique identifier assigned to each sampling event consisting of three parts: activity code, date of sampling as yymmdd, and a sequential counter (first sample of the day 001, second 002, …). If the activity code is a single digit, a leading "0" is **not** required.
   Example: 7021215001 would be entered for 7-02/12/15-001
   12021215001 would be entered for 12-02/12/15-001

2. **Activity Code**: identifies which program or project the sampling event is associated with. Activity codes are listed in **L Activity** table in the RECFISH Database.

ActivityCode	Activity
0	Short term projects
1	Interagency Collection
2	Recreational Angler
3	Tagging
4	Red Drum
5	SC Mullet
6	Co-op. Tagger
7	Carcass
8	SFR Sheepshead
9	SFR Whiting
10	SO Short-line Evaluation
11	YOY SO Survey ALTHAM-Summ
12	SO Adult Sacrifice 2002
13	YOY SO Survey WAS
14	MSPHP Survey WAS
15	MSPHP Survey ALTHAM -S&F
16	MSPHP Trawl Monitoring
17	SO Long-line Survey
18	SO Adult H&L Sacrifice 07

3. **Date**: date of sampling event formatted as mm/dd/yyyy.

4. **Time** and **Time2**: If the sampling event is not being timed, record the time of day of the event, generally at the beginning as convenient, in the **Time** field. If the event is being timed, record start time of day in **Time** and stop time of day in **Time2**. Input times in 2400 format (1pm = 1300). Events such as net sets (unless nets are being fished passively) will generally only need the **Time** field. Hook and lining and long-lining will generally require **Time** and **Time2**.
5. **Species:** species code, 3 is red drum.

6. **SoundSystem**: Major sound system where sampling event occurs. Codes are stored in RECFISH db in **L Sound System** table.

SoundSystem	SoundSystemName	Latitude	Longitude
2	Savannah River		
3	Wassaw	31.93	-80.95
4	Ossabaw	31.84	-81.04
5	St. Catherines	31.71	-81.16
6	McQueen Inlet		
8	Sapelo	31.55	-81.23
9	Doboy	31.38	-81.29
10	Altamaha	31.31	-81.31
11	Hampton River		
12	Village Creek		
13	St. Simons	31.13	-81.43
15	St. Andrew	30.99	-81.43
16	Cumberland	30.71	-81.47
94	Georgia		
95	Florida		
96	South Carolina		
97	North Carolina		
98	Off Shore		
99	Unknown		

7. **Location**: For projects that do not have defined stations, this is the common name of the nearest geographic feature to the sampling site.

8. **Station**: Pre-assigned set of locations to sample in.

9. **HookNumber**: If hook and line or long-line were used, record the number of hooks fished for the majority of the sampling event. This is not the size of the hooks used – only the number of hooks fished.

10. **Wind Direction**: Wind direction is coded as compass degrees in ~13 degree intervals. Ideally sampling events will not be so long as to encompass major shifts in direction. If shifts occur, record direction present for majority of sampling event.

11. **Wind Velocity**: Estimate of wind speed in 5mph intervals. Codes are given in **L Wind Velocity** table in database. Note that the first interval, code 1, includes 0mph.

12. **Tide Stage**: Tide stage can generally be read from the Garmin GPS units. This field can be filled in later using the **TIME** field(s) if need be.

13. **Moon Phase**: can be filled in later from **DATE** field if unknown at sampling.

14. **WeatherConditions**: general weather condition for majority of sampling event.

- 1 sunny, 2 partly sunny, 3 cloudy no rain, 4 rain

15. Salinity: should be recorded in ppt (psu).

16. Water Temp: should be recorded in C.

17. D.O.: should be recorded as mg/l.

18. Depth: recorded in feet.

19. GearCode: Gear codes.

GearCode	GearType	GearCode	GearType
0	Other	41	Whelk Trawl
1	Gill Net - 1	42	Commercial Shrimp Trawl
2	Gill Net - 1.25	51	Seine 50 x .875
3	Gill Net - 1.5	52	Seine 100 x 1.5
4	Gill Net - 1.75	53	Seine 100 x 2
5	Gill Net - 2	54	Seine 12 x .75
6	Gill Net - 2.25	55	Seine 100 x .875
7	Gill Net - 2.5	81	Cast Net
8	Gill Net - 2.75	82	Hook and Line
9	Gill Net - 2.875	83	Gig
10	Gill Net - 3	84	Spear Gun
11	Gill Net - 3.5	85	Dip Net
12	Gill Net - 4	86	Lift Net
13	Gill Net - 4.5	87	Commercial Crab Trap
14	Gill Net - 4.625	88	Recreational Crab Trap
15	Gill Net - 5	89	Fish Trap
16	Gill Net - 5.5	90	Long Line
17	Gill Net - 6	91	Snapper Reel
18	Gill Net - 8.5	92	Tournament Fish
19	Gill Net - 9	97	2.5 x 400
20	Trammel Net (Nylon) 10 x 2	98	2.5 x 200
21	14 x 2.75	99	2.5 x 600
22	2.875	100	Gill Net - 1.5"; 6'x200'
23	2.875	101	Gill Net - 2"; 6'x200'
24	3.5	102	Gill Net - 2.5"; 6'x200'
25	multi. x 3.5	103	2.5";6'x300'
26	Trammel Net (Mono) 14 x 3	104	2.75"in 14"out; 7'x600'
27	Gill Net - 6.75	105	flat otter trawl; 3.875"
28	Electrofishing	106	flat otter trawl; 3.875"
29	Gill Net - 2.875 (Mono)	107	2.75"in 14"out; 9'x600'
30	Gill Net - 3 (Mono 400 ft.)	108	9'x300'
31	Gill Net - 8	109	semi-balloon trawl; 3.875"
32	Experimental Gill Net	110	15/0 hooks; bottom
40	40' Otter Trawl	111	2.75"in 14"out; 7'x300'

20. FL: fork length (centerline)
21. SexCode: 1 male, 2 female, 3 unknown.
22. VisibleAnnuli: number of rings seen. The first ring is deposited when the fish is 16-18 month old. To place the fish in the appropriate year class 1 year will need to be added.

23. TotalWeight: weight of fish in grams.

Tagging release and return tabs:

This page is used for active tagging projects and for tagged fish collected during other sampling events associated with other projects.

1. **Primary ID**: this is the tag number of the original tag placed in the fish. On rare occasion the original tag is removed and a new tag is placed in a fish to be released. This generally occurs when a cooperative tagging angler removes a DNR tag and replaces it with his/hers. Having the Primary ID allows us to track the same fish through multiple tags.
2. **Tag Number**: 99.99% of the time this will be the same as the **Primary ID**. Unless there is information to the contrary, record the same number here as with the **Primary ID**.
3. **Tag Number 2**: use this field if you have information that a collected fish has had its original tag removed and a new one put in place. In the extremely unlikely event that a fish had its second tag replaced with a third new tag, **Tag Number 2** would be recorded as the third new tag number, **Tag Number** would be recorded as the second tag number, and **Primary ID** would remain unchanged as the number from the original tag placed in the fish. Should a fish be tagged a fourth time, it will be sacrificed immediately.
4. **Disposition:** 0 sacrificed, 1 released with tag, 2 released without tag, 3 released with new tag.
5. **length:** centerline length in inches.
6. **FishCondition:** 0 unknown, 1 good, 2 fair, 3 poor.
7. **HooksRemoved:** 0 unknown, 1 yes, 2 no.
8. **TaggingLocation:** 0 unknown, 1 boat, 2 in water, 3 on land.
9. **Estimate:** 0 unknown, 1 measurement, 2 estimate.
10. **MeasurementType:** 0 unknown, 1 FL, 2 TL.
11. **DistanceTraveled:** in miles.
12. **DirectionMoved:**

DirectionCode	Direction
0	Unknown
1	North
2	South
3	East
4	West
5	Northwest
6	Northeast
7	Southwest
8	Southeast
9	No Movement

13. **Growth:** growth from release to recapture in inches.
14. **Liberty:** days at large.

Species Code, Activity code, GearType, SoundSystem, Location,: record as described above.

Longline tabs:

A1 Depth, A1 Lat, A1 Long: The depth, latitude and longitude of the start of the set.

A2 Depth, A2 Lat, A2 Long: the depth, latitude and longitude of the end of the set.

Gillnet tabs:

QUAD: A designated area with the estuary/Activity Code. Wassaw has four quads

AREA: WAS = Wassaw

STATYPE: F=fixed (high probability of encounter/good habitat) R=random (low/unknown encounter rate)

POOL: Same as STATYPE

STRATUM: Specific Strata as AREA "-" QUAD"-" STATYPE. If Quads were collapsed then QUAD=00

TotalCount: Total number of red drum