

Yellowtail Flounder Cooperative Tagging Project



Tagging and Data Collection Protocol



Background – The Fish

- Yellowtail flounder, *Limanda ferruginea*, range from Labrador to the Chesapeake Bay. Off the U.S. coast, commercially important concentrations are found on Georges Bank, off Cape Cod, and off southern New England, generally at depths between 40 and 70 m (20 to 40 fathoms). Some yellowtail are also caught in the Mid-Atlantic Bight and in the Gulf of Maine.
- Off the northeast United States, yellowtail grow to 55 cm (22 in.) total length and attain weights of 1.0 kg (2.2 lb), but high rates of fishing mortality have greatly reduced average size and age.
- Yellowtail appear to be relatively sedentary, although seasonal movements have been documented. Tagging with data storage tags also shows fish move off-bottom frequently, although the cause is unknown.
- Spawning occurs during spring and summer, peaking in May. Larvae drift for approximately two months, then change form and settle to the bottom.
- Three stocks of yellowtail flounder are recognized in U.S. waters, these being the Georges Bank, Cape Cod/Gulf of Maine and southern New England/Mid-Atlantic stocks. Preliminary results from tagging show high residence in the Cape Cod/Gulf of Maine (95%) and the Georges Bank (98%) stocks areas. The Southern New England/Mid-Atlantic stock, however, demonstrates 50% residence, with 39% moving to Georges and 11% to Cape Cod/Gulf of Maine. According to the current model being used to estimate movement and mortality, the SNE/MA movements are high compared to the very low harvest rates for that stock. {Data sited current to March 2006}

Background – The Fishery

- The three U.S. stocks of yellowtail have very different histories and challenges for science and management.
- Cape Cod-Gulf of Maine - This stock has been more stable than the other two, but estimates of fishing mortality are extremely high, creating a difficult management problem for GOM groundfish management. Unfortunately, there are major technical problems with the CC-GOM YT stock assessment. One goal of the tagging study is to provide an independent estimate of mortality.
- Georges Bank - The stock was also depleted in the early 1990s, but rapidly rebuilt after management changes (closed area 2, mesh size, Canadian TACs). Some technical problems are arising in the GBYT stock assessment, and methods of age determination have been questioned. Another goal of the tagging project is to confirm age determinations, as well as understand the movement of yellowtail from the closed area.
- Southern New England-Mid Atlantic - The historically dominant resource was depleted by the early 1990s and stayed at low stock size, despite the Nantucket Lightship closure. It appears that fishing mortality has not been effectively reduced, because little management has been done in the Mid Atlantic. A 3rd goal is to better understand movement between Mid Atlantic and southern New England yellowtail.

Tagging Project Goals

1. Estimate *movement* among stock areas
2. Determine fishing *mortality* rates within stock areas
3. Provide *growth* increment observations



Tagging Check List

PAPERWORK/OTHER

- Captain's Haul Logs
- Scientific Research Permits
- Tagging Data Sheets (water-resistant)
- Clip board
- Scale envelopes
- Mechanical pencils/lead, paper clips
- Camera
- Field season folder with info

CAGE EQUIPMENT

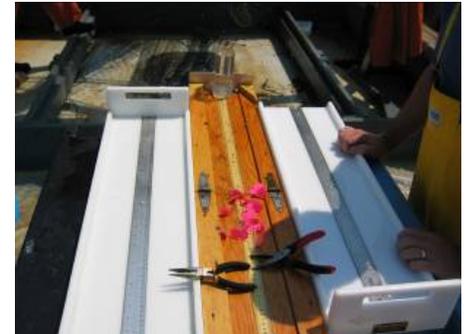
- 3 cages
- 3 high fliers
- 3 buoys (+any extras deemed necessary for floatation)
- Buoy lines, extra line
- Anchor lines + anchors (if necessary)
- Hog rings and hog ring pliers
- Hydrolab
- Video camera

TAGGING EQUIPMENT

- Large box for holding equipment
- Clear plastic divider box
- 2 measuring boards
- 3" nickel pins
- 2 magnets to activate DSTs
- 2 spring loaded pliers
- Tweezers for plucking scales
- Rubber bands for scale envelopes
- Working surface
- Holding tanks for the fish
- Timing device
- Net sensors (if possible)

TAGS

- Lottery tags, organized numerically
- Pink blanks
- Orange scale blanks
- \$100 pink/yellow tags
- Data storage tags (activated prior to the tow)
- Data storage tag oval blanks



How to fill out Captain's Log

- The Captain and Chief scientists are to arrange specific areas to fish based on the contract agreement prior to departure.
- Insure that the captain has enough haul logs for the trip. Explain how to properly fill out the sheets. Fill in all fields on the data sheet. Important points to remember:
 - **Trip ID:** On day trips, each day is entered as a new number (i.e. Day 1 = 01, Day 2 = 02, etc.) For trips of duration greater than 1 day, the same number should be entered for every day aboard the same vessel (i.e. Day 1 = 10, Day 2 = 10, etc.)
 - **Haul #:** Haul numbers will reset for single day trips but not for multi-day trips.
 - **Wind direction** can be circled if it is an estimate. Exact wind direction readings, from a computer or anemometer, should be written in the wind direction box (i.e. the wind direction is 93°).
 - **Begin** and **End haul** times should be entered in 24 hour clock mode.
 - **Total catch** should equal the sum of individual species estimates including yellowtail. Yellowtail weights should not be recorded as a count. If you count the number of fish, assume each one weighs 1 kg (2.2 lbs). Multiply your count by 2.2 and record in the box marked "YT Catch Estimated".
 - Make any comments about torn gear, net obstructions or other observations in the "**Comments**" section.

Getting ready to tag

- During steam out of prior to tow haul back, pre-arrange the lottery tags numerically. Organizing them on a nickel pin with 50 per pin.
- Ready the tag box with the following:
 - Pins
 - Pink blanks and Orange scale blanks
 - Lottery tags (pre-arranged numerically)
 - \$100 reward tags
 - Data storage tags and DST oval blanks
 - Rubber bands, scale envelopes, pliers, pencils and a timing device
- **The chief scientist should activate enough DSTs to last for 1 day. Be sure to record the time they were activated (24 hour clock).**
- Designate and record on the data sheet who will tag and record.
- Pre-fill the tagging data sheet with the heading information (Vessel name, date, etc.)
- During haul back, set up the deck in a way that is appropriate and safe based on the deck configuration.
- Set up a tagging bench or station
- Set up live well (s) and run the deck hose to fill.



Top: Improvised tagging bench used on a smaller vessel. Bottom: Large and small live wells.

Activating the Data Tags

- Hold the tag with its yellow bead thermistor to your right. The magnetic reed switch will be at the top edge of the tag.
- To begin a recording session, tap the tag at its upper right or left corner 4 times with one pole of a magnet. The four taps must occur within two seconds and the magnet must not come near the tag for the following two seconds. After each tap, move the magnet at least 2-inches away from the tag. The magnet does not need to actually touch the tag.
- The light-emitting diode (LED) will blink brightly to indicate that the tag has started. It will then blink at 14- and 15-second intervals (an average of once every 14.06 seconds), one blink corresponding to each sample that is taken.
- If the LED blinks approx. twice each second, the tag is in a rapid-recording test mode. To clear this, tap the tag 4 times with the magnet. The test mode will drain the battery more quickly than the normal recording mode.



Specifics to Fishing

- The priority is to obtain fish that are strong and healthy enough to be tagged and released in good to excellent condition (see condition ratings on page 11).
- Captain is responsible for finding concentrations of yellowtail
- Tow duration is to be short, no more than 40 minutes, to ensure small enough tows to process without undue stress and exposure to the fish. Ideal tow duration is between 15-30 minutes, depending on the area and time of day.
- If tows come up with few yellowtail and numerous skates and other species, move to another area. Bycatch, particularly skates, damage the condition of yellowtail.
- **Do not begin another tow while fish are being released, even if this compromised the amount of tows that can be done per day.**
- For day trips, perform 6-10 tows per day, depending on steam time and weather.
- For offshore, multi-day trips, make as many tows as possible in day light hours. **Stop fishing before dusk.**

Sorting the catch

- Have Captain estimate total catch (in pounds) and record on his tow data sheet.
- Choose the quickest most efficient way to isolate live yellowtail from the catch.
- With straight yellowtail tows, bag can be dumped in live well (if using a large live well).
- If the tow is mixed species, dump the tow on a wet deck.
- Gently select yellowtail from the mix and **place upright** in the live well (s).
- If there are enough people, have the crew isolate the yellowtail while the scientific staff begin tagging.



Top: Dumping clean catch directly into live well.
Bottom: Dumping mixed catch onto a wet deck.

Tagging – I: Fish Condition

- Gloves are not required to handle the fish (it is easier to handle the fish without gloves). If gloves are preferred, use rubber gloves that will not cause scaling. If no gloves are used, make sure hands remain wet when handling fish.
- Chose a fish from the live well and assess its condition. Only tag **EXCELLENT** or **GOOD** rated fish:
 - Rate the fish (1) if it is in **EXCELLENT** condition. Excellent fish will be lively, scale condition clean and relatively unscathed. Operculum or mouth movement may be noticeable. Fish feel robust and have strength when held against the measuring board. No blood clotting present around gills or operculum. Fish may be flapping, although yellowtail are generally calm, even when in excellent condition.
 - Rate the fish (2) if it is in **GOOD** condition. Good condition fish are those that generally look healthy, exhibit some signs of an excellent fish. Strong body with no large abrasions or defects. Fish may have scale abrasion or net marks. Anal protrusion or slight anal tearing present.
- Fish rated (3) are in **poor condition** and unfit to tag. Fish is unacceptable to tag if it appears that the chance of survival is low, heavy abrasion is present, body is flaccid, and there is little movement or reaction to handling. Notate why fish is unfit to tag (i.e. “giant gash, gilled, heavily abraded” etc.) or if the fish is dead (“beheaded, torn body” etc.)

Tagging - II: Sexing

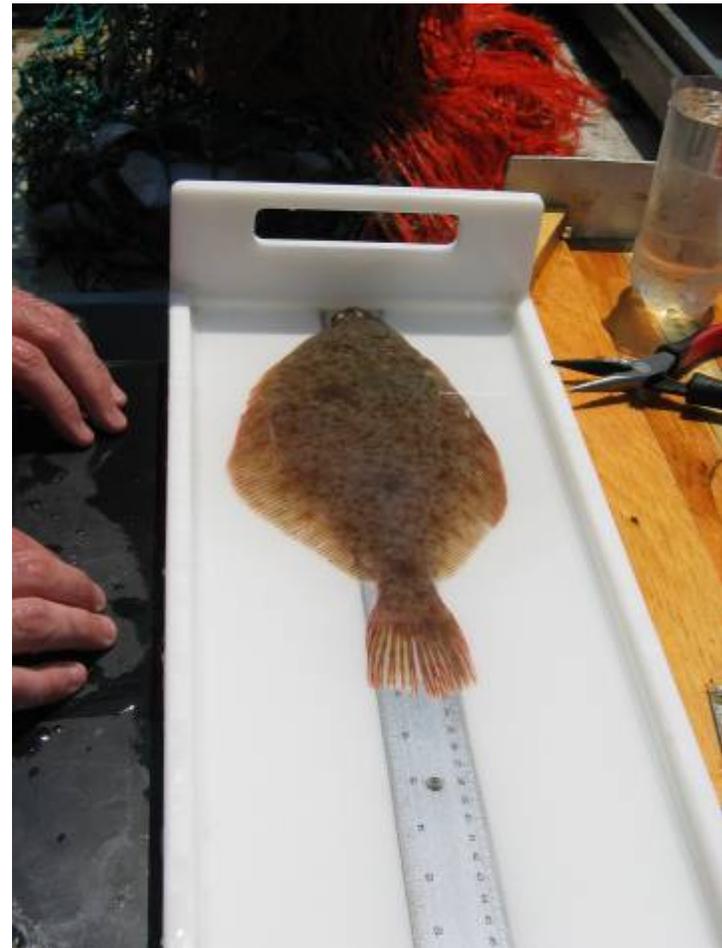
- Determine the sex of each fish. Maturity stage is not necessary to notate.
- Determine the sex by candling the fish. Hold the fish up to the sunlight and examine the ventral area of the blind side.
- Nearly all legal sized females should be mature (if tagging during the spawning season) and have a large ovary extending posteriorly from the abdominal cavity.
- Inspect the ventral area of the blind side to determine if an ovary is extending into the ventral tail meat:
 - If there is darker tissue extending from the abdominal cavity toward the caudal area, code as "female."
 - If the ventral and dorsal portions of the tail (posterior to the abdominal cavity) are identical in color, code as "male."



Top: Female. Bottom: Male.

Tagging – III: Measuring

- After the condition of the fish is deemed excellent or good, proceed to measure the fish.
- Minimize the time out of the water and handling of the fish.
- Fish size: Measure from end of snout to end of tail (to 1cm accuracy).
 - Southern New England tagging areas – Tag all sub-legal (less than 33cm) fish and legal (33+ cm). Gauge the size and capability of sub-legal fish to carry a DST before applying data storage tags.
 - All other tagging areas – Tagging legal fish is priority (33cm +). Tag sub-legal fish as time allows and not to detract or affect the quality or progress of tagging legal fish. Chief scientist can decide whether a fish is too small to tag.



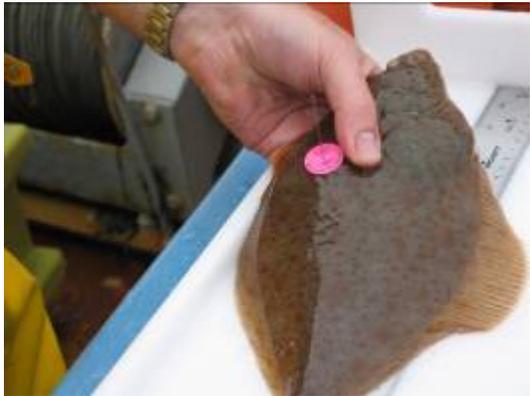
Applying Peterson Disks - I

- Locate lateral line arch on blind side of fish. Place the pin with blank disk installed just above the middle of line arch. Puncture the fish.
- Make smooth, clean puncture at a **perpendicular angle** to fish body until blank is flush with blind side.



Applying Peterson Disks -II

- Place pink disk (with side labeled “Call toll free 1-877-826-2612...”) facing away from fish on nickel pin, flush with fish body.
- To trim the pin, place needle-nose pliers slightly above flush with tag, cutting edge up and trim the pin. There should be about 1 inch of pin left once trimmed.
- Grab the end of pin with the tips of needle nose pliers. Crimp pin in a U-shape. Close gap between crimp tightly. Crimp should measure approx. 3 mm.
- Bend crimp over with pliers so it's at a perpendicular angle to the post of the pin (parallel to the fish body). **Insure there is space between tag and bend (approx. 3-4 mm, depending of fish size) to allow room for growth. For sub-legal fish, allow approx. 12-24 mm for growth, depending on fish size.**



Applying Peterson Disk - III

- Release fish immediately if it remains lively. If not, allow a minute or so of recovery in the live well before release.
- **Release the fish head first to minimize re-orientation and time in warm surface waters.**
- If you get a left-eyed yellowtail, treat and tag the same as right-eyed fish. Notate in comments on tagging data sheet.



Applying Data Tags – I

- **What you will need:** 1) Activated data tags, 2) pink oval backing tags, 3) nickel pins, two per tag, 4) pliers, 5) tweezers for taking scales, and 6) scale envelopes.
- Make sure the tag has been activated by watching for a red flash on the tag. If activated during the trip, the flash should be every 15 seconds to 1 minute.
- Data tags are applied using 2, 3” nickel pins (instead of the 1 used for disk tagging).
- Ready the oval backing tags by placing a pin in one end. Make sure the labeled side will be facing out.
- Align the oval blank similarly to the disk tag, above and centered to the lateral line arch.
- **Insert the first pin at a perpendicular angle** to the fish body. This is very important in aligning the tag correctly over the pins.
- When the pin and oval disk are in place, insert the second pin, **getting the two pins as parallel as possible** to each other.
- Fit the data tag, return address label up, over the pins.



Applying Data Tags - II

- Trim the pins one at a time. Place the needle-nose pliers slightly above flush with tag, cutting edge up and trim. There should be about 1 inch of pin left once trimmed.
- Grab the end of pin with the tips of needle nose pliers. Crimp pin in a U-shape. Close gap between crimp tightly. Crimp should measure approx. 3 mm.
- Bend crimp over with pliers so it's at a perpendicular angle to the post of the pin (parallel to the fish body). **Insure there is space between tag and bend (approx. 3-4 mm, depending of fish size) to allow room for growth.**
- For sub-legal fish, chief scientist will decide whether the fish is big enough to carry a data tag. If tagging, allow approx. 12-24 mm for growth, depending on fish size.
- Be sure to record the time when the fish is released for every data tag deployed.



Getting Scale samples

- Scale samples are to be collected for the following fish:
 - All \$100 tags
 - All data tags
 - \$1000 lottery tags that are applied with orange or pink scale sample backing tags.
- Chief scientist will decide how many scale samples to collect.
- Generally, taking scales from at the beginning of each tagging session is helpful in assuring scales are collected from fish in the best condition.
- Only take scales from fish in excellent condition.
- If taking scales will compromise fish health, take scales from next fish.
- Pluck 5-10 scales using forceps from just above the lateral line, approx. midway on body of fish.
- Place scales in a small envelope and label with the station information, date, sex and length of the fish.
- Record any comments on the data sheet.



Filling out the tagging data sheet

- Paper is “Right in the Rain” water-resistant.
- Trip ID and Haul #: (refer to page 7, (“Filling out the Captain’s Log”).
- Each tagger will have a pre-arranged set of tags on nickel pins. The tag numbers to be used will be recorded at the beginning of the haul for each tagger and modified at the end of the haul after all the fish have been tagged.
- Record the number of live and dead discards.
- Note the condition of the fish. There are 2 categories, “trawl damage” and “biological comments”. Check all that apply to the fish being tagged.
- Make any additional comments in the “Comments” field to the far right.
- Be sure to record the page numbers and all heading information on each sheet used. Each 2-sided sheet is considered one page and given the same number.
- The recorder must tally the total fish tagged and discarded at the end of the tagging session.

SAMPLE

SHEET 1 OF 1

YELLOWTAIL FLOUNDER COOPERATIVE TAGGING PROJECT TAGGING DATA SHEET

| | | | | | | | |
|---------|-------------|--------|----------|-----------|------------|----------------------|--------------------|
| TRIP ID | YT2005-____ | HAUL # | 7 | STAT AREA | 513 | HAUL DATE (mm/dd/yy) | 6 / 15 / 04 |
|---------|-------------|--------|----------|-----------|------------|----------------------|--------------------|

| | | | | | | | | |
|-----------------|-----------------------|--------------|----------------|--------------------|--------------|-----------|---------------------|--|
| TAGGER1 | Azure Westwood | | TAGGER2 | Stacy Kubis | | RECORDER | Steve Cadrin | |
| | BEGIN | END | | BEGIN | END | COMMENTS | | |
| TAGS USED | 19100 | 19112 | TAGS USED | 19150 | 19162 | | | |
| TAGS USED | H01080 | | TAGS USED | D1050 | | | | |
| TOTAL YT TAGGED | 30 | | FEMALES | 20 | MALES | 10 | | |
| # YT DISC ALIVE | 1 | | # YT DISC DEAD | 1 | | | | |

KEY: Condition: (1) EXCELLENT, (2) GOOD, (3) UNACCEPTABLE

| TRIP ID | Sex (M,F,U) | Length (cm) | Tag Number | Condition (1,2,3) | Time (24 hr) | TRAWL DAMAGE | | | | | | | BIOLOGICAL COMMENTS | | | | | Comments (Tag Type, Notes, etc.) | | |
|---------|-------------|-------------|------------|-------------------|--------------|--------------|-----------|------------|-------------|----------------|--------------|-----------|---------------------|--------|-----------|----------------|----------|----------------------------------|--------------|--------------|
| | | | | | | Scale Loss | Abrasions | Fin Damage | Fin Tearing | Anal Explosion | Anal Tearing | Net Marks | Ambi | Lympho | Milt/Ripe | Old Wound/Scar | Sea Lice | | Scales (Y,N) | |
| 1 | M | 36 | D1050 | 1 | 14:22 | SL | AB | FD | FT | AE | AT | NM | ambi | lympho | milt | ripe | scar | lice | Y | DST |
| 2 | F | 42 | H01080 | 2 | : | SL | AB | FD | FT | AE | AT | NM | ambi | lympho | milt | ripe | scar | lice | Y | \$100 HR TAG |
| 3 | F | 41 | 19100 | 1 | : | SL | AB | FD | FT | AE | AT | NM | ambi | lympho | milt | ripe | scar | lice | N | POOR COND |
| 4 | F | 38 | | 3 | : | SL | AB | FD | FT | AE | AT | NM | ambi | lympho | milt | ripe | scar | lice | N | POOR COND |
| 5 | M | 39 | 19150 | 1 | 14:25 | SL | AB | FD | FT | AE | AT | NM | ambi | lympho | milt | ripe | scar | lice | N | |
| 6 | M | 37 | 19101 | 2 | : | SL | AB | FD | FT | AE | AT | NM | ambi | lympho | milt | ripe | scar | lice | N | |
| 7 | F | 40 | | 3 | : | SL | AB | FD | FT | AE | AT | NM | ambi | lympho | milt | ripe | scar | lice | N | DEAD |
| 8 | F | 36 | 19151 | 2 | : | SL | AB | FD | FT | AE | AT | NM | ambi | lympho | milt | ripe | scar | lice | N | |
| 9 | F | 35 | 19102 | 2 | : | SL | AB | FD | FT | AE | AT | NM | ambi | lympho | milt | ripe | scar | lice | N | |
| 10 | F | 42 | 19103 | 1 | : | SL | AB | FD | FT | AE | AT | NM | ambi | lympho | milt | ripe | scar | lice | N | |

| | | | | | | | |
|---------|-------------|--------|----------|-----------|------------|----------------------|--------------------|
| TRIP ID | YT2005-____ | HAUL # | 7 | STAT AREA | 513 | HAUL DATE (mm/dd/yy) | 6 / 15 / 04 |
|---------|-------------|--------|----------|-----------|------------|----------------------|--------------------|

KEY: Condition: (1) EXCELLENT, (2) GOOD, (3) UNACCEPTABLE

| TRIP ID | Sex (M,F,U) | Length (cm) | Tag Number | Condition (1,2,3) | Time (24 hr) | TRAWL DAMAGE | | | | | | | BIOLOGICAL COMMENTS | | | | | Comments (Tag Type, Notes, etc.) | | |
|---------|-------------|-------------|------------|-------------------|--------------|--------------|-----------|------------|-------------|----------------|--------------|-----------|---------------------|--------|-----------|----------------|----------|----------------------------------|--------------|--|
| | | | | | | Scale Loss | Abrasions | Fin Damage | Fin Tearing | Anal Explosion | Anal Tearing | Net Marks | Ambi | Lympho | Milt/Ripe | Old Wound/Scar | Sea Lice | | Scales (Y,N) | |
| 11 | M | 35 | 19152 | 1 | 14:27 | SL | AB | FD | FT | AE | AT | NM | ambi | lympho | milt | ripe | scar | lice | N | |
| 12 | F | 41 | 19104 | 1 | : | SL | AB | FD | FT | AE | AT | NM | ambi | lympho | milt | ripe | scar | lice | N | |
| 13 | M | 40 | 19153 | 1 | : | SL | AB | FD | FT | AE | AT | NM | ambi | lympho | milt | ripe | scar | lice | N | |
| 14 | F | 38 | 19105 | 1 | : | SL | AB | FD | FT | AE | AT | NM | ambi | lympho | milt | ripe | scar | lice | N | |
| 15 | M | 38 | 19154 | 1 | : | SL | AB | FD | FT | AE | AT | NM | ambi | lympho | milt | ripe | scar | lice | N | |
| 16 | F | 37 | 19155 | 1 | : | SL | AB | FD | FT | AE | AT | NM | ambi | lympho | milt | ripe | scar | lice | N | |
| 17 | F | 36 | 19106 | 1 | : | SL | AB | FD | FT | AE | AT | NM | ambi | lympho | milt | ripe | scar | lice | N | |
| 18 | F | 36 | 19156 | 1 | : | SL | AB | FD | FT | AE | AT | NM | ambi | lympho | milt | ripe | scar | lice | N | |
| 19 | M | 35 | 19107 | 2 | : | SL | AB | FD | FT | AE | AT | NM | ambi | lympho | milt | ripe | scar | lice | N | |
| 20 | M | 39 | 19157 | 1 | : | SL | AB | FD | FT | AE | AT | NM | ambi | lympho | milt | ripe | scar | lice | N | |
| 21 | F | 44 | 19108 | 1 | 14:33 | SL | AB | FD | FT | AE | AT | NM | ambi | lympho | milt | ripe | scar | lice | N | |
| 22 | F | 42 | 19158 | 1 | : | SL | AB | FD | FT | AE | AT | NM | ambi | lympho | milt | ripe | scar | lice | N | |
| 23 | M | 32 | 19159 | 1 | : | SL | AB | FD | FT | AE | AT | NM | ambi | lympho | milt | ripe | scar | lice | N | |
| 24 | F | 47 | 19109 | 2 | : | SL | AB | FD | FT | AE | AT | NM | ambi | lympho | milt | ripe | scar | lice | N | |
| 25 | F | 41 | 19160 | 1 | : | SL | AB | FD | FT | AE | AT | NM | ambi | lympho | milt | ripe | scar | lice | N | |
| 26 | F | 40 | 19110 | 1 | : | SL | AB | FD | FT | AE | AT | NM | ambi | lympho | milt | ripe | scar | lice | N | |
| 27 | M | 35 | 19161 | 1 | : | SL | AB | FD | FT | AE | AT | NM | ambi | lympho | milt | ripe | scar | lice | N | |
| 28 | F | 44 | 19111 | 2 | : | SL | AB | FD | FT | AE | AT | NM | ambi | lympho | milt | ripe | scar | lice | N | |
| 29 | F | 43 | 19162 | 2 | : | SL | AB | FD | FT | AE | AT | NM | ambi | lympho | milt | ripe | scar | lice | N | |
| 30 | F | 44 | 19112 | 2 | 14:35 | SL | AB | FD | FT | AE | AT | NM | ambi | lympho | milt | ripe | scar | lice | N | |

Recapturing a tagged fish

- Remove the tag from ALL recaptured fish. Do not re-use the tag.
- Treat each fish as a recapture and record (if from a previous trip) and location. Take scales from high reward, DST's and scale-labeled blanks. Use the tag recapture phone sheets to record the information.
 - Tag number
 - Date
 - Latitude/Longitude
 - Length (if the fish was released on a separate trip)
 - Make any observations about the tag wound area and health of the fish.
- In the “Reported By:” category, write “T” which stands for “Tagging cruise”
- If there are a large number of recaptures from the same day or trip, move to a new fishing spot.

Notes

Contacts (2006)

- Azure Westwood, Yellowtail Tagging Field Coordinator, NEFSC, Woods Hole:
Azure.Westwood@noaa.gov, 508-495-2238 or toll free for tag returns: 877-826-2612.
Cell: 508-837-8636
- Dr. Steve Cadrin, Yellowtail Tagging Project Supervisor, NOAA/UMASS CMER
Director, SMAST, New Bedford : Steven.Cadrin@noaa.gov, 508-910-6358. Cell: 508-221-6756
- Josh Moser, Tagging Technician, NEFSC, Woods Hole: Josh.Moser@noaa.gov, 508-495-2246
- Talia Bigelow, Tagging Data Management, NEFSC, Woods Hole:
Talia.Bigelow@noaa.gov, 508-495-2198
- Nathan Kieth, Cooperative Research Field Team, NEFSC, Woods Hole:
Nathan.Kieth@noaa.gov, 508-495-2083