

National Fish and Wildlife Foundation

Final Programmatic Report

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Project Name and Number: Enhance Right Whale Disentanglement Response (GA) (2006-0093-005)

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1) Summary

This project resulted in numerous improvements to right whale disentanglement response capabilities in the Southeast U.S. Infrastructure was improved with funding for new equipment, supplies and operating expenses. Staff experience was improved thanks to extensive on-water training (e.g. sixty vessel cruises were conducted during 2007-2008, including eleven entanglement/health assessment responses). As an additional benefit, genetics samples were collected from 73% of documented right whale calves, contributing to ongoing genetics and population demographics research. Lastly, disentanglement response capabilities were improved due to enhanced cooperation among the Georgia Department of Natural Resources (GDNR), Florida Fish and Wildlife Research Institute (FWRI), National Marine Fisheries Service (NMFS), and other right whale conservation groups.

2) Introduction

The objectives of this project were to: 1) enhance right whale disentanglement response in the Southeast U.S., 2) contribute to right whale demographics and population health research by collecting right whale biopsy samples and 3) enhance right whale research and management in the Southeast U.S. through improved inter-agency collaboration.

3) Methods

a) **Disentanglement Response and Readiness** were enhanced as follows:

- i) Existing supplies and equipment were maintained, inventoried and tested prior to the calving season; needed equipment and supplies were purchased and organized along with existing equipment and supplies,
- ii) GDNR, FWRI and NMFS staff participated in a preseason disentanglement refresher during November 2007 and 2008, coordinated by NMFS and the Provincetown Center for Coastal Studies (PCCS) and hosted at the GDNR coastal headquarters in Brunswick, GA,
- iii) Equipment and gear were utilized and maintained throughout the calving season (Dec. 1-March 31),
- iv) GDNR, FWRI, NMFS, PCCS and aerial survey staff maintained lines of

communication regarding sightings of entangled and/or injured whales, previously entangled whales, response plans, etc.

- b) **Right Whale Entangled Whale Response** was conducted by GDNR, FWRI and NMFS staff, working in close consultation with NMFS and PCCS staff and following Atlantic Large Whale Disentanglement Network (ALWDN) protocols. Responses to entangled whales varied according to numerous variables, but methods generally involved the following:
 - i) Aerial survey locates an entangled or injured whale and forward information to first responders,
 - ii) Vessel-based team transit to the location of an entangled or injured whale,
 - iii) First responders verify and photo-document the source of the entanglement,
 - iv) Responders consult with NMFS and PCCS to determine if further intervention is needed,
 - v) Responders proceed with telemetry attachment, gear removal, or similar intervention if warranted,
 - vi) Responders cooperate with NMFS, PCCS and other staff if more intensive measures are required subsequently, and
 - vii) Photos, gear and other data are compiled and submitted to NMFS and/or PCCS upon completion.

- c) **Right Whale Biopsy Sampling** was conducted by GDNR, FWRI, NMFS and contract staff working under the direct supervision of a permitted researcher. Biopsy methods generally involved the following:
 - i) An aerial survey team locates a target whale (i.e. a whale that has not been previously sampled or whale that needs a health assessment sample) and forward information to a vessel-based biopsy team,
 - ii) Vessel crew transits to the locations and assesses the whale's identity based upon its callosity pattern, scars and other unique characteristics,
 - iii) A photographer photo-documents the target whale(s) such that the whale's identity can be confirmed subsequently biologists at the New England Aquarium (NEAq),
 - iv) The vessel approaches the whale to be sampled at idle speed and within sufficient distance to allow a biologist to collect a skin/blubber sample from the whale's flank with a biopsy dart propelled by a crossbow or compound bow,
 - v) The floating dart is retrieved, skin/blubber is extracted from the biopsy tip, and the sample is processed accordingly.

4) Results

a) Outputs

- i) The short-term results of the project are outlined in the logic framework table (Table 3.) A summary of the outputs is as follows:
 - (1) Funds were used by GDNR and FWRI to pay for equipment, supplies and operating expenses that are necessary for effective and safe disentanglement response. The resulting improvements to infrastructure facilitated entanglement/health assessment response, right whale biopsy sample collection and improved cooperation among GDNR, FWRI and NMFS biologists. GDNR, FWRI and NMFS staff conducted a total of sixty vessel cruises during the project period. Of those, eight entanglement and/or health assessment responses were conducted involving a total of eleven right whales (Fig. 1, Table 4):

- (a) *Right Whale BK01SEUS06*—This whale had previously been documented in the Bay of Fundy during Sept 2006 and was the subject of a first response and unsuccessful follow-up disentanglement attempt on Jan 15-16, 2007. The whale was subsequently disentangled off of North Carolina.
 - (b) *Right Whale 3346 “Kingfisher”*—Kingfisher has been entangled around its right pectoral fin since 2004 and was documented four times by vessel during 2007-2008. A biopsy sample was collected for health assessment on Feb 2, 2008 and high quality photographs and thermal images of the whale’s entanglement were collected on Feb. 15, 2008.
 - (c) *Right Whale 3333*—This whale was documented by the NEAq aerial survey team on Jan 29, 2008. GDNR and FWRI vessels responded to the location, but the whale disappeared shortly upon the teams’ arrival. No other responses were conducted.
 - (d) *Right Whale 3314 “Yellowfin”*—Yellowfin was disentangled in the Southeast U.S. in 2005. A biopsy for health assessment purposes was collected on Dec 19, 2007.
 - (e) *Right Whale 3530 “Ruffian”*—This injured whale was documented the NEAq aerial survey team on Jan 29, 2008 and was covered with extensive scars and lacerations, presumably from entanglement in commercial fishing gear. The whale was documented by GDNR and FWRI vessel on three occasions during Feb 2008. A biopsy sample was obtained on Feb 7, 2008 and thermal images were obtained on Feb 20, 2008.
 - (f) *Right Whale 3520*—A health assessment biopsy was obtained on Dec 19, 2007. The whale has a series of healed propeller scars along its right dorsolateral surface.
 - (g) *Right Whale 3503*—This whale is marked by a series of propeller scars/wounds that appear to be in the process of healing. Thermal images of the wounds were obtained on Feb 15, 2008.
 - (h) *Right Whale 1301*—This adult female lost her 2008 calf during Jan 2008. She is also known to have lost at least one previous calf. A health assessment biopsy was collected on Jan 10, 2008.
- (2) GDNR contracted with experienced biologists from Coastwise Consulting and New England Aquarium during 2007 that were permitted to collect right whale biopsy samples. Biopsy sampling continued during 2008 in cooperation with NMFS biologists. Fourteen calves and four previously unsampled juvenile/adult right whales were sampled in 2007 (Fig. 2, Table 5). Fifteen calves and five previously unsampled juvenile/adult whales were collected in 2008. Skin from all biopsy samples was submitted to NMFS to be used in ongoing genetics/demographics research. Twenty of the above biopsy samples were sub-sampled and submitted to Dave Rotstein at U. of Tennessee to support ongoing population health research. Biopsy sampling also enabled GDNR and FWRI staff to gain valuable experience operating vessels in close proximity to right whales. Accordingly, Clay George (GDNR) and Tom Pitchford (FWRI) were added to Dr. Teri Rowles’ (NMFS) research permit for health assessment in 2007. Clay George was also added to Dr. Scott Kraus’ (NEAq) research permit for right whale close vessel approaches and non-calf biopsy in 2008.
- (3) The biopsy and disentanglement components of this project resulted in increased cooperation among GDNR, FWRI, NMFS and other right whale conservation groups. Sixty disentanglement/health assessment/biopsy cruises were conducted

during the project (Table 6). Of those, 80% of cruises included staff from two or more agencies. This level of close cooperation resulted in improved interagency communication and effectiveness. It should be noted that the biopsy effort would have been impossible without extensive cooperation from right whale aerial survey teams and NEAq biologists that specialize in whale photo-ID.

- ii) Tables 4-6 provide information regarding cruise summaries, disentanglement/health assessment response and biopsy sample collection, respectively.
- iii) Discrepancies between the proposal and outcome of the project are outlined as follows:
 - (1) We intended to complete the project within one year. The project was extended into the 2007-2008 season due to delays in purchasing a truck and executing a contract between GDNR and FWRI. Impacts on the project were negligible.
 - (2) One goal of the project was to develop a list of large boats that would be available for disentanglement support in the Southeast U.S. Our intention was to include both privately operated and government agency operated boats (e.g. research vessels). Following consultation with NMFS, privately-operated boats were removed from consideration for the following reasons:
 - (a) The principal commercial fisheries in Georgia, Florida and South Carolina (i.e. shrimp trawl and blue crab) do not use boats that are appropriate for disentanglement response. Blue crab fishermen utilize 20-30ft outboard boats that are too small for disentanglement support. Shrimp fishermen use 40-75ft trawlers with maximum speeds of 8-10 knots that are too slow for disentanglement support. Gillnet boats based in North Carolina and south Florida no longer operate (legally) off of South Carolina, Georgia or northeast Florida during the winter months because a gillnet ban was implemented by NMFS in 2006.
 - (b) Most charter fishing boats along the Southeast U.S. coast are small (20-30ft) USCG-uninspected vessels that are only permitted to carry six or fewer passengers. These vessels were deemed inappropriate because of their small size and less rigorous safety requirements.
 - (c) There are small numbers of appropriate USCG-inspected charter boats and commercial work boats (e.g. bar pilots) in coastal Georgia and Florida that would be appropriate for disentanglement. Owners we spoke with were unwilling to guarantee their vessels' availability without payment upfront. Most also quoted cost of \$5,000 per day which seemed excessive. Bar pilots were unwilling to make their boats available except in the immediate vicinity of ports.

Following consultation with NMFS, we decided that it would be more practical to continue to solicit in-kind assistance from government agency vessels on a case-by-case basis in the event that a large support boat is needed (Table 7). The advantage of federal and state vessels include: increased safety, increased cooperation among government agencies, lower cost, and fewer concerns about liability. The primary disadvantage of government vessels is that, like private vessels, their availability at any given time cannot be guaranteed.

If a government support vessel is not available, our fall-back strategy is to use two Zodiac 23ft rigid-hull inflatable boats (RHIBs; Fig. 3) in concert—one as the

disentanglement boat, the other as the support/tow boat ¹. The benefits of the 2-RHIB approach include: 1) coastwise mobility, 2) low cost, 3) high level of safety, 4) good photo-documentation capabilities (via a collapsible tower) and 5) 300-mile operating range. The negatives of this approach are: 1) limited storage space, 2) inability to track overnight.

- (3) One project goal was for GDNR and FWRI staff to gain sufficient experience to be added to the NMFS Northeast Fisheries Science Center's (NEFSC) research permit for right whale biopsy (Table 3), or to amend the GDNR right whale aerial survey permit to allow close vessel approaches and biopsy sampling. GDNR and FWRI staff have not been added to NMFS NEFSC permit to date. Nor can the GDNR permit be amended because those activities are considered a major permit modification. Instead, NMFS NEFSC has cooperated directly with GDNR and FWRI since 2007 by providing a permitted NEFSC biologist to work in the field alongside GDNR and FWRI biologists. This cooperative arrangement will likely continue into the near future. GDNR intends to submit a research permit application in 2009 in an attempt to address this issue.
- (4) One goal of the project was to increase the number of GDNR/FWRI biologist that have attended the PCCS Disentanglement Apprenticeship from two to four. This goal was not met during the project because of staff turnover at GDNR and FWRI during the project period. However, a GDNR and FWRI biologist each attended the Disentanglement Apprenticeship in September 2008. As such, this goal was met soon after completion of the project using other funding sources.

b) Post-project Outcomes

- i) Predicted values of post-project outcomes are provided in Table 3. GDNR and FWRI are committed to participation in the ALWDN. The goals of this project were to: 1) maintain first response proficiency (e.g. telemetry attachment, photo-documentation), 2) improve gear documentation capabilities (e.g. removing significant amounts of gear for gear analysis), 3) provide skilled support for Level 5 responders from other agencies and organizations, and 4) develop the skills to conduct intermediate-level disentanglement activities unsupervised when requested by NMFS. Two biologists from GDNR (Mark Dodd, Clay George) and one from FWRI (Tom Pitchford) were recently invited to apply for promotion to Level 4 in the ALWDN, which indicates to us that skill levels of GDNR and FWRI staff are improving. NMFS' decision regarding Level 4 status should be made by 2009. Even if awarded, however, GDNR and FWRI staff will continue to depend on outside help from Level 5 responders in many disentanglement cases. Whale entanglements are relatively rare events in the Southeast U.S., so it may be difficult for GDNR and FWRI staff to develop the skills necessary to be promoted to Level 5, even in the long-term
- ii) The near- and long-term benefits of the project are outlined in Table 3 and summarized as follows:
 - (1) The primary goal of the project was to improve disentanglement infrastructure in the Southeast U.S., thereby improving effectiveness of disentanglement response and reducing the number of long-term entanglements. GDNR and FWRI disentanglement infrastructure has certainly improved thanks to enhancements in

¹ The GDNR and FWRI combat inflatable disentanglement boats have been rigged to tow behind the GDNR and FWRI RHIBs at speeds of up to 20 knots, thereby making the combat inflatable boats available for use even if a large support boat is unavailable.

infrastructure and staff skills. These enhancements should be valuable given that the number of individual right whales sighted each year in the Southeast U.S. has been increasing steadily (North Atlantic Right Whale Catalog, unpublished data). If this trend continues, we predict that GDNR and FWRI staff will respond to increasing numbers of entangled and injured whales in upcoming years. We also predict that entanglements will be documented more completely, more gear will be collected for analysis and the opportunities for intervention (if warranted) will increase. It is difficult to predict whether such improvements will translate directly into fewer long-term entanglements. First, experience level of GDNR and FWRI staff will be limited by staff turnover and the number of entanglement cases that occur each year in the Southeast U.S. (see b.i above). Second, approximately half of all right whale disentanglement attempts are unsuccessful (PCCS unpublished data), even when undertaken by the most experienced ALWDN responders. Barring significant improvements in disentanglement technology, significant reductions in entanglement rates will likely be best accomplished through changes in fishery practices or policies.

- (2) A second goal of the project was to initiate a consistent multi-agency right whale biopsy sampling effort to support ongoing population demographics and health research. This secondary goal relates to the primary goal because experience gained from biopsy sampling activities can be applied to disentanglement activities. GDNR, FWRI and NMFS intend to continue this effort during the 2008-2009 season, which will be the fourth year of a concerted Southeast U.S. right whale biopsy effort. We predict that this work will likely continue into the future. Continued cooperation with right whale aerial survey teams and whale photo-ID experts at NEAq will be critical to this effort.
 - (3) The last goal of the project was to improve interagency cooperation with respect to right whale disentanglement and other conservation efforts. The project certainly improved interagency cooperation in the short-term. Long-term cooperation among the agencies will likely continue, funding permitting.
- iii) Right whale disentanglement and biopsy sampling are tasks in GDNR's Section 6 Agreement with NMFS. GDNR will continue to cooperate with FWRI and NMFS on these issues as long as the tasks are listed in the GDNR Section 6 Scope of Work and funding is available. Because right whales are so widely dispersed in the Southeast U.S., this work would be impossible without a moderate to high level of right whale aerial survey effort. Moreover, the biopsy component of the project is dependent on adequate funding for maintenance of the photo-ID catalog and biomolecular research (i.e. processing of samples).
 - iv) Not applicable

5) Discussion & Adaptive Management

a) Lessons Learned and Transferability

- i) Entanglement in commercial fishing gear is a leading cause of North Atlantic right whale mortality and serious injury. Reducing anthropogenic mortality and serious injury is crucial to right whale population recovery. The Recovery Plan for the North Atlantic Right Whale (NMFS 2005) outlines numerous management strategies to reduce commercial fisheries impacts. These strategies fit into the following general categories: 1) fishery operations (e.g. policy, regulations), 2) gear modifications, 3) monitoring, and 4) disentanglement. This project contributed directly to two of these strategies: disentanglement and monitoring. This project also contributed indirectly

to fisheries policy and gear strategies, because the information gathered from documenting entanglements feeds back indirectly to inform fishery policy.

The primary goal of this project was to enhance GDNR and FWRI disentanglement capabilities. These capabilities include: 1) maintaining first response proficiency (e.g. telemetry attachment, photo-documentation), 2) improving gear documentation capabilities (e.g. removing significant amounts of gear for gear analysis), 3) providing skilled support for Level 5 responders from other agencies and organizations, and 4) developing the skills to conduct intermediate-level disentanglement activities unsupervised when requested by NMFS. We believe that investing in GDNR and FWRI is the most effective way to address basic disentanglement needs in the Southeast U.S. for a number of reasons: 1) there are relatively few whale entanglements documented in the Southeast U.S. (generally fewer than one per year), 2) GDNR and FWRI staff are onsite year-round, 3) GDNR and FWRI staff have significant agency infrastructure and resources at their disposal, 4) GDNR and FWRI staff can fulfill their obligations to the ALWDN while fulfilling other right whale conservation responsibilities, and 5) there are few other conservation organizations on the Southeast U.S. coast available to fill this role.

The second and third goals of this project were to develop a biopsy sampling program in the Southeast U.S. and improve cooperation among the state and federal agencies. In addition to benefiting right whale demographic and population health research, these goals also had direct, positive benefits for disentanglement response in the Southeast U.S. by increasing staff experience and improving cooperation among agencies.

This project did have its limitations. GDNR and FWRI staff will continue to need assistance from Level 5 responders during many disentanglement cases. Given the low frequency of entangled whale sightings in the Southeast, it is uncertain whether GDNR or FWRI staff will obtain the experience that is needed for promotion to Level 5. Moreover, state agencies are subject to staff turnover, which further limits experience level. For these reasons, state agency staff will continue to depend on outside help from Level 5 responders at NMFS, PCCS and other organizations when responding to complicated entanglements.

The limitations of disentanglement response in reducing right whale entanglements in general should also be considered. Disentanglement is dangerous, it is often unsuccessful, it focuses on individuals rather than the population, and it does nothing to directly prevent entanglements from occurring. While small reductions in entanglements may occur through disentanglement response, significant reductions in entanglement will only occur through changes in fishing practices or reductions in fishing effort when and where right whales are present.

- ii) See 5.a.i above. Data collected from entangled whales provide invaluable information about the impacts of commercial fisheries on whales. These data are critical to recovery efforts because they inform fisheries management and policy efforts. For this reason we believe that documentation and monitoring (not disentanglement) is arguably more important for population recovery than disentangling entangled whales. This project was valuable because it enhanced our capacity to document and monitor whale entanglements.

Regarding disentanglement capabilities, this project enhanced GDNR and FWRI skill and infrastructure, which should have positive impacts on disentanglement capabilities in the Southeast U.S. for years to come. Maintaining disentanglement capabilities is important for right whale recovery because the survival of individual

- female right whales is potentially significant to population recovery. Nonetheless, we recognize that the limitations of disentanglement in affecting population recovery are considerable, as stated above. We feel that the current priority to “free every entangled whale” (Recovery Plan, NMFS 2005) is unrealistic, resource intensive and distracts from the real solution (i.e. preventing entanglements from occurring). Rather, we suggest that disentanglement activities should be focused on the right whale population, rather than the well-being of individual whales. The following priorities would be more population-centric: 1) documenting sources of entanglements, 2) monitoring status of entangled whales over time, and 3) disentangling female right whales when possible (i.e. entangled males should receive a lower level of priority). Doing so would reduce cost, reduce risk and return the focus to population recovery.
- iii) This project is one example of GDNR’s increasing commitment to right whale conservation efforts in the Southeast U.S. GDNR is in a unique position to coordinate right whale disentanglement efforts and other conservation efforts in Georgia. No other organization in Georgia has the infrastructure and staff to fulfill this role. Our agency’s involvement in right whale conservation in the Southeast U.S. will likely continue to grow thanks to continued cooperation with FWRI, NMFS and other organizations.

b) Dissemination

- i) Data collected during this project were submitted to NMFS, PCCS and NEAq, respectively. Disentanglement data from this and other projects are compiled by PCCS and made available to other disentanglement network members via a password protected website. Photo-ID, genetics and health assessment data from this and other projects may be accessed through the North Atlantic Right Whale Consortium data access process (http://www.rightwhaleweb.org/pdf/consortium_database.pdf). Data collected during this project are subject to the Georgia Open Records Act and will be made available to the public upon request. NMFS staff coordinated public outreach efforts during disentanglement events.
- ii) No outreach products were developed during this project. NMFS Southeast Regional Office should be contacted for press release requests.

c) NFWF Adaptive Management

- i) Not applicable

6) References

- i) Not applicable

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Approved: _____ Date: November 20, 2008
Signature

R. Clay George, Natural Resource Biologist 1
Print name and title

Figure 1. Location of entangled, previously entangled, injured and other North Atlantic right whales documented for health assessment off the Georgia and northeast Florida coast, 2007 to 2008.

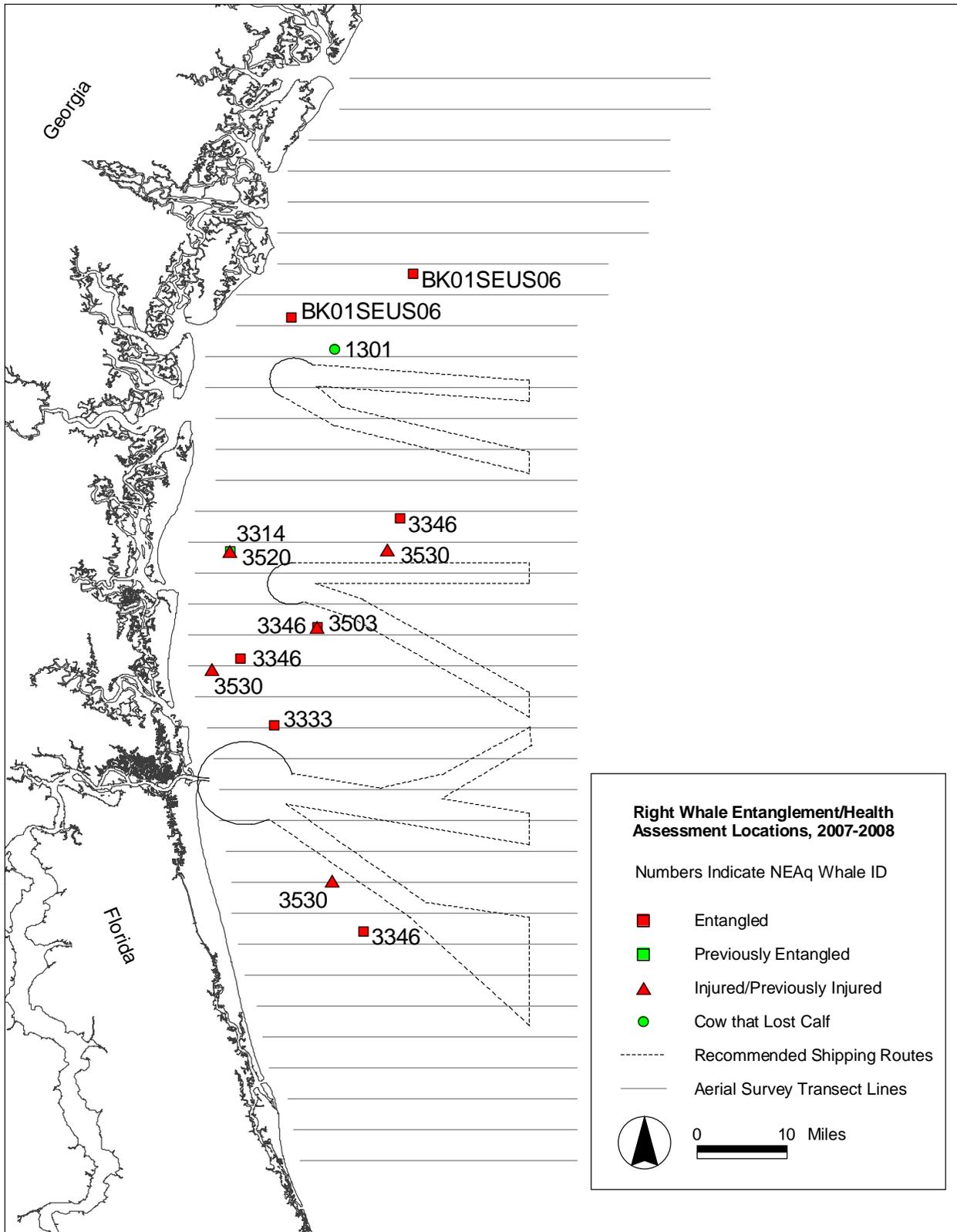


Figure 2. Locations of North Atlantic right whales biopsy sampled off of the Georgia and northeast Florida coast, 2007-2008.

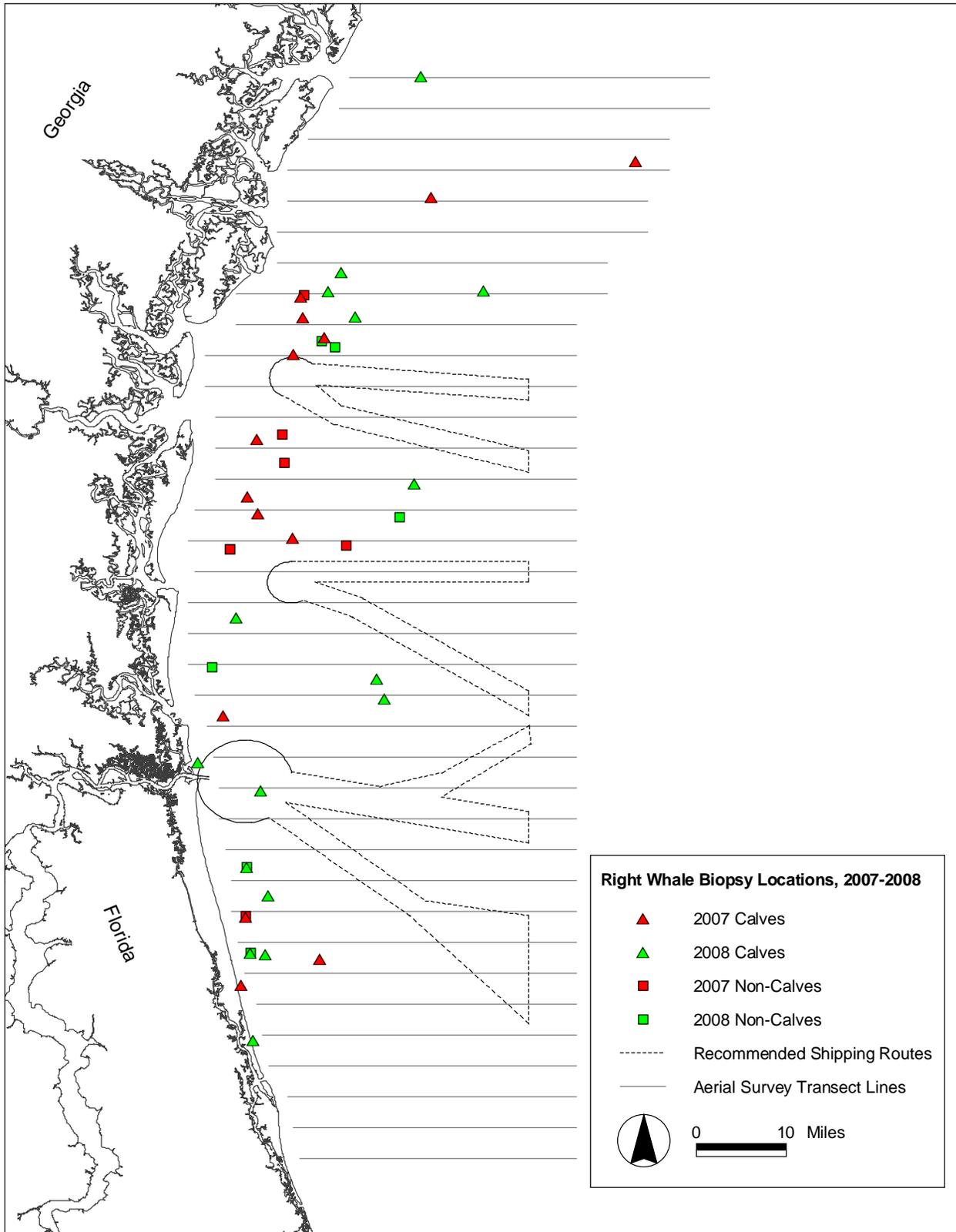


Figure 3. NMFS Zodiac Rigid-Hull Inflatable Boat maintained and operated by GDNR. FWRI maintains and operates an identical boat.



Table 1. Proposed Project Budget

Budget Class	Description	NFWF	Matching	Total
Equipment	Pickup Truck for Towing Zodiac and Disentanglement Cache)	\$10,000	\$10,000	\$20,000
Supplies	Whale Biopsy Supplies (Crossbow, Arrows, etc.)	\$1,600	\$0	\$1,600
	Satellite Telephone Rental (4 mos. @ \$150/mo.)	\$600	\$0	\$600
	Camera Lens	\$600	\$0	\$600
	Boating Safety Gear (e.g. Mustang Suits)	\$800	\$0	\$800
	Field and Office Supplies (e.g. Boat Supplies, Field Gear)	\$1,200	\$0	\$1,200
	Boat and Vehicle Fuel and Maintenance	\$4,600	\$0	\$4,600
	Binoculars	\$600	\$0	\$600
Other	Contract w/ FWRI to Assist w/ Biopsy/Disentanglement	\$10,000	\$0	\$10,000
	Contract w/ Coastwise Consulting to Provide Permitted Biologist for Disentanglement/Biopsy Support	\$10,000	\$0	\$10,000
	Contract w/ New England Aquarium to Provide Permitted Biologist for Biopsy Support	\$10,000	\$0	\$10,000
Total		\$50,000	\$10,000	\$60,000

Table 2. Project Expenditures

Budget Class	Description	NFWF	Matching	Total
Personnel	Salary, Principal Investigator	\$37	\$8	\$45
	Fringe, Principal Investigator	\$15	\$3	\$18
Equipment	Pickup Truck for Towing Zodiac and Disentanglement Cache)	\$17,616	\$3,608	\$21,224
Motor Vehicle	Fuel	\$387	\$79	\$466
Supplies and Materials	Other (Field Supplies)	\$805	\$165	\$970
	Purchase Card Expenses (Field Supplies, Satellite Phone Rental, Mustang Suits)	\$4,912	\$1,006	\$5,918
	Small Equipment not on Inventory (Binoculars)	\$674	\$138	\$812
Freight	International shipping for biopsy arrows/tips	\$32	\$6	\$38
Other Operating Expenses	Biopsy arrows/tips	\$326	\$67	\$393
Contracts	Contract w/ FWRI to Assist w/ Biopsy/Disentanglement	\$8,293	\$1,699	\$9,992
	Contract w/ Coastwise Consulting to Provide Permitted Biologist for Disentanglement/Biopsy Support	\$8,300	\$1,700	\$10,000
	Contract w/ New England Aquarium to Provide Permitted Biologist for Biopsy Support	\$8,300	\$1,700	\$10,000
Total		\$49,697	\$10,179	\$59,876

Table 3: Logic framework table with indicators

Activities	Short-Term Outputs	Long-Term Outcomes	Indicator	Baseline Value	Predicted Value of Project Output	Actual Value of Project Output
Obtain funds to pay for field equipment, supplies and operating expenses	Entangled right whales are documented, tracking buoys attached and gear removed when possible; GDNR and FWRI are properly prepared for disentanglement response; gear collected from entangled right whales submitted to NMFS gear analysis team	Fewer long-term whale entanglements; Whale entanglement data contribute to better fisheries management practices; skilled staff on-site in Southeast U.S. leads to more effective disentanglement response	Number of fully equipped disentanglement teams in Southeast U.S.	1	2	2
Dedicated disentanglement support vessels identified along Southeast coast	Support vessels always available for disentanglement response	Dependence on U.S. Coast Guard vessel support reduced	Average number of support vessels per port in Southeast	<1	2	2
GDNR Contracts with Coastwise Consulting and New England Aquarium to collect biopsy samples in the Southeast U.S.	GDNR/FWRI staff gain valuable experience operating vessels around whales, collecting biopsy samples, conducting photo-ID approaches; entangled right whales are biopsy sampled; genetics samples are collected from right whale calves	Effectiveness of disentanglement response improves as GDNR and FWRI staff gain more experience around right whales; GDNR and FWRI contribute to long-term right whale biopsy sampling effort which is more cost-effective; DNR seeks amendment to research permit to allow close approaches and biopsy darting	<i>As Outlined in Proposal:</i>			
			Number of permitted biopsy teams in Southeast	0	2	2 (partially permitted—see 4.a.iii(3))
			<i>A More Accurate Indicator Would Have Been:</i>			
			Percentage of right whale calves biopsy sampled each calving season	<50%, variable among seasons	>50%	2007: 67% 2008: 79%

GDNR/FWRI cooperate closely with NMFS and PCCS on whale entanglement and fisheries management issues during 2006-2007 season	Disentanglement responses are more effective; GDNR and FWRI draw upon common resources during disentanglement events	Cooperation and collaboration among GDNR and FWRI results in more successful, cost-effective disentanglement response; interagency research and management is improved	Percentage of entangled whales responded to	75%	90%	100%
			Number of biologists in Southeast U.S> that have completed the PCCS disentanglement apprenticeship	2	4	2

Table 4: Entangled, previously entangled and injured North Atlantic right whales documented by vessel off the Georgia and northeast Florida coast, 2007 to 2008. Abbreviations: GDNR=Georgia Dept. of Natural Resources, FWRI=Florida Fish and Wildlife Research Institute, NEAQ=New England Aquarium, NMFS=National Marine Fisheries Service, UF=U. of Florida, UNCW=U. of North Carolina Wilmington, Eg=right whale.

Date	Responding Agency	Latitude	Longitude	NEAQ Whale ID	Whale Condition	Health Assessment Biopsy	Biopsy Sample ID	Comments
1/15/07	GDNR NMFS	31.1442	-81.2449	BK01SEUS06	Entangled	No	N/A	Entangled Eg BK01SEUS06 first response, telemetry attached, long-line gear collected and submitted to NMFS for analysis
1/16/07	GDNR FWRI NMFS	31.2150	-81.0483	BK01SEUS06	Entangled	No	N/A	Entangled Eg BK01SEUS06 disentanglement/biopsy response, no gear removed or biopsy sample collected
2/27/07	FWRI NMFS	30.1530	-81.1285	3346	Entangled	No	N/A	Entangled Eg 3346 “Kingfisher” photographed with other juvenile whale
12/19/07	GDNR	30.7670	-81.3433	3314	Previously Entangled	Yes	19DEC07 “A” GDNR-V	Previously entangled Eg 3314 “Yellowfin” and Eg 3520 with healed propeller wounds in 4-whale SAG, both sampled for health assessment
				3520	Previously Injured	Yes	19DEC07 “B” GDNR-V	
1/10/08	GDNR FWRI	31.0953	-81.1737	1301	Lost Calf	Yes	10JAN08 “D” GDNR-V	Eg 1301 lost its 2008 calf, sampled for health assessment
1/29/08	GDNR FWRI	30.4850	-81.2717	3333	Entangled	No	N/A	Entangled Eg 3333 sighted by NEAQ survey plane, GDNR and FWRI vessels responded, whale disappeared upon arrival
2/2/08	GDNR NMFS	30.8200	-81.0700	3346	Entangled	Yes	02FEB08 “A” GDNR-V	Entangled Eg 3346 “Kingfisher” sampled for health assessment
		30.7700	-81.0883	3530	Injured	No	N/A	Injured Eg 3530 photographed but unable to obtain biopsy for health assessment
2/7/08	GDNR NMFS	30.5767	-81.3717	3530	Injured	Yes	07FEB08 “A” GDNR-V	Injured Eg 3530 photographed, biopsy samples obtained for health assessment
2/9/08	FWRI NMFS	30.5937	-81.3262	3346	Entangled	No	N/A	Entangled Eg 3346 “Kingfisher” in 6-whale SAG, underwater photographs obtained with pole camera
2/15/08	FWRI NMFS UNCW	30.6444	-81.2026	3346	Entangled	No	N/A	Entangled Eg 3346 “Kingfisher” and injured Eg 3503 in 6-whale SAG, photographs and thermal images of entanglement obtained
				3503	Injured	No	N/A	

2/20/08	FWRI NMFS UF	30.2336	-81.1784	3530	Injured	No	N/A	Injured Eg 3530, photographs and thermal images of injuries obtained
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Table 5: Whale ID, sampling location and sample disposition of North Atlantic right whales biopsy sampled off the Georgia and northeast Florida coast, 2007-2008.

Date	Whale Field ID	NEAq Whale ID	Time	Latitude	Longitude	Sample ID	Trent University	NOAA Archive	Dave Rotstein	Research Permit
1/24/07	B	2007CalfOf2642	11:34	30.7867	-81.2417	24JAN07 "B" GDNR-V	Yes	Yes	Yes	Merrick
1/27/07	B	2007CalfOf2614	10:37	30.8533	-81.3150	27JAN07 "B" GDNR-V	Yes	Yes	No	Merrick
1/27/07	F	2007CalfOf1705	13:33	31.0833	-81.2400	27JAN07 "F" GDNR-V	Yes	No	No	Merrick
1/27/07	G	1810	15:39	31.1800	-81.2233	27JAN07 "G" GDNR-V	Yes	Yes	No	Merrick
1/27/07	H	2007CalfOf1810	15:30	31.1767	-81.2283	27JAN07 "H" GDNR-V	Yes	Yes	No	Merrick
1/30/07	F	2007CalfOf2645	13:59	31.1433	-81.2250	30JAN07 "F" GDNR-V	Yes	Yes	Yes	Merrick
2/7/07	B	2007CalfOf2145	13:20	30.1047	-81.1975	"B" 7Feb07 FWRI-V	Yes	Yes	Yes	Merrick
2/8/07	B	2007CalfOf1425	11:43	30.8267	-81.2983	"B" 8Feb07 FWRI-V	Yes	Yes	Yes	Merrick
2/8/07	G	CT01BOF05	12:59	30.9083	-81.2550	"G" 8Feb07 FWRI-V	Yes	Yes	No	Merrick
2/8/07	K	2007CalfOf2611	14:50	31.1117	-81.1900	"K" 8Feb07 FWRI-V	Yes	Yes	Yes	Merrick
2/10/07	B	2007CalfOf1701	15:08	30.4993	-81.3540	"B" 10Feb07 FWRI-V	Yes	Yes	No	Merrick
2/17/07	A	1620	12:26	30.1733	-81.3175	17FEB07 "A" GDNR-V	Yes	Yes	Yes	Merrick
2/17/07	B	2007CalfOf1620	12:26	30.1733	-81.3175	17FEB07 "B" GDNR-V	Yes	Yes	Yes	Merrick
2/20/07	B	2007CalfOf2746	11:33	30.9462	-81.2993	20FEB07 "B" GDNR-V	Yes	Yes	Yes	Merrick
2/21/07	B	2007CalfOf2430	12:32	30.0635	-81.3260	"B" 21Feb07 FWRI-V	Yes	Yes	Yes	Merrick
2/22/07	I	SE07BK08	16:35	30.7740	-81.1558	22FEB07 "I" GDNR-V	Yes	Yes	Yes	Kraus
2/27/07	K	2007CalfOf2605	16:45	31.3391	-81.0182	27FEB07 "K" GDNR-V	Yes	Yes	Yes	Merrick
2/28/07	A	CTAK01/SE06CT02	12:43	30.9540	-81.2587	28FEB07 "A" GDNR-V	Yes	Yes	No	Kraus
3/12/07	D	2007CalfOf1911	16:23	31.3963	-80.6872	12MAR07 "D" GDNR-V	Yes	Yes	No	Merrick
12/19/07	A	3314	11:57	30.7670	-81.3433	19DEC07 "A" GDNR-V	Yes	Yes	Yes	Rowles
12/19/07	B	3520	11:57	30.7670	-81.3433	19DEC07 "B" GDNR-V	Yes	Yes	Yes	Rowles
1/6/08	C	2008 CalfOf1622	12:15	30.4233	-81.3943	06JAN08 "C" GDNR-V	Yes	Yes	No	Merrick
1/6/08	E	2008 CalfOf2753	15:26	29.9730	-81.3053	06JAN08 "E" GDNR-V	Yes	Yes	Yes	Merrick
1/7/08	K	2008 CalfOf2330	17:07	31.2165	-81.1635	07JAN08 "K" GDNR-V	Yes	Yes	No	Merrick
1/8/08	B	2008 CalfOf1802	16:49	30.3783	-81.2933	08JAN08 "B" GDNR-V	Yes	Yes	No	Merrick
1/10/08	C	3230	11:44	31.1050	-81.1950	10JAN08 "C" GDNR-V	Yes	Yes	Yes	Merrick

1/10/08	D	1301	14:08	31.0953	-81.1737	10JAN08 "D" GDNR-V	Yes	Yes	Yes	Rowles
1/10/08	G	2008 CalfOf1408	16:59	31.5339	-81.0342	10JAN08 "G" GDNR-V	Yes	Yes	No	Merrick
1/24/08	A	3292	15:42	30.1137	-81.3105	24JAN08 EgA FWRI/V	Yes	Yes	No	Merrick
1/24/08	B	2008 CalfOf3292	15:42	30.1137	-81.3105	24JAN08 EgB FWRI/V	Yes	No	No	Merrick
1/24/08	D	2008 CalfOf1308	13:05	31.1450	-81.1400	24JAN08 "D" GDNR-V	Yes	Yes	Yes	Merrick
1/29/08	B	2008 CalfOf1243	13:33	30.2083	-81.2817	EgB 29JAN08 FWRI/V	Yes	Yes	No	Merrick
1/29/08	C	3293	14:04	30.2533	-81.3167	EgC 29JAN08 FWRI/V	Yes	Yes	No	Merrick
1/29/08	D	2008 CalfOf3293	14:04	30.2533	-81.3167	EgD 29JAN08 FWRI/V	Yes	Yes	No	Merrick
2/2/08	A	3346	16:20	30.8200	-81.0700	02FEB08 "A" GDNR-V	Yes	Yes	Yes	Rowles
2/7/08	A	3530	11:16	30.5767	-81.3717	07FEB08 "A" GDNR-V	Yes	Yes	Yes	Rowles
2/7/08	D	2008 CalfOf3130	15:46	31.1877	-80.9333	07FEB08 "D" GDNR-V	Yes	Yes	No	Merrick
2/9/08	B	2008 CalfOf2790	13:06	30.5258	-81.0932	09FEB2008 "B" FWRI/V	Yes	Yes	No	Merrick
2/16/08	D	2008 CalfOf2040	13:39	31.1853	-81.1846	16FEB08 "D" GDNR-V	Yes	Yes	No	Merrick
2/20/08	B	2008 CalfOf1245	13:20	30.5588	-81.1060	20FEB08 "B" GDNR-V	Yes	Yes	No	Merrick
2/24/08	B	2008 CalfOf1812	10:41	30.8750	-81.0450	24FEB08 "B" GDNR-V	Yes	Yes	No	Merrick
2/25/08	E	2008 CalfOf3292	14:11	30.6577	-81.3332	25FEB08 EgE FWRI/V	Yes	Yes	Yes	Merrick
3/1/08	B	2008 CalfOf1703	11:37	30.1128	-81.2862	01MAR08 EgB FWRI/V	Yes	Yes	No	Merrick

Table 6. Summary of North Atlantic right whale research cruises conducted by GDNR, FWRI and NMFS staff off the Georgia and northeast Florida coast, 2007-2008. Where multiple research permits are listed, photo and biopsy takes are indicated by “x/y” respectively. Abbreviations: Eg=right whale, M/C=mother and calf, SAG=surface active group. Four digit numbers in comments field indicate NEAq whale ID numbers (matches have not necessarily been confirmed by NEAq).

Date	Departure Port	Depart Time	Return Time	Vessel	Crew	Eg Groups	Eg's Photo-graphed	Eg's Biopsy Sampled	Eg Calves Sampled	Research Permit	Comments
1/15/07	Brunswick	15:00	17:45	Hurricane	Dodd, George, Winn, Zoodsma	1	1	0	0	Rowles	Entangled Eg BK01SEUS06 first response, telemetry attached, portion of gear removed for analysis
1/16/07	Brunswick	10:00	18:00	Hurricane and Orion	Dodd, Garrett, George, Jackson, Pitchford, Slay, Youngner, Zoodsma	1	1	0	0	Rowles	Entangled Eg BK01SEUS06 disentanglement/biopsy response, no gear removed or biopsy sample collected
1/23/07	Fernandina	10:20	15:40	Orion	George, Jackson, Pace, Pitchford, Slay	0	0	0	0	N/A	No Eg's sighted
1/24/07	Brunswick	9:50	17:50	Hurricane	George, Slay, Pace, Youngner	1	2	1	1	Merrick	M/C 2642
1/27/07	Fernandina	9:40	18:00	Hurricane	George, Harris, Pace, Slay, Zoodsma	5	10	4	3	Merrick	4 M/C (2614, 1705, 1810, 2746), 1 Mom/Yearling (1611)
1/30/07	Brunswick	9:00	15:45	Hurricane	Garrett, George, Pace, Youngner	3	6	1	1	Merrick	3 M/C (2601, 2746, 2645)
2/4/07	Brunswick	14:00	16:00	Hurricane	George, Slay	1	2	0	0	Merrick	M/C 2746 avoided approach, no sample attempted
2/7/07	St. Johns	11:30	15:00	Orion	Dodd, Garrett, George, Pace, Slay	1	2	1	1	Merrick	M/C 2145
2/8/07	Fernandina	10:10	16:30	Orion	Garrett, George, Jackson, Pace, Slay	4	10	3	2	Merrick	3 M/C (1425, 1810, 2611), 4 Eg SAG
2/9/07	St. Johns	10:15	15:30	Orion	Garrett, Jackson, Pace, Pitchford, Slay	0	0	0	0	N/A	No Eg's sighted
2/10/07	St. Johns	14:00	16:30	Orion	Gwalthney, Jackson, Pace, Slay, Wong	1	2	1	1	Merrick	M/C 1701
2/11/07	Fernandina	10:30	16:00	Hurricane	Compton, Dodd, George, Pace, Slay	2	4	0	0	Merrick	M/C 2145, 2 Eg SAG, high-def video taken

2/15/07	Brunswick	10:00	15:00	Hurricane	Chadwick, Conger, George, Pace	0	0	0	0	N/A	No Eg's sighted
2/17/07	St. Augustine	10:00	14:00	Orion	Chadwick, Conger, George, Pace, Schulte	1	2	2	1	Merrick	M/C 1620
2/20/07	Brunswick	10:00	13:00	Hurricane	Conger, Dodd, George, Mahoney, Pace	1	2	1	1	Merrick	M/C 2746
2/21/07	St. Augustine	9:30	15:00	Orion	Conger, Garrett, Jackson, Pace, Pitchford	1	2	1	1	Merrick	M/C 2430, whale/vessel approach documented, 1 humpback photographed, hydrophone recording
2/22/07	Brunswick	12:30	18:00	Hurricane	Compton, Conger, George, Mackinnon	4	10	1	0	Merrick	3 Eg SAG, 2 pairs, 1 Eg's traveling, SE07BK08 sampled
2/24/07	Brunswick	9:45	18:30	Hurricane	Conger, George, Smith	2	4	0	0	Merrick	1 pair, M/C pair 2746, 2746 calf interacted w/ boat, Jamie Smith HD video
2/26/07	St. Augustine	12:00	16:00	Orion	Gwalthney, Jackson, Pace, Pitchford	2	4	0	0	Merrick	M/C 2642, Pace hydrophone
2/26/07	Brunswick	10:30	19:00	Hurricane	Conger, George, Smith, Winn	2	3	0	0	Merrick	1 single, M/C 1620, J. Smith HD video
2/27/07	St. Augustine	12:45	16:30	Orion	Garrett, Gwalthney, Jackson, Pace, Pitchford	3	6	0	0	Rowles 1/0 Merrick 5/0	3 Eg SAG, 1 juvenile, 2 juveniles including entangled Eg 3346 "Kingfisher", hydrophone recording
2/27/07	Brunswick	10:30	18:30	Hurricane	Conger, Mackinnon, Smith, Youngner	4	11	1	1	Merrick	2 M/C (2746, 2605), 1 single, 6 Eg SAG
2/28/07	Brunswick	10:00	15:30	Hurricane	George, Pace, Youngner	1	7	1	0	Merrick	7 Eg SAG
3/3/07	Brunswick	10:30	15:00	Hurricane	Conger, George, Mahoney	1	2	0	0	Merrick	M/C 2430
3/7/07	Brunswick	10:30	16:30	Hurricane	Conger, George, Taylor, Youngner	3	16	0	0	Merrick	4 Eg SAG, M/C 2430, 10 Eg SAG
3/8/07	Mayport	11:00	16:15	Orion	Conger, Jackson, Nilsson, Pitchford, White	2	4	0	0	Merrick	2 M/C (1701, 1620)
3/11/07	Fernandina	14:00	18:00	Orion	Conger, Pitchford, Zoodsma	1	3	0	0	Merrick	3 Eg SAG
3/12/07	Brunswick	13:00	20:15	Hurricane	Conger, George, Youngner	2	4	1	1	Merrick	2 M/C pairs (2605, 1911)
12/19/07	Brunswick	10:00	18:00	Hurricane	George, Dodd	1	4	2	0	Rowles	4 Eg SAG, previously entangled Eg 3314 "Yellowfin" and Eg 3520 with healed prop marks sampled for health assessment
12/20/07	Brunswick	15:15	18:00	Hurricane	George, Meegan, Walsh, Rainwater, Norton	2	4	0	0	Rowles	2 juveniles, M/C 1408

1/6/08	St. John's/ St. Augustine	10:00	17:00	Hurricane	Conger, George, Sparks, Jackson, Accardo, Zoodsma	3	5	2	2	Merrick	1 single, 2 M/C pairs (1622, 2753), video
1/7/08	Brunswick	10:30	18:30	Hurricane	Conger, George, Sparks, Munoz	3	10	1	1	Merrick	6 Eg SAG, 1 pair, 1 M/C 2330
1/8/08	Fernandina	11:00	21:00	Hurricane	Conger, Jackson, Pitchford, Sparks, Mahoney	1	2	1	0	Merrick	1 M/C 1802, video
1/10/08	Brunswick	9:00	18:30	Hurricane	Conger, George, Sparks, Jackson, Forester	4	6	3	1	Rowles 2/1 Merrick 4/0	2 pairs including 1301 for health assessment, 1 M/C 1408
1/23/08	Brunswick	10:00	14:00	Hurricane	Conger, George, Sparks, Brower, Grassia	0	0	0	0	N/A	No Eg's sighted
1/24/08	St. Augustine	14:30	17:15	Orion	Pace, Pitchford, Jackson, White	1	2	2	1	Merrick	1 M/C 3292
1/24/08	Brunswick	10:15	17:00	Hurricane	Conger, George, Sparks, Foley	2	4	1	1	Merrick	2 M/C
1/29/08	St. Augustine	11:45	18:50	Orion	Conger, Pitchford, Accardo	2	4	3	2	Merrick 3/2 Rowles 1/0	2 M/C (1243, 3293) sampled, responded to entangled Eg 3333, but not resighted
1/29/08	Brunswick	9:30	18:30	Hurricane	Pace, George, Sparks	3	7	0	0	Merrick 2/0 Rowles 5/0	1 M/C, 1 pair, 3 Eg SAG, responded to entangled Eg3333, but not resighted
2/2/08	Fernandina	9:30	19:00	Hurricane	Conger, Pace, George, Sparks, Windham-Reid	2	5	1	0	Rowles	4 Eg SAG including entangled Eg 3346 sampled for health assessment, 1 pair included injured 3530 with 1 unphotographed Eg, 3530
2/4/08	St. Augustine	11:00	13:00	Orion	Pace, Pitchford, Jackson	0	0	0	0	N/A	No Eg's sighted
2/5/08	Jacksonville	13:00	19:00	Orion	Pace, Pitchford, Jackson, Gwalthney	1	1	0	0	Merrick	No biopsy targets located, sighted yearling on way back to port not photographed by plane
2/7/08	Fernandina	10:30	20:00	Hurricane	Pace, George, Sparks, Ganley	2	4	2	1	Merrick 2/1 Rowles 2/1	M/C 3130, 1 pair Eggs included injured Eg 3530 sampled for health assessment, video
2/8/08	Brunswick	12:00	18:15	Hurricane	Pace, Pitchford, White, Accardo	2	4	0	0	Merrick	M/C 3180, but calf too young/small to dart, 1 pair juveniles

2/9/08	Jacksonville	12:30	18:15	Orion	Pace, Pitchford, Jackson, Gordon	2	9	1	1	Merrick 3/1 Rowles 6/0	M/C 2790, 6 Eg SAG including entangled Eg 3346 sampled for health assessment, single Eg
2/15/08	Jacksonville	10:00	16:45	Orion	Pitchford, Jackson, Jamison Smith, Pabst, Fougères	2	9	0	0	Rowles	Entangled Eg 3346 "Kingfisher" and # 3503 "Caterpillar" with healing propeller wounds in SAG, photographed with thermal imager
2/15/08	Darien	8:30	17:30	Hurricane	Pace, George, Winn, Grassia	3	7	0	0	Merrick	2 pairs, 3 Eg SAG, Winn photographed
2/16/08	Darien	8:30	17:00	Hurricane	Pace, George, Sparks, Brower	2	4	1	1	Merrick	4 Eg SAG only 2 photographed, 1 M/C 2040, George photographed, Bower video
2/20/08	Jacksonville	9:00	16:30	Orion	Pitchford, Jackson, Zoodsma, Walsh	1	6	0	0	Rowles	Injured Eg 3530 "Ruffian" photographed with thermal, still, and video
2/20/08	Fernandina	9:00	16:00	Hurricane	Pace, George, Sparks, Foley	1	2	1	1	Merrick	1 M/C, Foley Photographed
2/24/08	Fernandina	9:10	17:30	Hurricane	Pace, George, Naessig, Cunha	3	4	1	1	Merrick	1 M/C, 2 singles including Eg 3442, Naessig photographed, additional M/C 1245 seen but not photographed, radioed location to plane and they photographed
2/25/08	Fernandina	11:00	17:45	Orion	Pace, Pitchford, Jackson, Cabana	3	4	1	1	Merrick	Hydrophone Eg 3130 and calf, resample 2008CalfOf3292.
2/29/08	Brunswick	9:20	5:00	Hurricane	Pace, George, Sparks, Ganley	2	5	0	0	Merrick	2 pair, 1 not photographed, M/C pair
3/1/08	St. Augustine	9:00	13:30	Orion	Pace, Jackson, Sparks, Zoodsma	1	2	1	1	Merrick	1 M/C 1703, Jackson photographed, Zoodsma video
3/5/08	Fernandina	13:00	18:30	Hurricane	George, Sparks, GPB crew	2	4	0	0	Kraus	1 M/C 1308 hydrophone, 1 pair, George/Sparks photographed, Sparks video, GPB HD video
3/6/08	Brunswick	9:00	17:00	Hurricane	George, Sparks, Naessig, GPB Film Crew	1	4	0	0	Kraus	1 SAG of 4, Sparks photographed, GPD HD video
3/10/08	Brunswick	9:00	13:00	Hurricane	George, Sparks, Brower, Kunicki	0	0	0	0	N/A	Rough seas, no Eggs seen
3/11/08	Brunswick	9:00	17:30	Hurricane	George, Sparks, Foley, Christina PR, Kunicki	3	6	0	0	Kraus	3 M/C (1812, 2790, 1308) all hydrophone, Foley/Sparks photographed, Foley/Sparks video
3/13/08	Brunswick	8:30	16:00	Hurricane	George, Sparks, Ozier, Ganley	1	2	0	0	Kraus	1 M/C 1703 hydrophone, Ganley photographed, Sparks video
3/28/08	Brunswick	14:00	19:00	Hurricane	George, Winn, Sparks, Grassia	1	4	0	0	Kraus	1 SAG of 4 hydrophone, Sparks photographed

Table 7. Federal and state vessels that may be available for disentanglement support.

Agency	Location	Vessel Description
GDNR	Brunswick, GA	43ft Guimond lobster boat, outfitted for marine fisheries research
NOAA Gray's Reef NMS	Savannah, GA	41ft former USCG twin diesel workboat converted for marine research
Skidaway Institute or Oceanography	Savannah, GA	92ft steel hull research vessel
USCG	Sector Jacksonville (St. Marys, GA to Port Canaveral, FL)	Four cutters, workboats at each station
	Sector Charleston (SC and GA coast)	Three cutters, workboats at each station