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VIRGINIA RECREATIONAL FISHING DEVELOPMENT FUND
PROJECT APPLICATION

NAME AND ADDRESS OF APPLICANT	PRINCIPAL INVESTIGATORS
Virginia Institute of Marine Science P.O. Box 1346 Gloucester Point, VA 23062-1346	Jon Lucy, VIMS Marine Adv. Services Claude Bain, VA Saltwater Fishing Tournament., VMRC
PRIORITY AREA OF CONCERN Recreational Fisheries Research and Education	**PROJECT LOCATION** VIMS and VSFT-Virginia Beach; lower Chesapeake Bay and VA offshore waters

DESCRIPTIVE TITLE OF PROJECT
Virginia Game Fish Tagging Program 2008 (Yr. 14 Proposal)

PROJECT SUMMARY

Initiated in 1995, primarily funded by Saltwater Recreational Fishing License Funds and matching VIMS funds, this project is a cooperative program of the Virginia Saltwater Fishing Tournament (Marine Resources Commission) and VIMS Sea Grant Marine Advisory Program. As of January 1, 2005, annually training anglers via a series of coastal workshops, the program enables a corps of 150-200 experienced anglers to direct tagging effort on select target species important to VA's marine recreational fisheries, (a value of over one billion dollars annually). As of 2006 database records (used by researchers, fishery mangers, anglers, etc.) include 103,850 tagged fish/fish length records and 10,400 fish recapture records (a10% recapture rate as of 2006).Target species are: black and red drum, black sea bass, cobia, flounder, gray triggerfish, sheepshead, spadefish, speckled trout, and tautog. Striped bass is not tagged, such work in VA accomplished by VIMS in cooperation with USFWS/state coast-wide tagging program. During 2005 and 2006, trained anglers tagged and released approximately 10,200 and 16,300 fish, respectively, and 970 and 1,890 recaptures were added to the database each year. Tagging continues at two power plant areas during fall-winter-early spring in cooperation with Dominion Power as the plant areas serve as "warm-water havens" in particular for red drum and speckled trout. The program database is regularly used by staff and fishery technical committees with VMRC, the ASMFC, and MAFMC. Tag-recapture data is shared between VA and NC, and researchers from each state co-author presentations at scientific meetings. Program results are documenting both expected, and unexpected, movement and habitat use patterns of target species. Target species either spawn in the lower Bay, or in offshore-nearshore waters of VA-NC, using Virginia waters as nursery/feeding grounds. Tagging data on tautog, black sea bass, tautog, and flounder have been specifically requested for use in FMPs (fishery management plan development and plan updates). Tag-recapture data for cobia show sexually mature fish return consistently returning to the bay over periods of 1-5 years after tagged in the bay. Tagging annually shows large numbers of flounder, red drum, and speckled trout inside Rudee Inlet, a heavy use area. Tagging results on sub-legal flounder continue documenting close association with structure-based habitats in the bay (fishing piers, artificial reefs, bridge-tunnel areas, etc.).This VA pattern is supported by acoustic tracking of flounder in a small NJ coastal river. Building on the tagging data, for 2006-2007 VIMS conducted a flounder acoustic tracking study of 3 sites in York River and mid bay waters. Flounder "site fidelity" and movement at, and among, the sites is more complex than anticipated.

EXPECTED BENEFITS

Provide data on local fish movement and seasonal migrations, data previously unavailable on tagging program target species all of which are important to VA's marine recreational fisheries. In the case of flounder, the Game Fish Tagging Program has collected more data on flounder movement and habitat use than possible in VIMS tagging studies in the mid-1980s and early 1990s. The "new" data basically support VIMSs conclusions. Of use to fishery managers, tagged fish size data annually document fish year classes supporting VA fisheries, data collected by anglers on the fishing grounds. Tag-recapture data demonstrate surprisingly rapid seasonal movements of some species between VA and NC waters. Data document over wintering of large numbers of speckled trout and red drum in at least two power plant areas, and possible retention of these species in Rudee Inlet during mild winters. The heavy boat-traffic areas of Rudee are being documented as major habitat and forage areas over multiple years for flounder, speckled trout, and red drum. Tagging results can be used by researchers and fishery managers to document numbers and sizes of species released under fishery regulations in the VA fishery. The data will help improve management of Virginia's fisheries. Through the program, information on fish movement and habitat use patterns in Virginia waters continues to improve. It reaches the angling community through talks to fishing clubs and VIMS web site, but more importantly through trained angler taggers spreading results across the angling community. The program also provides the angling community an educational and fisheries conservation experience regarding benefits to Virginia's marine recreational fisheries from carefully releasing fish as directed by fishery regulations. Results of the tagging program show anglers first hand that significant numbers of released catches survive and can be caught again for improved angling experiences.

COSTS

VMRC Funding:	$ 49,878	(VIMS portion)	+ **$23,215 (VMRC portion)** = **$73,093**
VIMS Funding:	$ 20,724	(VIMS contribution)	
Total Cost :	$ 70,602	(VIMS)	= **$93,817 (Total Cost VIMS &VMRC)**

Detailed budget included with proposal

BUDGET

Virginia Game Fish Tagging Program
Virginia Institute of Marine Science
Proposed Budget for January 1, 2008 to December 31, 2008

BUDGET CATEGORY			DIRECT	MATCH
I. Salaries				
a. Jon Lucy, Co-PI $78,119 Per Year $6,510 Per Month	1.5 mm/1 mm		$ 9,765	$ 6,510
b. Data Technician, TBN $32,355 Per Year $2,696 Per Month	2 mm		$ 5,393	
Subtotal			$ 15,157	$ 6,510
II. Fringe Benefits (35%)			$ 5,305	$ 2,278
Total Salaries and Fringe Benefits			$ 20,463	$ 8,788
III. Publications (Annual Report, Website/Recapture Updates)			$ 2,000	
IV. Travel (Local travel for field work, Tagging work group meetings, presentations at scientific meetings and association clubs.)			$ 4,000	
V. Supplies			$ 13,440	
25,000 T-Bar Tags @$430/1,000		$ 10,625		
1,000 Steel Dart Tags @$1		$ 1,000		
50 Tagging Guns @$30		$ 1,500		
35 Tagging Needles @$3		$ 105		
35 Measuring Boards @$6		$ 210		
Subtotal		$ 13,440		
VI. Total Direct Costs			$ 39,903	$ 8,788
VII. Indirect Costs - 25% VMRC			$ 9,976	
Indirect Costs - 45% on Match				$ 3,955
Indirect Costs - 20% from Direct				7,981
VIII. TOTAL PROJECT COSTS			$ 49,878	$ 20,724

5/24/2007

Virginia Game Fish Tagging Program
Budget – 2008
VMRC Portion

Tagging Awards		
800 Hats @ $5.50 each	4400	
600 T-Shirts @ $6.00 each	3600	
150 Pewter Fish Pins @3.00 each	450	
10 Gift Certificates (large,yearend awards) @ $100 (5) & $50 (5)	750	
1000 Decals @ .60 each	600	
500 Digital Stickers @ 1.75 each	875	
360 Tackle Organizers @ 2.50 each	900	
12 Tag Plaques @ $20 each	240	
Conservation Certificates	500	
Data Sheets and Cards	500	
	12815	
Postage and Shipping		
U. S. Postage	1400	
UPS Shipping	7000	
	8400	
Supplies (Paper, Envelopes, Mailers, Tape, Bubble Wrap etc.)	800	
Travel	1200	
Total		**$23,215**

Virginia Game Fish Tagging Program
Year 14 Proposal (2008)

January 1, 2008 to December 31, 2008

Proposal Submitted to:

Virginia Recreational Fishing Development Fund
Virginia Marine Resources Commission
2600 Washington Avenue, Third Floor
Newport News, Virginia 23607

Proposal Submitted by:

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May 21, 2007

Virginia Game Fish Tagging Program (VGFTP)
Year 14 Proposal (2008)

Overview

Initiated in 1995, the Virginia Game Fish Tagging Program (VGFTP) coordinates a fish tagging and fish tag-recapture database generated through contributed efforts of a dedicated corps of trained marine anglers. The project is operated cooperatively by Claude Bain, Director of the Virginia Saltwater Fishing Tournament (under VMRC), and Jon Lucy, Recreation Specialist, VIMS Marine Advisory Program. Significant matching funds are provided by the Virginia Institute of Marine Science of the College of William and Mary. There is also additional administrative support provided by the Virginia Sea Grant Program, a federal funding source (National Oceanic and Atmospheric Administration-NOAA) of major significance to VIMS as part of the broader Virginia Sea Grant Marine Advisory Program.

Program responsibilities are shared, taking advantage of the respective organizations' communication links with the marine recreational angling community and strengths in data handling-analysis and graphics-publication production. For example, the VSFT Virginia Beach location and regular contact with marinas, tackle shops, and anglers through the citation program for catches of trophy fish makes it the natural partner for receiving and keying tagged and recaptured fish data. Tags, tagging needles, etc. are regularly mailed to taggers and records maintained regarding tag-number series individual taggers have. Tag-recapture reports are sent by the office to both to taggers and persons reporting tagged fish, and appropriate reward items (hats, T-shirts, etc.,) mailed to persons phoning in recaptured fish reports. Database files are maintained and updated at the office, then forwarded to VIMS.

At VIMS tagged fish data and tag-recapture data records are checked for possible inconsistencies or errors, then summarized and analyzed for production of annual reports (hard copies and web-based formats). Text, graphics, and data files are maintained and updated in user-friendly formats for both to anglers as well as fishery researchers and managers. Graphics illustrating fish movement and habitat use patterns are developed for a variety of educational programming (VIMS Marine Science Day, "Kids Fishing Clinics," science teachers' courses, and public presentations such as to angling clubs and civic groups, etc.). Data and graphics also are organized in appropriate formats for the annual series of Tagging Training Workshops, for posters alerting anglers to report tagged fish, and for presentations at regional and national scientific conferences. Ordering of tags and tagging equipment, and construction of measuring boards, is handled by VIMS. The Institute also periodically conducts tag retention field trials to determine whether changes are needed in the type of tag used for specific species as well as smaller versus adult size fish.

Target species for 2002-2006 were black drum, black sea bass, cobia, flounder, gray triggerfish, red drum, sheepshead, spadefish, speckled trout (spotted seatrout), and tautog. Summer flounder replaced weakfish in 2000 as significant tagging effort on the latter species never produced greater than a one percent recapture reporting rate (tank-based tag retention trials indicated high tag loss rates over 2-4 week periods).

Target Species 2002-2006

Black Drum	*Pogonias cromis*
Black Sea Bass	*Centropristis striata*
Cobia	*Rachycentron canadum*
Flounder (fluke)	*Paralichthys dentatus*
Gray Triggerfish	*Balistes capriscus*
Red Drum	*Sciaenops ocellatus*
Sheepshead	*Archosargus probatocephalus*
Spadefish	*Chaetodipterus faber*
Speckled Trout	*Cynoscion nebulosus*
Tautog	*Tautoga onitis*

Through 2006, the program's database includes over 103,800 tagged fish records and approximately 10,400 recapture records. The database helps to document within year, and year-to-year habitat utilization and movement patterns of carefully selected target species in Virginia waters. In addition, the program documents significant coastwise migrations for certain species.

The program's data are of interest both to the angling community as well as to fishery researchers and managers. The number and size distribution of target fish tagged each year are of special interest to fishery managers as such data provide useful indicators of the mix of year classes sustaining top ranked recreational fisheries and the relative size distribution of fish being released in the fishery under ever-changing size and bag limit management regulations.

The program maintains a corps of experienced, trained angler-taggers who can capitalize on opportunities to focus significant tagging effort on key species which often suddenly exhibit high levels of abundance during any given fishing season. While contributing significantly to the rebuilding and sustaining of specific fisheries comprising Virginia's one billion dollar marine recreational fishery, such events take on greater value when tagging documents sizes and relative numbers of recreationally-targeted fish occurring in state waters, and the habitats they utilize year to year.

In recent years the program has maintained its team of trained angler taggers at approximately 150-200 individuals. This level of participation keeps the program manageable while producing useful data for the species targeted.

Examples follow to illustrate what the program is accomplishing. Through the combined effort of trained anglers tagging select target species across major popular fishing areas in Virginia bay and offshore waters, hard data are being acquired on (1) how and when species seasonally important to Virginia's coastal anglers use local waters, (2) juvenile and adult fishes' long-term habitat preferences while in state waters, and (3) defining waters and fish habitats beyond Virginia's borders important to sustaining fish populations on which the state's marine angling fishery depends.

- Flounder tagged in Chesapeake Bay and Chincoteague Inlet waters consistently demonstrate that of fish tagged one year, local movement occurs during the warmer part of the year, but in the following year a portion of the tagged fish typically are found again

in, or have returned to, the waters where they were initially tagged. Over similar periods and time scales, flounder tagged in the bay and behind ocean inlets regularly move offshore during cooler months, ultimately dispersing north and south during the following year. Recaptures of such fish occur from Rhode Island to New York-New Jersey beaches and inlets and as far south as Myrtle Beach, South Carolina.

- Cobia tagged inside the bay are recaptured months to years post tagging off North Carolina, along Florida's east coast, and even in the Gulf of Mexico. Of greater significance, since 1999-2000, adult cobia tagged inside the bay are documented to return again to the bay, both for feeding and spawning, one, two, three, four, and even five years after being tagged. It cannot be known for certain whether a portion of adult and juvenile fish in the bay one year return annually to the bay or simply periodically over longer time spans.

- During 1999, 2000, 2002, 2003, and 2006, large year-classes of sub-adult red drum have been documented to contribute significantly to Virginia's marine recreational fishery, along with good numbers of adult fish entering the fishery in more recent years. At least during milder winters Rudee Inlet waters, close to and well flushed by ocean water and having a few places approaching 30 feet in depth, appear to hold sub-adult drum, i.e., fish were tagged there on January 1, 2006, and from mid-November through late December 2006.

- The contribution of strong year classes of speckled trout to the recreational fishery has likewise been confirmed by tagging efforts during 1995, 1999, 2002, and 2004-2006, with some fish over-wintering in the area of lower bay power plants during both colder and more mild winters. In 2006 large concentrations of speckled trout were tagged during January in the Hampton Roads area where surface water temperature ranged from 46-50 F from about January 1-24.

- With Chesapeake Bay largely the northern range of significant angling fisheries for red drum and speckled trout, rather discrete, episodic fall migrations of Virginia-tagged fish occur to North Carolina waters with numerous fish moving distances of 30 to 200+ miles in 3-90 days post tagging, i.e., such fish therefore are covering estimated "straight-line distances" of 1-5 miles, even 6-15 miles per day.

- Twelve years tagging of tautog in Virginia Bay and offshore waters, having produced nearly1,900 recaptures, document tautog do not undergo significant seasonal movements inshore in spring and offshore during fall-winter, as the case in waters from New York to Rhode Island. More importantly, fish tagged in Virginia bay and offshore waters show no distinctive northward migration. Through 2006, only two bay-tagged fish (0.1% of all recaptures) have been recaptured to north of Virginia borders, one at the Ocean City Inlet, MD jetties and one at the Harbor of Refuge inside the mouth of Delaware Bay.

2006 Accomplishments

During 2006 the program far exceeded its previous best tagging year (2004) with 16,300 fish tagged across ten target species. During 2004 about 12,000 fish were tagged. The record number of fish tagged during 2006 also resulted in a record number of recaptures, i.e., nearly 1,900 reports by year's end. Anglers, charter captains and head boat mates, trained observers on trawlers, commercial fishers, fish packing-fish retail businesses, etc., reported approximately 950-1,000 fish recaptures annually in 2003-2005. Tagged fish recapture reports for 2006 were nearly double that level.

For the tagging program to accomplish its objectives, large numbers of fish have to be tagged at key fishing locations. During 2006 twenty anglers tagged 50-100 fish, 18 anglers 100-200 fish, 9 anglers 200-400 fish, 5 anglers 500-750 fish, and 1 angler over 850 fish. In addition, an especially dedicated angler tagged nearly 3,600 fish over the course of the year. All made important contributions to the program database, whether they focused on tagging primarily one species or a mix of species.

At the end of 2006 the program database includes over 101,800 tagged fish records and nearly 10,400 recaptured fish records, an overall cumulative reporting rate of 10%. In comparison, through 2005 the program had accumulated nearly 86,900 tagged fish records and just over 8,300 recapture reports, a 9.6% cumulative reporting rate for recaptured fish.

Training of Taggers

Tagging Training Workshops for new taggers were held at four different locations during the last half of February 2006 (VIMS-Gloucester Point campus, VIMS-Wachapreague campus on the Eastern Shore, Virginia Beach-Marina Shores, and Hampton-Bass Pro Shops host). Trained anglers active in the program during 2005, as an annual requirement, had to notify program coordinators they wanted to continue with the program for 2006. This "re-registration" requirement serves two purposes. It allows those who might lose interest in tagging for whatever reasons to ease out of the program gracefully. The process also provides guidance regarding how many new participants can be brought onboard during training workshops.

In addition to updates on program results, new taggers receive detailed instruction on recording and reporting tagged fish data including use of water-resistant data sheets. They also learn catching, handling, and hook-removal protocols required to minimize stress in fish. Experienced taggers also share their experiences on such issues and how to avoid mistakes in recording tag numbers and total lengths for fish tagged. New taggers also are walked through proper tagging techniques using the Hallprint T-bar tags (for fish from about 10-26 inches TL) and stainless steel dart tags (for larger specimens of drums and cobia), with experienced taggers weighing in on tagging techniques found especially workable, especially when catches come in rapidly. Once completing hands-on" tagging trials with freshly iced fish, new taggers receive a limited number of tags, a tagging gun (for T-bar tags) and/or tagging needle plus tagging stick (for stainless steel dart tags), measuring boards, and data sheets.

As indicated, experienced taggers are also invited to the workshops to discuss updates on recapture results and to share their suggestions with the new recruits. Many new to the tagging program at such workshops have signed up for the instructional sessions because they fish in association with current

taggers and want to join in learning first hand more about seasonal movements and habitat preferences of their favorite fish. The winter 2006 workshops brought approximately 35 new taggers into the program.

Database Use

In recent years information generated by the program has been utilized by the Atlantic States Marine Fisheries Commission (ASMFC), VMRC, VIMS, and the North Carolina Division of Marine Fisheries. For example, data on sizes and numbers of flounder and tautog tagged in a given year provide good indicators for state and federal fishery managers of the relative abundance of year classes of juvenile and adult fish available on the fishing grounds. In the case of target species such as flounder, tautog, red drum, black sea bass, and speckled trout, often the majority of fish tagged during the year are 1-2 year old fish. These fish are typically smaller than regulatory size limits, or just crossing the threshold of such limits. Therefore, they are good indicators during a given year of the sizes and numbers of fish being released across the recreational fishery.

Results for the tagging program are not only distributed to anglers and fishery managers, they are shared with scientists at meetings and through research journals. For example, a presentation was made at the well-attended Flatfish Conference during late November 2006 in Connecticut (organized by NOAA Fisheries and other sponsors). Comprehensive tag-recapture data using conventional tags were described regarding site fidelity patterns of flounder associated with structure sites as well as very preliminary results from a project using passive acoustic telemetry methods to monitor flounder presence-absence at structure sites. Over 100 attendees were in attendance from marine research labs and universities along the Atlantic coasts.

Data on tautog document that over the past 12 years the species in Virginia does not undergo significantly distinctive seasonal movements inshore-offshore, the case for the species in waters from New York north. Nor does the species in Virginia waters show extensive northward movements beyond the area of the mouth of Delaware Bay. As previously mentioned, on two tautog recaptures out of nearly 1,900 data records show any movement beyond the northern border of Virginia extended about 30 miles offshore.

The tagging program's results for tautog were part of the argument forming the basis for a peer-reviewed, scientific paper appearing in the January 2007 issue of Fisheries, the monthly periodical of the American Fisheries Society. Titled "Evaluating Localized vs. Large-Scale Management: The Example of Tautog in Virginia," the paper provides significant arguments for managers to consider regarding the fact that Virginia tagging data and catch curve analyses of the Virginia fishery support that fishing mortality levels in Virginia waters occur somewhat uniquely on a local scale, not a coastwise scale. Therefore, regulatory reductions imposed on fishing effort in Virginia are not likely to alleviate overfishing on the population in more northern waters.

Data on tagged red drum and flounder have been forwarded to VMRC during spring 2007. The red drum data are being considered, along with much other data, for input into updating the species' stock assessment.

Regarding speckled trout, in May 2007 the North Carolina Division of Marine Fisheries requested multiple years of data on fish sizes and tag-recapture records for the species. Apparently given almost no

recapture data resulting from an earlier angler-assisted trout tagging effort in North Carolina, the Virginia data may be all that exist for the two-state region. Of special interest, the Virginia data document the episodic, often rapid movement during fall of speckled trout from Virginia bay and Rudee Inlet waters to North Carolina beaches and sounds. These data typically show the trout moving 30-200+ miles over relatively short periods. This indicates at a minimum the fish are capable of seasonally covering distances to more southern waters at rates of 1-10 miles per day.

Program results for flounder continue documenting consistent patterns of "site fidelity" to certain fishing piers, bridge-tunnel complexes, and special habitat areas such as waters inside Rudee Inlet. It is apparent that structure-oriented habitat plays a role for feeding aggregations of flounder, but the conventional tagging data cannot define clearly the actual temporal use of structure areas by flounder. For example, even with some multiple recapture records of flounder at specific fishing piers and the Hampton Roads Bridge Tunnel, nothing can be determined about the fish's behavior in between tag recapture events.

Given the obvious association of flounder to structure in the bay, it is important to clarify how flounder actually use structure-based habitat areas in the bay. If such areas provide long-term, seasonal aggregation areas for juvenile and adult fish, such areas could then be significant in contributing towards overall rebuilding of the flounder population in the mid-Atlantic region.

Building upon the flounder tagging program's data, VIMS initiated a study aimed at clarifying the interaction of flounder and structure-associate habitat areas ("Understanding Localized Movements and Habitat Associations of Summer Flounder in Chesapeake Bay Using Passive Acoustic Arrays"). Currently data are being analyzed from buoyed hydrophones tracking flounder movement from June 2006 through late March 2007 at three sites (Gloucester Point Fishing Pier, Back River Artificial Reef, and a non-structure area at York Spit off the mouth of the York River). Surgically implanted with small acoustic transmitters, 120 legal and sub-legal flounder, equally divided among the three sites, have now been documented to exhibit rather complex movements in the vicinity of, and among the study sites.

Special Program Elements and Select Results

While regular activities of the program continue month to month, behind the scenes special issues are addressed as time allows aimed at improving overall results form the dedicated tagging work of program members. One such issue is whether the primary tags (T-bar tag) are staying for significant times in each of the target species. Not only can various types of tags "behave" differently across the range of species we target, a given tag which works effectively in small fish may not work equally as well in larger fish of the same species.

For example, after changing from smaller dart tags to larger, stainless steel dart tags in large drum, recaptures reports dramatically improved. We are now conducting field trials to examine tag loss concerns in speckled trout and red drum.

Tag Retention Concerns in Speckled Trout and Red Drum

Tag retention field trials have been initiated when opportunities to double tag good number of fish have occurred. We are testing our primary tag, the Hallprint T-bar tag, against the high-retention, soft-

anchor, abdominal tag, also made by Hallprint. The trials require fish to have both the T-bar anchored in its traditional location (the base of the dorsal fin) while an abdominal anchor tag, a design of known high-retention, is inserted through a small incision in the fish's muscle just behind the pectoral fin and along the lower portion of the abdominal cavity area. Therefore the tagging must be done by those experienced with such procedures, not the case for the usual angler.

With the T-bar tag, we receive valuable, quality returns showing speckled trout move farther distances along the coast (VA to NC) than typically shown by tagging studies on the species in southeastern Atlantic waters, or Gulf coast waters. However, if tagged fish are losing significant numbers of T-bar tags after being at large for several months, then we might expect some improvement in recapture rates with double-tagged fish.

Trout exhibit nearly 100 % retention rates for T-bar tags when held in net pens or vinyl wire cages for short observation periods (5-8 days). However, we continue to have quite low recapture rates year after year with the species (the cumulative rate never rises above 3%), and recapture periods are typically only 5-80 days.

During fall 2004, approximately 50 trout were double-tagged, most in Lynnhaven Inlet, but also a few in Rudee Inlet. Holding sample specimens of double tagged specks in VIMS Aquarium (three fish: 10, 12, and 14 inches TL) from late December 2004 through April 2005 showed tag entry areas healed well and both tags stayed in the fish during a 14 week trial. As of April 20007, however, none of the trout double-tagged during 2004 have produced a recapture report..

During fall 2005, working cooperatively with various taggers in Lynnhaven and Rudee Inlets and at the Elizabeth River Hot Ditch CEC Canal, we double-tagged 86 speckled trout. In 2006 an additional 136 speckled trout were double-tagged. For 2007, over 100 specks have been double tagged to date. Overall, except in 1-2 cases where the angler was uncertain if the recaptured fish had two tags, both the T-bar and abdominal anchor tags have remained in the fish over reporting times of weeks up to several months.

Some positive results may be slowly developing from the effort with speckled trout. Of the 86 double-tagged trout from 2005, seven recaptures have been reported to date (4 during 2005 and 3 more in 2006). Compared to the typical 3% recapture reporting rate for single-tagged trout tagged during 2005, the double-tagged fish are showing a recapture reporting rate of 8%. Of course the slight improvement to date could be due to nothing more than fish with two tags are more likely to be seen and reported than fish with only a single tag. Also, in the angling community a "double-tagged fish might be considered "more important to report" and/or likely to result in a better reward than a single-tagged fish. So far, only 3 of the 136 double-tagged trout from 2006 have been recaptured, a reporting rate of 2.2%. More reports hopefully will help clarify this perplexing issue.

Other Tagging Issues Receiving Attention

The T-bar tag, the primary tag used for sheepshead, is not producing recapture results and will be replaced with a single barb, plastic tip dart tag during 2007. In 2006 just over 150 sheepshead (18-22 inches total length) were tagged at the Chesapeake Bay Bridge Tunnel. With repetitive fishing and tagging occurring in much the same area, no recaptures occurred. This indicates the T-bar tags are

possibly being abraded against barnacle-encrusted structure or in some other way being lost from the fish. Consulting with our tag manufacturer, Hallprint, the indicated dart tag has produce recapture results elsewhere in Sparidae (porgy) species. Therefore a version of the dart tag will be tried on the species.

Noteworthy Results by Species

Black Drum

The occurrence of juvenile black drum was documented in the warm-water discharge canal of the Elizabeth River CEC Power Plant with tagged fish producing single and multiple recaptures. A double recapture of a 12 inch juvenile drum tagged in March 2006 showed the fish in the canal 14 days post tagging, and by July (after 121 days at large/DAL), the fish was only miles from the plant still in the Elizabeth River's Southern Branch.

A juvenile drum (9 inches) tagged in the Lynnhaven Inlet "narrows" in October 2005 was recaptured in Bogue Sound, NC, in July 2006 (280 DAL) and reported as 17 inches long.

Recaptures of three larger fish occurred: (1) A 27 inch drum tagged in July 2005 at the Chesapeake Bay Bridge Tunnel was recaptured May 2006 (302 DAL) on the seaside of Eastern Shore (in Great Machapungo Inlet), (2) A 30 inch drum tagged May 2006 at the Inner Middle Ground Shoal was recaptured in October 2006 (150 DAL) near the Chesapeake Bay Bridge Tunnel. Released with its tag in place, it was caught again one day later and released, and (3) A 47 inch drum tagged in May 2006 at Latimer Shoal was recaptured at Inner Middle Ground Shoal the same day.

Black Sea Bass

With numbers of tagged fish up, 2006 recaptures doubled those in 2005.

Two fish (11 and 15 inches TL), one tagged at the Triangle Wreck in October 2004 and one in November 2005, were recaptured at the same area in June and October 2006, respectively, after 608 and 328 DAL. A few other recaptures over times at large of nearly one year also occurred at the Chesapeake Bay Bridge Tunnel (CBBT) and at other offshore wrecks including one at the 4A Buoy Dry Dock SE of Rudee Inlet.

A 9.5 inch bass tagged September 2005 in Lynnhaven Inlet was recaptured June 2006 at Jones Inlet, NY (252 DAL).

Many recaptures of juvenile sea bass (5-6 inches TL) tagged at the CBBT Sea Gull Fishing Pier and in the York River at the Gloucester Point Fishing Pier showed recaptures occurring again at the respective piers around 10-60 days post tagging.

Sea bass tagged at the Tiger Wreck SE of Rudee Inlet were typically recaptured again at the wreck 14-60 days after tagging.

Multiple recaptures of sea bass showed fish remaining near or returning to sites over periods of 30-78 days. At the Big D Wreck adjacent to the CBBT a sea bass recaptured after 32 DAL was then recaptured again at the site after 78 DAL. At the Bridge Tunnel's Sea Gull Fishing Pier a bass recaptured after 6

DAL was then again caught at the pier after 30 DAL from its initial tagging in mid-July. There were numerous double recaptures of sea bass at the Sea Gull Pier showing similar patterns of short-term "site fidelity."

Cobia

Cobia tagging and cobia recaptures were increased in 2006 over previous years. One of the highest years for recaptures of adult fish, 2006 documented recaptures of fish returning to Chesapeake Bay one, two, four, and five years after being tagged.

Tag return data continue to document that a significant portion of sexually mature fish return to Chesapeake Bay waters, possibly annually, or at least once, or possibly multiple times over periods of 1-5 years. Spawning has been documented to occur during summer months in the lower Bay therefore the bay serves both as a nursery area, juvenile grow-out area, and major forage area for cobia moving from Virginia to Florida's east coast.

Indirectly associated with the tagging program, during May-June 2006 nearly 160 juvenile cobia (17-21 inches TL) were released at VIMS from the Institute's Finfish Aquaculture Facility. The purpose of the tagged fish release was to determine if the fishes learned to forage on their own and would ultimately move into the lower bay. Forty recaptures (25%) showed the fish quickly dispersed and were in apparent good condition when recaptured. To check tag retention 27 juveniles were double tagged. Five double tagged fish were recaptured over periods of 10-48 days post tagging with all retaining both tags.

During 2006 there were two more records of bay-tagged cobia being recaptured off Florida's east coast, bringing the total of such events to five since 1998.

A 40 inch cobia tagged in August 2001 off the Sandbridge Ocean Front was recaptured off Chincoteague in August 2006 (reported as 45 inches TL).

A 29 inch cobia tagged June 24, 2006, at the Inner Middle Ground Shoal in the area of the CBBT, moved up the bay, being recaptured only 7 days later at York Spit off the mouth of the York River.

A 39 inch cobia tagged June 20, 2006, at Smith Island Inlet near the southern end of the Eastern Shore Barrie Islands was recaptured 9 days later just inside the bay at Inner Middle Ground Shoal.

A 52 inch cobia tagged in July 2004 at Fishermen's Island was recaptured in July 2006 at York Spit (reported as 58 inches TL).

Of 24 adult cobia recaptures during 2006, 8 of the fish were released again, four with their tags in place.

Flounder

Tagging effort on summer flounder during 2006 slightly exceeded that in 2005 with approximately 6,100 and 6,200 flounder tagged during the years, respectively. Recaptures during 2006 were nearly 800 fish, the highest results since the species was initially targeted in 2000.

Within-year site fidelity patterns were observed as in past years at structure sites (fishing piers and bridge-tunnel complexes). As in 2005, for the Gloucester Point Fishing Pier (197 recaptures) and Hampton Roads Bridge Tunnel (139 recaptures), single recaptures showed 20-40% of recaptured flounder still at, or having returned to, their respective tagging locations 1-2 weeks following release. Again as in 2005, both sites also exhibited 18-30 recaptures where the flounder were still associated with their respective tagging sites after periods of 21-30 days and 31-50 days at large. At each site, 3 and 14 recaptures, respectively, occurred for flounder associated again with their respective tag sites following 71-100 days post tagging.

At the Gloucester Point Fishing Pier and the bridge tunnel there were 5 and 7 multiple flounder recaptures, respectively. At the fishing pier 3 multiple recaptures occurred over short periods of 6-10 days post tagging while the other 2 events occurred 21-33 days post tagging. At the bridge tunnel there were longer multiple recapture periods for flounder remaining associated with the structure. There were 4 double recaptures of fish remaining associated with the site for periods of 54-119 days post tagging. Three triple recaptures at the site occurred over periods of 34-69 days post tagging.

Year to year returns of flounder to the general site where they were tagged the previous year (2005) were again documented during 2006 at favorite flounder fishing sites. The most significant number of such events were observed at the Hampton Roads Bridge Tunnel (22 returns) and the Chesapeake Bay Bridge Tunnel (10 returns). The rather broad area of Chincoteague Inlet to Ocean City, MD accounted for 6 year-to-year recapture records. During 2006 the Gloucester Point Fishing Pier had 4 recaptures of flounder tagged at the site in 2005.

Coastal movement patterns of flounder were similar in 2006 to those documented since 2000-2001. Examples occurred where flounder tagged in Virginia bay and inshore waters during 2004 and 2005 moved onto the continental shelf and were ultimately recaptured off, or along New Jersey beaches and inlets, Long Island, NY, and off Point Judith, RI. The latter recapture was of a flounder tagged inside Chincoteague Inlet in May 2005 and set a new program record for movement Virginia-tagged flounder to more northern waters. Flounder tagged in Chesapeake Bay during 2004 or 2005 were also recaptured during 2006 offshore of Chincoteague, offshore the area from Virginia Beach to the North Carolina Outer Banks, and inside North Carolina inlets and sounds.

Gray Triggerfish

Most tagging, and recaptures, occurred at the Chesapeake Bay Bridge Tunnel with most recapture periods ranging from 7-36 days. There were six multiple recapture events, including one triple recapture, the fish in the latter case being at large 19, 30, and finally a total of 54 days.

Red Drum

Tagging effort for red drum in 2006 was 33% and 45% greater, respectively, than during the previous two best tagging years (2002 = 2,730 drum, 2003 = 2,251 drum). Given that at the end of 2006 the program's total red drum tagging effort was about 14,000 fish (1995-2006), in 2006 trained anglers were responsible for tagging 29% of all red drum tagged during the 12 year history of the tagging program.

Among important things documented in 2006 was the relative abundance of drum year classes entering the bay. The size distribution of red drum tagged during the year indicated that even some fish less than one year old (around 7-12 inches TL) were present. The greatest number of sub-adult fish (called "puppy drum," by many VA-NC anglers) was one year old fish (about 13-18 inches TL).

However, the fishery was also bolstered by small but consistent numbers of two year olds (around 20-26 inches TL), and even a few three year old fish (27-30 inches TL). Older, larger year classes were also tagged during the year (around 300 fish approximately 30-55 inches TL). The broad mix of red drum year classes in Virginia waters during the year provides strong supporting evidence that in 2006 the portion of the red drum stock using Virginia-North Carolina waters was in relatively good condition.

Tagging of sub-adult red drum in power plant warm-water discharge areas provided data on the length of time such areas hold these fish. With good numbers of drum tagged at the York River power plant's canal jetties during fall/early winter 2006, 6-12 recaptures over three distinct "times-at-large" showed tagged drum still in the canal area after 11-20, 21-40, and 41-60 days post tagging.

While the power plants typically retain tagged drum for various periods during winter into early spring months, small numbers of sub-adult drum tagged during fall 2005 and fall 2006, and occasionally during early spring 2006, moved away from the two plants. Some drum tagged at the York River power station canal (the York River Hot Ditch) during fall 2005 were recaptured in late winter-spring 2006 near the mouth of the York River (Goodwin Islands) and down the bay, e.g., in the lower James River, in Hampton Roads, and inside Rudee Inlet.

Among sub-adult drum tagged during fall 2006 at the York River Hot Ditch jetties, some fish also moved out of the canal in relatively short periods post tagging and were recaptured in lower bay locations. Such recaptures occurred approximately 16-40 days post tagging at Poquoson Flats, Norfolk's Ocean View Beach, Lynnhaven Inlet, in the Cape Henry surf at the bay mouth, and inside Rudee Inlet. A drum tagged at the jetties on October 24, 2006, was recaptured 21 days post tagging (in mid-November 2006) at the Avon Fishing Pier along the ocean beach north of Cape Hatteras, NC.

Some sub-adult drum tagged during fall 2005 and winter 2005-2006 in the Elizabeth River Hot Ditch area were ultimately recaptured during summer-fall 2006 in the lower James River, at the Monitor Merrimac Bridge Tunnel, at Fort Monroe near the Hampton Roads Bridge Tunnel, and across the bay on Plantation Flats (off the town of Cape Charles). Similar patterns have been observed in previous years.

From drum tagged inside the lower bay and Rudee Inlet, recaptures occurred during late summer through fall at locations outside of the bay, i.e., along the North Carolina Outer Banks beaches, at Oregon Inlet, into middle to northern areas of the western shore of Pamlico Sound, and further south to Core and Bogue Sounds in protected waters behind Cape Lookout. Such fish were often recaptured in surprisingly short post-tagging times (3-30 days or 30-45 days post tagging). These recaptures indicate the tagged fish were traveling minimum straight-line distances of 50-100+ miles. Therefore minimum straight-line movement rates ranged from around 1-12 miles per day. In a few cases, unusually rapid movement appears to have occurred, i.e., the rates being upwards of 15-20 miles per day.

Results of drum movement from Rudee Inlet waters to the beach areas of Corolla to Oregon Inlet, NC, and areas further south from Avon-Hatteras (and inside Pamlico Sound), provided more detail about the episodic movement patterns of the fish. Of drum tagged during September-October inside Rudee, some tagged fish moved out of the inlet and were recaptured at points from Corolla to Oregon Inlet, NC, only 2-14 days after being tagged. Simultaneously, fish tagged during the same period continued to be recaptured inside the inlet over periods of 1-35 days post tagging.

Similarly, other drum tagged in the inlet moved out of the inlet and were recaptured over periods 6-35 days post tagging in waters even further south. Tagged during September-October, the fish were subsequently recaptured inside Pamlico Sound (at points on the sound's western shore and in its more southern areas) and along the ocean beaches from Avon to Hatteras, NC. During the same period, drum tagged inside Rudee continued being recaptured in Rudee's protected waters on a regular basis.

From over 15 years of tagging in North Carolina, only a small number of records exists of large drum tagged in North Carolina being recaptured in Virginia waters. Data on such movements were enhanced by one additional tag return in May 2006. Rob Collins, a long-time Virginia tagger, caught a red drum (41 inch TL/40 inch FL) on May 24, 2006, off Fisherman's Island (at the southern end of the Eastern Shore barrier islands). The 41.5 inch TL drum had been tagged off the fishing pier at Avon, North Carolina, on November 10, 2005 (165 days prior).

Four recaptures of VA-tagged adult drum from North Carolina waters are now documented in the tagging database. With just over 300 large drum tagged during 2006 in Virginia, more evidence of the timing and duration of the southern migration of the large fish should gradually accumulate.

Tag Retention Field Trials on Red Drum--Results from double-tagged drum field trials will provide insight on T-bar tag retention rates and help determine if there is a better tag for use on sub-adult drum. The small percentage of sub-adult drum recaptures at periods greater than 95 days post tagging indicate that over longer periods retention problems may be occurring with T-bar tags. Limited double tagging of sub-adult drum occurred during 2006, and such efforts will increase in 2007.

The problem has been documented as possibly a very serious one from aquaculture facility holding trials of double tagged red drum in South Carolina (T. Smith, W. Jenkins, and M. Denson. 1997. Overview of an Experimental Stock Enhancement Program for Red drum in South Carolina. Bulletin of the Natural Resources Institute, Aquaculture Supplement 3:109-115). Small drum were tagged with a T-bar tag at the base of the dorsal fin and also with an abdominal anchor tag just behind the pectoral fin. Over the first two months of the trial, retention rates of the abdominal tag remained constant at 100% while the retention rate in T-bar tags dropped to 84%. Retention rates of both tags largely remained unchanged over the next 3-7 months. However after 7 months, retention rates of the T-bar tag dropped sharply. At the end of the 14 month study, the mean T-bar tag retention rate was only 17%, statistically lower than that for the abdominal tag (100%).

During 2006, through discussions at Tagging Training Workshops and placing posters at boat ramps, marinas and tackle shops (see addendum), awareness increased among taggers and their angling associates regarding particularly valuable data which might be acquired on red drum if anglers would think ahead towards setting up possible multiple recapture events. This requires being prepared to quickly

record the fish's tag number when it is captured via a note or by keying it into one's cell phone. Then the fish, if in good condition, can be released with its tag in place. The educational process seems to be working. Of 337 recaptures of sub-adult drum (13-24 inches) in 2006, 171 (51%) were reported in which the fish were released still carrying their tags. Twelve of the drum had been at large for 100-180 days since being tagged.

Sheepshead

Because of the lack of recaptures in 2006, efforts will be made to use a different style tag on the species during 2007.

Spadefish

Tagging of spadefish increased somewhat in 2006 compared to 2005 but recaptures remained at low levels (only 28). Tagging was concentrated at the Chesapeake Light Tower (approximately 13 miles offshore of Virginia Beach). Recaptures typically occurred within 28-60 days of tagging with the fish still at the Tower. There were two longer period recaptures. A spadefish tagged in the Bay (at Wolf Trap Light) in June 2005 was recaptured one year later to the day, again at the same location. A fish tagged in September 2005 at the Tiger Wreck southeast of Rudee Inlet was recaptured inAugust 2006 (325 days at large) at the same wreck, the fish likely having moved during winter to more southern waters.

Speckled Trout

Speckled trout recapture data continue to be significant. Fish tagged in the lower bay, as well as in Lynnhaven and Rudee Inlets, are now being documented to move significant distances during fall to North Carolina waters. Even more interesting, as in 2004 and 2005, some fish are moving over 100-235 miles (approximate straight-line distances) along the Outer Bank beaches and into North Carolina sounds over relatively short time periods.

Approximate calculations of minimum net movement per day indicate that fish are capable of covering such distances sometimes in less than a week's time, while others make the trip in 30 to 60 days. This translates into minimum net movement from Virginia bay and Rudee Inlet tagging sites of 1-8 miles per day.

Reference was made in the Overview section of this proposal regarding efforts to double tag speckled trout to examine possible T-bar tag retention issues. With only a small number of recaptures of double- tagged trout being reported to date, it is too early to know if, or how serious the problem might be. To date, nearly all recaptures of double-tagged trout show both tags in the fish. However, the trend may be changing. Recapture of a double-tagged trout released at the Hampton Roads Bridge Tunnel in late January 2007 occurred May 4, 2007, along the Eastern Shore seaside marshes in the Machipongo River (near Willis Wharf); the fish had lost its T-bar tag after being at large only 3.3 months. In addition, a recapture reported May 30, 2007, in the Ware River (Mobjack Bay) of a trout double-tagged in the same river in October 2006 documented that the fish had lost its T-bar tag sometime during its 7.5 months at large.

Tautog

Numbers of tagged tautog increased significantly from 2005 to 2006 (over 2,000 fish tagged). Recaptures likewise increased. Most recaptures were fish both tagged in the bay and at offshore wrecks and other structure sites.

Strong patterns of "site fidelity" continue to be supported by recapture results. The data continue to document no significant migration of Virginia tagged fish to waters north of Delaware. Over 12 years of tagging the species in Virginia, there have been only two instances where tautog tagged in Virginia waters (the bay in both cases) were recaptured north of the border of the state. The two records document one fish moving from the bay to the inlet jetties at Ocean City, MD. The other bay-tagged fish moved to the Harbor of Refuge breakwater at the entrance to Delaware Bay. As referenced previously, tagging results for tautog are encouraging researchers to re-think management options for the species.

Numerous double-recapture records were again obtained during 2006, some showing the same fish captured twice at its tagging site over approximately 300-600 days. The majority of recaptures during 2005 were for fish 10-15 inches TL with times at large of 200 to just over 350 days.

2008 Project Needs and Objectives

This project is multi-dimensional, contributing to both research and management data needs as well as including a public education component. The tagging program has carefully selected targeted species that are not typically the subject of intensive tagging studies in Chesapeake Bay waters. In the case of flounder, the program is collecting current and comprehensive data on how the species uses bay and Eastern Shore habitats. With more data than some earlier studies, the tagging program's flounder results are generally supporting findings of earlier VIMS flounder tagging research (in the late 1980s and mid-1990s) and that other researchers working to understand the species' seasonal and year-to-year migration patterns in mid-Atlantic waters (see R. Kraus and J. Musick. 2001. A Brief Interpretation of Summer Flounder, *Paralichthys dentatus*, Movements and Stock Structure with New Tagging Data on Juveniles. Marine Fisheries Review 63 (3):1-6).

As indicated at the beginning of the proposal, the tagging program currently directs trained angler taggers to focus tagging on red drum, black drum, cobia, speckled trout, summer flounder, black sea bass, spadefish, tautog, sheepshead, and gray triggerfish.

Overall program objectives focus on teaching anglers to carry on quality tagging on select target species and to maintain, as well as submit in a timely fashion, accurate tagging data. The program strives to produce data which helps expand understanding of (1) target species' seasonal movements within years, and between years, as the fish move into and then leave Chesapeake Bay and nearshore waters (all target species but tautog are generally seasonal visitors to state waters), (2) within-year movement and habitat use patterns of target species using bay and offshore waters, (3) movement times and rates of target species between Virginia waters and coastal waters both north and south, (4) the year classes (fish sizes) of target species contributing to Virginia's marine recreational fisheries and their temporal dynamics in the fishery, (5) growth data on target species, (6) relative numbers and sizes of fish released by anglers under fishery size and bag limit regulations, and (7) feedback to anglers, based on hard data,

about the relative survival rates of released fish when handled properly, including how such fish ultimately contribute to anglers' catches both short and long-term.

The public education component of the VGFTP has three important aspects: (1) fostering of public interest in conservation and resource management by direct angler involvement in the program, (2) communication regarding the science of studying fisheries resources – how the process works, the types of information needed, and how anglers can contribute to the process, and (3) educating the public about resource needs, the benefits of catch-and-release fishing, and fish handling techniques to improve survival of released fish.

Approach

The program limits the number of trained, angler taggers participating at any one time in the program. This enables better management and tracking of tagging material needs, allows keeping up with data processing needs, and helps keep response time reasonable regarding sending fish tagging information and rewards to those reporting catches of tagged fish. Volunteers are enrolled on a "first-come, first-served" basis during December and January. At the end of the year, veteran taggers are required to re-register to continue with the program in the coming year.

Four training sessions are held in February to early March each year to update taggers on current results and to train those new to the program. All new enrollees must attend a training session. During the two hour session, they receive information about program objectives, proper ways to reduce catching and handling stress in fish to be tagged, proper tagging procedures, and required recording and submission of tagged fish data. After completing a practical exercise where they satisfactorily anchor tags in freshly iced fish specimens, new taggers receive their tagging equipment.

Veteran taggers are not required to annually attend training workshops, although they are invited to do so to not only become updated on results from their tagging efforts, but also to share ideas and tips regarding maintaining accurate tagging data records and efficient ways to handle and tag various target species. Every training workshop includes experienced taggers interacting with new comers.

Persons recapturing and reporting a tagged fish receive a letter thanking them for their effort and detailing information about the fish they caught. They have the option to receive a program hat, T-shirt, or other reward item for reporting the recapture. Taggers receive a letter summarizing the original tagging and detailing the recapture.

Volunteer taggers receive a "Conservation Award" certificate for tagging a minimum of 25 fish during the year. Anglers having the greatest number of tagged fish records by target species in a given year are awarded with a "To Tagger" plaque. The angler tagging the most fish overall also receives an award plaque as does the angler whose tagging effort results in the greatest number of overall recaptures during the year.

The program remains alert to the need to conduct tag retention studies on target species and to experiment with various tag designs for the program's mix of target species.

Expected Benefits

1. Generation of information and data on recreationally important fish species, as detailed in the section on "Needs and Objectives". Standing alone much of this information may not be sufficient to generate actions or decisions on resource-related issues, but it may point to potential problems, may point out new or previously unknown possibilities warranting targeted scientific work, may bolster, verify, bring into question, help evaluate current research and management regimes.

2. The opportunity to tag large numbers of fish on short notice with an experienced group of trained taggers. This situation has occurred numerous times, especially with regard to juvenile and adult red drum, cobia, summer flounder, speckled trout, spadefish, sheepshead, and tautog. During 2006 strong year classes of sub-adult and adult red drum resulted on the program able to tag more drum than any previous year in the 12 year history of the program.

3. Better communication, understanding and cooperation among scientists, managers, and anglers regarding tagging programs. Better information to the public about tagging efforts, proper fish handling techniques, and the role and importance of catch-and-release fishing in the recreational fishery.

4. An annual report summarizing the tag program results. Annual report available on website at VIMS.

5. A database available for fisheries managers, scientists and institutions.

Location

The project is located in Virginia and the taggers are Virginia recreational fishermen. All species of fish targeted by the VGFTP are recreationally important and are found seasonally in the Chesapeake Bay. Tagging efforts will occur in the Chesapeake Bay and adjacent offshore waters.

Annual Report

The annual report for year 2006 was completed in May 2007 and a copy provided to the Recreational Fishing Advisory Board and VMRC staff. Program participants and others in the angling community are provided hard copies of such reports, if requested. Since 2002, annual reports for the program have been available on VIMS web site www.vims.edu/adv/recreation/tag/index. A link to the VIMS site is provided on the VMRC web site as well.

Budget (follows as a separate page)