

SEA TURTLE STRANDING AND SALVAGE NETWORK - A REVIEW

The objectives of Sea Turtle Stranding and Salvage Network (STSSN) have evolved from documenting mortalities to serving as a monitoring/enforcement tool for management. Costs associated with the STSSN have increased inordinately. The only funding of the program before 1995, other than for the national STSSN coordinator, was for a 3 year evaluation of strandings pre- and post- TEDs in 4 representative areas throughout the southeast U.S. and Gulf of Mexico (Thompson and Martinez, 1990); these contracts were supported with SEFSC base monies and by MARFIN grants (Table 1). Since 1995 STSSN contracts have been funded with RPS monies: \$180.5K in FY 1995; \$311K in FY 1996, \$300K in FY 1997, and \$382,000 in FY 1998. In FY 1999 the STSSN was partially¹ funded by \$290.8K in RPS monies, all of which was transferred to base for these activities.

In FY 2000, for the first time since the RPS monies became available, the sea turtle RPS Panel did not recommend full funding for the STSSN². The sea turtle RPS Panel recommendation for FY2000 does not include either the \$104.2K requested by the SEFSC or the \$50K requested by SERO, in addition to monies transferred to base, to fully support the STSSN weekly systematic surveys in the southeast. Thus, the agency is forced to re-evaluate its need for the STSSN as currently implemented. The primary justification for the current STSSN is to support management as a monitoring/enforcement tool. It is a census. The other functions of the STSSN can be accomplished with a much lower effort and can be accomplished with existing dollars. Management must determine whether a census in all or some areas is necessary and on what time scale, and, if additional funds are needed, appeal the panel's recommendations to Andy Rosenberg. The purpose of this paper is to review the STSSN, highlight issues, and identify the decisions that need to be made.

¹Note that the RPS panel recommended the full amount that the SEFSC requested. However, the amount that the SEFSC requested was about 50% of the total needed to conduct weekly systematic surveys throughout the s.e. U.S. The lesser amount was requested because the SEFSC anticipated cutting back the stranding network as it recognized that the use of the data as a proxy for mortality estimates was questionable. The basis for cutting back the network was to be based on an analysis of the STSSN by Terry Henwood and Arvind Shah, using \$13K of FY 1998 RPS monies allotted for this purpose. The amount received was sufficient to fund the network for 7 months, July 1, 1999-January 30, 2000.

²The SEFSC requested the full amount to support the program for 12 months because it had yet to receive the Henwood and Shah report. Since the submission of the proposal the 1999 unpublished report has been produced and it highlights problems with the interpretation of the STSSN data and identifies some areas where little information is being gained, indicating that the network could be scaled back.

The Sea Turtle Stranding and Salvage Network (STSSN) documents dead or injured sea turtles along the coasts of the eastern United States (Schroeder, 1989). The STSSN relies on a trained group of volunteers, including state and federal employees and private individuals, to collect basic biological data on each turtle located. Each animal is identified to species, the condition or state of decomposition is determined, standard carapace measurements are taken, and any obvious wounds, injuries or abnormalities are noted and described. Volunteers who have received additional training may also perform necropsies on a carcass to determine the general state of health of the animal prior to death, determine sex, and locate any obvious internal abnormalities. Data are recorded on standardized report forms which are submitted first to a state coordinator and then to the national STSSN coordinator at the National Marine Fisheries Service Southeast Fisheries Science Center, Miami, Florida.

The STSSN was established in 1980 to collect data on injured or dead sea turtles which washed up on s.e. U.S. and Gulf of Mexico beaches. It resulted from a recommendation of the First World Conference on Sea Turtle Biology, Conservation and Management convened in October 1979 at which NMFS agreed to implement a network to archive data on sea turtle strandings at the SEF[S]C. In 1986, the SEF[S]C decided that in order to develop indices of mortality, they needed to implement systematic sampling of selected sampling areas for stranded sea turtles (Thompson and Martinez, 1990). The concept of mortality indices was predicated on the assumption that either all carcasses were reported or that a known proportion of total strandings were reported, that effort was reported, and that the proportion of animals stranding within an area is a constant in time. This program was initiated in March 1987 and was phased in through 1987 and 1988 within selected areas of the southeast U.S. coast (zones 17-21, 4-5, 28-29, 31-32; Fig. 1) and extended through 1989. Mortality per unit of effort (MPUE), which is defined as the number of strandings reported per km per month, was calculated. The authors found that mortality as represented by numbers of animals stranding, was highly seasonal and that the magnitude of the index of mortality was determined by the causes of mortality, the abundance of turtles, and the prevailing seasonal conditions which influenced whether carcasses washed up for detection - none of which could be quantified. The authors found that while the magnitude of mortality recorded during the systematic surveys differed from that recorded in years before the surveys began and after it ended, the patterns of mortality were similar, leading them to conclude that the voluntary stranding network, where it existed, provided excellent coverage and that most strandings were reported and recorded through the voluntary network.

Since then the STSSN has responded to strandings on much of the beaches of the Southeast U.S., but before 1995 effort levels, seasonality of effort, etc. varied greatly. As a result of the jeopardy decision of the November 14, 1994 Biological Opinion on the shrimp fishery, resolution of litigation (CMC and TSA/NFI *vs* Brown), the agency's resulting Emergency Response Plan (60 FR 19885, April 21, 1995; 60 FR 52121, October 5, 1995), and a Congressional mandate³, starting with the 1995 shrimping season,

³Congress mandated NMFS to establish a standardized statistical sea turtle stranding network about FY 1995 (there remains some question about what was the first year as we were unable to track down the appropriations language for the early years) and reminded NMFS of this obligation in subsequent years' appropriations language (Table 2).

virtually all of the area was surveyed weekly and weekly reports which calculated strandings per unit effort surveyed by zone (SPUE) were distributed by the national STSSN coordinator. The necessary contracts were supported with RPS monies (Table 3). During 1995-1996 weekly strandings were compared to the Interim Take Limits established under the ERP for each zone and, depending on the level of strandings and their persistence in time, management actions may have been triggered. With the Biological Opinion issued on June 11, 1996, ITL's as defined by the ERP no longer were used to trigger management actions, but the weekly coverage of the beaches continued. In recent years, 1997-1998, Interim Stranding Limits (ISLs) determined by the Turtle Expert Working Group (TEWG, which also was mandated by the ERP) were used for guidance in determining excessive strandings levels, but they were not identified as a management trigger.

Despite the limitations (see below) researchers have used STSSN data to demonstrate a correlation between offshore shrimping effort/activity and strandings in Texas (Caillouet *et al.*, 1991, 1996; Magnuson *et al.*, 1990) and in South Carolina (Crowder *et al.*, 1995; Murphy and Hopkins-Murphy, 1989; Magnuson *et al.*, 1990) and have demonstrated the effect of TEDs on strandings (Crowder *et al.*, 1995; Royle and Crowder, unpublished ms.). The correlations, although significant, were not high. However, it was these correlations, in part, that led the National Research Council to conclude that incidental capture in shrimp trawls is the primary cause of mortality of a substantial numbers of sea turtles (Magnuson *et al.*, 1990).

Strandings and observer data were the supporting justification to require TEDs in two fisheries: the shrimp trawl fishery and the winter trawl fishery for summer flounder. Strandings data identified a need for special TED regulations during the northerly spring migration of leatherback turtles along the east coast and the leatherback contingency plan was developed (60 FR 47713, September 14, 1995); more recently strandings of leatherbacks off northeast Florida resulted in the requirement of TEDs using the leatherback modification for a 30 d period (64 FR 69416, December 13, 1999). Size frequency information from the strandings data base currently are being used to revise the minimum dimensions of TED openings. Strandings data also are used to monitor the effectiveness of tow time limits, used in lieu of TEDs, in a small area off the North Carolina coast. Proponents of a marine reserve off Padre Island, Texas, who wish to protect the newly established nesting population of Kemp's ridley, are using strandings data to show that, because of an increased number of stranded adult Kemp's ridleys on those beaches, a marine reserve is needed for the area.

Ostensibly strandings data are collected weekly to manage fishery/turtle interactions. Henwood and Shah (1995-unpublished report) concluded that there are major shortcomings in using strandings as a real-time management tool, but noted that the only viable alternative may be costly observer programs. Since the implementation of TEDs in both the shrimp fishery and the winter trawl fishery for summer flounder, strandings infrequently have been used for managing interactions. As a result of the ERP, special regulations were applied temporarily 5 times in two Shrimp Fishery Sea Turtle Conservation Areas

(SFSTCAs) during 1995 and 1996⁴. Strandings have been used to direct NMFS' enforcement activities, especially off Texas and Louisiana (G. Proulx, personal communication). Other than the shrimp trawl fishery and the winter trawl fishery for summer flounder off NC and VA, strandings rarely have been used by NMFS to manage fisheries known to take turtles (gill nets, fish trawls other than the summer flounder fishery, whelk trawls/dredges), the exception being the December 1999 closure of part of Pamlico Sound, N.C. to large mesh gill nets fished for southern flounder (64 FR 70196, December 16, 1999). For some fisheries, killed animals are not likely to strand (*e.g.*, pelagic longline fisheries).

Strandings data have been used for purposes other than to manage fishery interactions and a comprehensive list of information that can be obtained from strandings is given in Henwood and Shah (1999-unpublished report). Strandings are the source of samples for many ongoing studies, including the age and growth study which is critical to stock assessments of loggerhead and Kemp's ridleys. Salvaged carcasses are used in the study of the anatomy, physiology, toxicant and debris exposure, in life history studies of turtles, to determine the natal origin (subpopulation) of the animals, and for numerous student projects. Fresh carcasses are used to establish baselines for health assessment studies which are needed to evaluate any subsequent stranding event. One of the most valuable contributions of the STSSN is the recovery of tags from which migration and growth data are obtained. Strandings are the source of recovery of wire tags placed in wild Kemp's ridley hatchlings; this study will determine the duration of the pelagic stage of the species and will be used to validate ageing methodology.

As pointed out in the National Research Council, strandings data have several limitations (Magnuson *et al.*, 1990). Henwood and Shah (1995-unpublished report) also discuss the many factors that influence strandings rates. The database is not independent of the distribution of nearshore mortality factors and in the earlier years it was not independent of survey effort, which rarely was uniform or comprehensive. Thus the data are not appropriate for quantifying the distribution of sea turtles. Also, due to wind and current patterns and varying rates of decomposition, turtles may strand far from the source of mortality or may never strand and these factors may vary in time and space. Lastly, because of the apparent size selectivity of TEDs, the size distribution of stranded loggerhead and green turtles may not represent the size distribution of animals in the nearshore waters (Epperly and Teas, 1999). Therefore, strandings demonstrate only that mortalities have occurred. They may not be a reliable indicator of the number of mortalities that have occurred. And, significantly, the absence or low number of strandings does not imply that at-sea mortality, even of great magnitude, has not occurred (Epperly *et al.*, 1995). Thus, it is not clear what the results of strandings, including weekly systematic surveys, mean.

Strandings data cannot be used as an estimator of fishing mortality. The Turtle Expert Working Group attempted to use the strandings data set to construct a catch curve from which instantaneous rates of mortality could be estimated. Because of the high variability in the data resulting from natural variability in strandings and from cohort sizes and because of uncertainties associated with the interpretation of

⁴1995: once in Georgia, once in Georgia and South Carolina, and twice in Texas

1996: once in Georgia

strandings data, the TEWG was not confident in their mortality estimates and thus could not reliably model the Kemp's ridley population nor determine the in-water population size.

The cost of obtaining strandings information in the current manner is high. The estimated cost of the STSSN census in the southeast for FY 2000 is (Table 4). In FY 1999 RPS funds were transferred to base for three separate projects: \$128.8K to SEFSC to operate the STSSN for 7 months, \$50K to SEFSC (Galveston) for STSSN coverage on the upper Texas coast, and \$112K to SERO to support Section 6 activities, including the STSSN, in South Carolina and Georgia (Table 1). These monies still are available for FY 2000. In addition, for FY2000 SEFSC requested \$104.2K more to support the STSSN for a full 12 months and to support clerical assistance, and the SERO requested an additional \$50K to support Section 6 activities in North Carolina which previously were funded through the SEFSC (Table 4). The RPS sea turtle panel did not recommend funding the additional requests in full. Thus, because of lack of funding the agency is forced to re-evaluate its need for the STSSN as currently implemented - a need identified already and fulfilled by the Henwood and Shah (1999) report. Because strandings are somewhat predictable and distinct geographic and temporal patterns emerge (Henwood and Shah, 1999-unpublished report) and because the weekly censuses with questionable meaning appear no longer to be used by management, it may not be necessary to conduct the surveys in the future. If the STSSN no longer is needed as a real-time monitoring/enforcement tool, the other functions of the STSSN can be accomplished with a much lower effort and can be accomplished with existing dollars. Management must decide whether they want/need weekly systematic surveys throughout region.

If management decides they do not need weekly systematic surveys throughout the region, it may be valuable to continue the existing program in some areas where enforcement needs the data to direct their effort and not to continue the systematic surveys in other areas. It may be valuable to continue enhanced support in areas where fisheries activities other than shrimp trawling may account for a significant number of strandings (*e.g.*, North Carolina). In the past enforcement primarily has concentrated their efforts in the western Gulf of Mexico, an area where we would not be able to obtain the information without funding STSSN contracts. In other important areas, such as Florida, prior comparisons have shown that, due to the population density, most strandings would be reported without surveying the beaches weekly (Thompson and Martinez, 1990) and thus it may not be necessary to provide monies to support a systematic survey therein. This may be true, also for Georgia, South Carolina, and North Carolina, but because the presence of beachgoers is very seasonal in these areas, because the population density in the offseason is low, and because so many areas are remote, it may be necessary to continue supporting these states for some of their STSSN activities. This is particularly true of North Carolina which has the greatest amount of shoreline of the three, many fisheries, and very high number of strandings. The state has not made a commitment of funds to the network and it is questionable whether we would get the strandings data without supporting a NC STSSN contract. In contrast, both Georgia and South Carolina which have shorter coastlines, fewer fisheries, and fewer strandings have made substantial investments in their networks. It might be possible to scale back our financial commitments to these two states. In further contrast, the states of the northeast still operate their networks without federal funding. A possible funding scenario is given in Table 5.

One of our greatest obstacles in cutting back funding for the STSSN is the precedent we set by funding the states/contractors beginning in 1995; they have enhanced their networks and have come to rely on a stable source of funding. As a result of our reducing funding, they may refuse to provide data that they once supplied voluntarily. Because they are operating under USFWS jurisdiction (on land) and not NMFS' (in water) we have no leverage to require reporting. A second concern is Congress. They have been vocal in mandating a standardized statistical Sea Turtle Stranding Network (Table 2), but for the first time in 5 years this mandate does not appear in the appropriations language.

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Table 1. Funding History of Sea Turtle Stranding and Salvage Network in Southeast U.S.

Description	FMC	Amount
1987-1989 (~60% SEC Base and ~40% MARFIN)		
pre- and post-TED monitoring (in part TX, FL, GA, and SC)	SEC	~\$80,000.00
FY 1995 (RPS)		
S.E.U.S. Sea Turtle Stranding and Salvage Network (TX-NC)	SER	\$180,500.00
FY 1996 (RPS)		
Enhance sea turtle stranding and salvage network (TURT-MAND): directed research on fate of dead turtles at sea - currents, decomposition, abundance	SEC	\$150,000.00
Enhance sea turtle stranding and salvage network (96-ST-07): Improve coverage, accurate reporting, establishes NMFS-constituent working group	SEC	\$311,000.00
		\$461,000.00
FY 1997 (RPS)		
Implement sea turtle recovery plans through Sec. 6 agreements	SER	\$100,000.00
Sea turtle stranding and salvage network	SER	\$200,000.00
		\$300,000.00
FY 1998 (RPS)		
Sea turtle recovery plan implementation and STSSN support to Georgia and South Carolina	SER	\$112,000.00
Sea Turtle Stranding and Salvage Network	SEC	\$220,000.00
Sea Turtle Stranding and Salvage Network - upper Texas coast	SEC	\$50,000.00
		\$382,000.00
FY 1999 (all were transferred to base)		
Sea turtle recovery plan implementation and STSSN support to Georgia and South Carolina	SER	\$112,000.00
Sea Turtle Stranding and Salvage Network (7 months)	SEC	\$128,800.00

Sea Turtle Stranding and Salvage Network - upper Texas coast	SEC	\$50,000.00
		\$290,800.00

Table 2. Congressional Mandates for the Sea Turtle Stranding and Salvage Network

FY 1995 ? (Barbara and Therese were not able to provide copies of the language for these earlier years)

FY 1996 ?

In the FY 1997 appropriations language Congress reminded NMFS that “Despite the committee direction for the last 2 years, NMFS has yet to establish a standardized statistical Sea Turtle stranding network [Do it in consultation with industry and report back by November 15, 1997]”.

In the FY 1998 appropriations language Congress reminded NMFS “Despite the Committee’s direction for the last two years, NMFS has yet to establish a standardized statistical Sea Turtle Stranding Network. The Committee is adamant and directs NMFS to immediately implement the Committee’s direction using available funds and in direct consultation with the commercial fishing industry and conservation groups, and report back to the Committee no later than November 15, 1997 of its progress in meeting this directive.

In FY 1999, “The committee continues to concur with the direction included in the conference report accompanying the FY98 Act, and directs NMFS and the Secretary of Commerce to comply with such direction.”

In the FY 2000 report there no longer is language directing NMFS to conduct standardized statistical Sea Turtle Stranding and Salvate Network surveys.

Table 3. RPS contracts, 1996-1999. Contracts for FY 1995, 1996 and 1998 were for 12 months. Contracts for FY 1997 were for 9 months. FY 1999 contracts all were for 7 months, except McNeese State's which was for 4 months.

<u>Contractor</u>	<u>1995</u>	<u>1996</u>	<u>1997</u>	<u>1998</u>	<u>1999</u>
University of Texas, Pan American	\$10,000	\$10,300	\$8,000	\$12,150	\$6,875
Padre Island National Seashore	\$23,000	\$25,000	\$19,500	\$27,000	\$16,050
University of Texas, Port Aransas	\$10,000	\$15,000	\$11,091	\$16,000	\$9,860
McNeese State University	\$20,500	\$15,900	\$10,912	\$21,757	\$5,250
Aquarium of the Americas		\$10,500	\$6,000	\$8,653	
Gulf Islands National Seashore	\$14,000	\$9,700	\$8,100	\$11,200	\$6,550
University of South Alabama		\$14,900	\$11,187	\$19,811	\$11,670
Florida Fish & Wildlife Conservation Commission	\$30,000	\$49,663	\$37,099	\$48,921	\$28,537
North Carolina Wildlife Resources Commission	\$19,500	\$49,800	\$36,629	\$43,125	\$27,708
Section 6 Agreements to Georgia and South Carolina ?		\$100,000	\$100,000	\$100,000	\$100,000

Table 3. Budget for FY2000 Sea Turtle Stranding and Salvage Network Systematic Weekly Surveys. A. SEFSC Contracts, B. SEFSC Galveston Laboratory, C. SERO Section 6 Agreements.

A. SEFSC Contracts		FY00 - FY01 Request (\$K)
Total Contracts		\$ 164.8
University of Texas, Pan American	12.0	
Padre Island National Seashore	29.2	
University Of Texas, Port Aransas	18.8	
McNeese State University	15.8	
Aquarium of the Americas	7.0	
Gulf Islands National Seashore	11.8	
University of South Alabama	22.1	
Florida Fish & Wildlife Conservation Commission	48.1	
Temporary/Contract Employee (GS-6 equivalent)		\$ 52.2
Equipment, supplies (computer for new hire, software, necropsy supplies, film/developing, shipping, etc.)		\$ 5.0
Travel (Annual Sea Turtle Symposium, Northeast Region meeting)		\$ 2.0
Invitational Travel to Annual Meeting (state coordinators, contractors)		\$ 9.0
TOTAL		\$ 233.0
Less amt. transferred to base in FY 1999 (includes \$13.8K ovhd)		\$ (128.8)
TOTAL ADDITIONAL REQUEST		\$ 104.2

B. SEFSC, Galveston Laboratory		\$ 50.00
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C. SERO Section 6 Agreements		\$
North Carolina	\$50.00	
South Carolina	\$50.00	
Georgia	\$50.00	
Less Amount Transferred to Base in FY99 (includes \$12K ovhd)		\$ (112.00)

TOTAL ADDITIONAL REQUEST		\$	50.00
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Table 5. Proposed Funding Scenario for FY2000 using existing RPS base monies, expected current year increases transferred to base, and

Contractor	Source of Funds	Total STSSN Request in FY2000	Proposed Allocation of SEC Base Monies	Proposed Allocation of SEC RPS FY2000 monies	Proposed Allocation of SER Base Monies
University of Texas, Pan American	SEC RPS base	\$12.0	\$10.2		
Padre Island National Seashore	SEC RPS base	\$29.2	\$24.8		
University of Texas, Port Aransas	SEC RPS base	\$18.8	\$16.0		
Galveston	SEC RPS base	\$50.0	\$50.0		
McNeese State	SEC RPS base	\$15.8	\$13.4		
Aquarium of the Americas	SEC RPS base	\$7.0			
Gulf Islands National Seashore	SEC RPS base	\$11.8			
University of South Alabama	SEC RPS base	\$22.1			
Florida Fish & Wildlife Conserv. Comm.	SEC RPS base	\$48.1	\$18.0	\$16.9	
Georgia DNR	SER RPS base	\$50.0			\$50.0
South Carolina MRD	SER RPS base	\$50.0			\$50.0
North Carolina WRC	SER RPS base	\$50.0			\$50.0
SEC Costs					
Contractor (GS-6 equiv.)	SEC RPS base	\$40.6	\$40.6		
Equipment and Supplies	SEC RPS base	\$5.0	\$3.8		
National Coordinator travel	SEC RPS base	\$2.0	\$2.0		
Invit.Travel to Annual Coordinator's Meeting	SEC RPS base	\$9.0			
National STSSN Coordinator	SEC base	\$49.5	\$49.5		
SER Costs					
overhead (per FY99 proposal)		\$12.0			\$12.0
Total Costs		\$482.9	\$228.3	\$16.9	\$162.0
Available (\$K):					
SER RPS Base, FY99 transfer	\$112.0				
SER RPS Base, FY2000 current year increase	\$50.0				
SEC RPS Base, FY99 transfer	\$128.8				
SEC RPS Base, Galveston FY99 transfer	\$50.0				
SEC Base	\$49.5				
SEC RPS FY2000 annual funds	\$16.9				
Total Available	\$407.2				

FY2000 RPS annual allocation.

Figure 1. STSSN Zones.

