Final Report

NOAA Award # NA06NMF4520120

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Introduction

This is the Final Report submitted under NOAA Award #NA06NMF4520120, "Consortium for Wildlife Bycatch Reduction," covering the period April 4, 2007 - March 31, 2009. The Consortium consists of Blue Water Fishermen's Association, Duke University, Maine Lobstermen's Association (MLA), New England Aquarium (NEAq), and the University of New Hampshire (UNH). It was established to support the collaborative research and development of solutions to endangered species bycatch, focusing primarily in the US portion of the Northwest Atlantic but drawing from shared international experience in bycatch mitigation.

Consortium projects fall under three main categories:

- Global exchange of bycatch reduction technology
- Understanding wildlife interactions with commercial fishing operations
- Research and development of bycatch reduction approaches

Under the current award, the Consortium is implementing four main projects as outlined in its funding proposal to NMFS:

1) Research and Development of Alternative Fishing Ropes
2) Research and Development of Approaches to Reduce Depredation by Cetaceans and Other Species
3) Applied Research on Wildlife Behavior and Sensory Systems
4) Fostering Collaboration Among Stakeholders

A fourth project, Research and Development of Alternative Gillnets, was not supported due to limited funding, although the Aquarium is implementing an evaluation of barium sulfate gillnets in South America with another grant.

Report Organization

The principal reports for some projects are attached as appendices. This is the case for reports by MLA and UNH under Research and Development of Alternative Fishing Ropes. Reports for some other Consortium-sponsored projects, such as Duke University's pilot whale study, have already been submitted to NMFS in previous Interim Narrative

Reports. All other projects are reported in this introductory section but may include reference to additional documentation in the appendices. This first section also includes information requested by Mary Colligan (NMFS Assistant Regional Administrator for Protected Resources) in a letter to Walter Flaherty (NEAq Executive Vice President/CFO) dated June 9, 2009. Please note: Final reports from MLA and UNH (Appendices A and B) reflect comments and questions received in a previous letter from Mary Colligan to Walter Flaherty dated December 28, 2008.

The full list of appendices for this report:

Appendix A. Final Report to the Consortium for Wildlife Bycatch Reduction, *Maine Lobstermen's Association*
Appendix B. Assessing Right Whale Entanglement Risk through In Situ, Gear-Whale Flipper Interaction Experiments, *UNH and Blue Water Concepts*
Appendix C. NOAA Technical Memorandum NMFS-PIFSC-16 (Shark Deterrent and Incidental Capture Workshop, April 10-11, 2008)[1]
Appendix D. Agenda and Presentations from the 2009 Consortium Meeting, Boston, MA
Appendix E. Bycatch of protected species and other species of concern in U.S. East Coast commercial fisheries, *Erika Zollett*
Appendix F. Executive Summary of the ICES SGBYC 2009 Final Report
Appendix G. Ropes acquired by the Consortium

Report of Activities

Research and Development of Alternative Fishing Ropes

This project had two parallel objectives. One was to have lobster fishermen evaluate the practicality of fishing with different prototype and potentially "whale-safe" ropes. The second was to examine the performance of these ropes during encounters with a constructed model of a right whale flipper by studying the dynamics of the interactions and assessing any differences between experimental and typical fishing ropes. Appendices A and B have the full reports from both projects.

Applied Research on Wildlife Behavior and Sensory Systems

A report on the study documenting dogfish response to electropositive mischmetal was previously submitted to NMFS. However, we reprint here a copy of the NOAA Technical Memorandum NMFS-PIFSC-16 of November 2008 (*Shark Deterrent and Incidental Capture Workshop*) co-hosted by the Consortium and the New England Aquarium which included a presentation based on the dogfish research (pp. 51-53, Appendix C).

[1] This reprint is included following a request from Mary Colligan in a letter to Walter Flaherty of the New England Aquarium dated December 29, 2008.

Research and Development of Approaches to Reduce Depredation by Cetaceans and Other Species

Pilot whale-longline interaction study, Duke University
Duke University's final report on pilot whale-longline interactions off Cape Hatteras was submitted as part of the Consortium's Interim Report. Below are Dr. Andy Read's responses to the questions (reprinted in italics) received in the December 29 letter from Mary Colligan.

1. Is there a reason why the 2008 survey was conducted during a different season than the previous survey, which was conducted in August 2007?

Yes, our NOAA permit expired at the end of May 2008.

2. In the previous report provided on this research, dated October 2007, researchers communicated with longline vessels and recorded sounds while the longline vessels were setting and hauling their gear. The title of this report suggests that interactions between pilot whales and longline gear were documented. Were interactions documented during the May 2008 survey? If so, what were the results?

No interactions were documented in May 2008.

3. *What information on pilot whale sensory systems was collected?*

None.

4. The report indicates that five DTAGs were successfully deployed on pilot whales. However, the report further indicates that the tags were not deployed on animals that were in the vicinity of longline gear. If the purpose of these tags is to monitor pilot whale behavior in the vicinity of longline gear, how will the information collected during the 2008 survey be used to develop effective future mitigation strategies?

We used the May 2008 cruise to develop protocols to safely tag and track pilot whales and to examine their foraging behavior away from fishing gear. We will be tagging and tracking pilot whales in the vicinity of longline gear in August 2009.

5. What are the future plans for this project?

With Consortium funding Duke researcher plan to carry out stable isotope analysis and a field trial of a "whale-safe" longline hook.

Fostering Collaboration among Stakeholders
A. On-line Database of Bycatch Reduction Studies: www.bycatch.org
The research and development of bycatch reduction techniques is a very active and dynamic field, involving hundreds of engineers, biologists, and fishermen from around the world. In order to facilitate the exchange of information about these techniques, we

created a searchable on-line database of studies undertaken to evaluate bycatch reduction methods.

As of July 7, 2009 the database had 93 citations of bycatch studies including summaries of each one's main findings. Most of these studies were added to the database by the Consortium's part-time Research Assistant. The bycatch reduction techniques (57) referred to in these studies are defined in an accompanying glossary, as are descriptions of commercial fishing methods. Users can conduct searches of these studies by year, type of fishing gear, reduction technique, or non-target wildlife group. Where available, there are links to the studies themselves and contact information for authors.

The Consortium created this database to improve the accessibility and exchange of information about bycatch reduction techniques. It also set up the website to facilitate the voluntary uploading of new references by registered users of which there are 43 (as of July 7, 2009), representing 11 countries and multiple government, non-government, industry, and academic institutions. These users may upload new studies by filling in information requested on the computer screen in a very user-friendly process. The Study Group for Bycatch of Protected Species (SGBYC) of the International Council for the Exploration of the Sea (ICES) recently contributed several new publications that were missing from the database. During a meeting in January of 2009 attended by the Consortium Director, this group decided that by contributing studies to this database it could meet its own objective of having a compendium of bycatch mitigation research. Appendix F is the Executive Summary of the Final Report of the Study Group for Bycatch of Protected Species 2009 (SGBYC) that refers to the on-line database.

To convey an idea of how much the website is used, the Webmaster at New England Aquarium reported 5,881 visits (*i.e.*, visitor sessions) from April 25-July 7, 2009, and an average of 80 visits/day over that period. Page requests (meaning page views or page hits) for the same period totaled 9,593 for an average of 130/day.

For the next grant cycle, the Consortium plans to migrate the website from PHP/MySQL code to an open source management system (Drupal) which will improve the ability to edit and maintain the site including adding new content. We will also look for opportunities to attract more volunteers to help upload new and missing content, including by sending periodic reminders to registered users to share new publications.

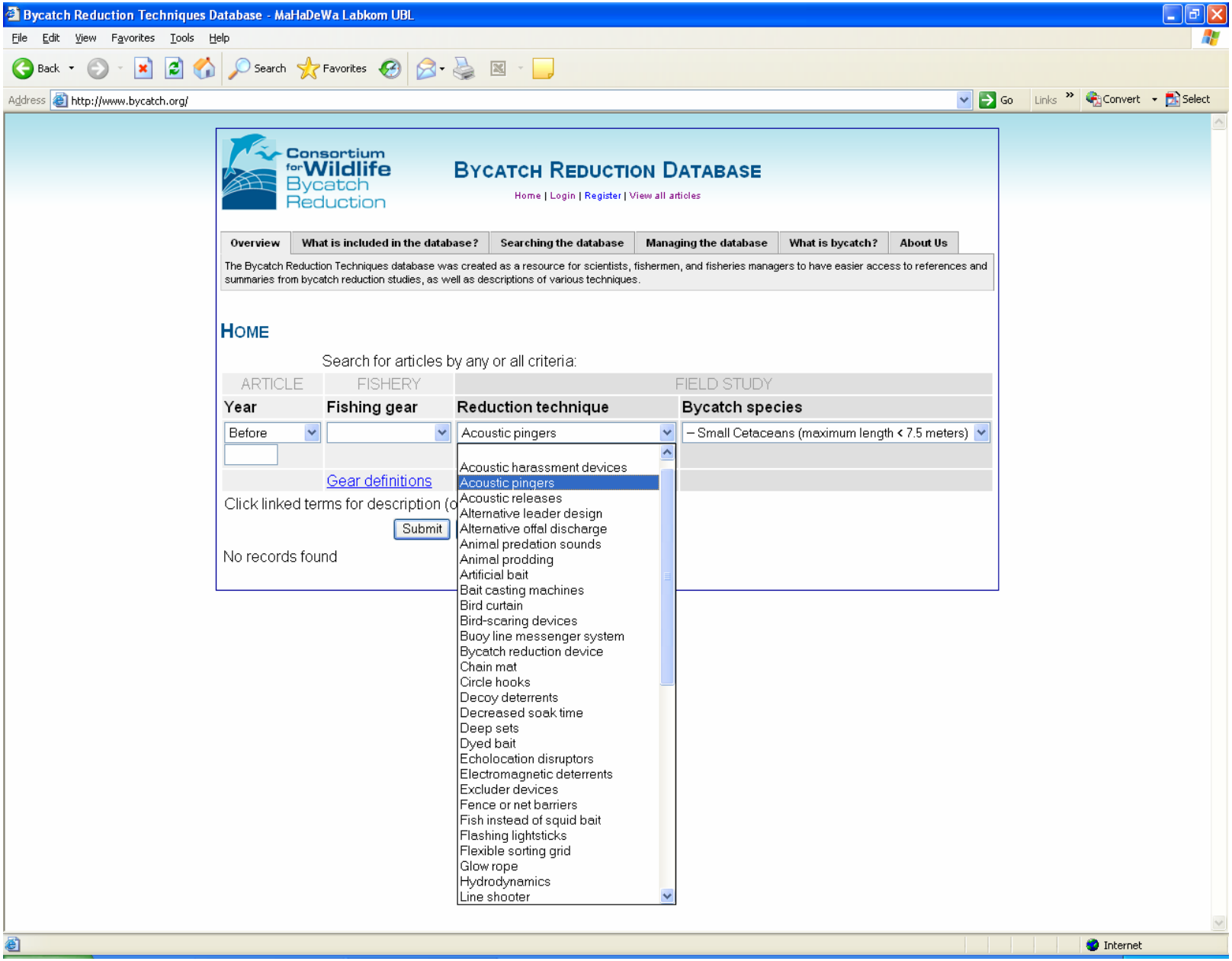


Figure 1. The search page of www.bycatch.org, showing a portion of the drop down menu for selecting a bycatch reduction technique.

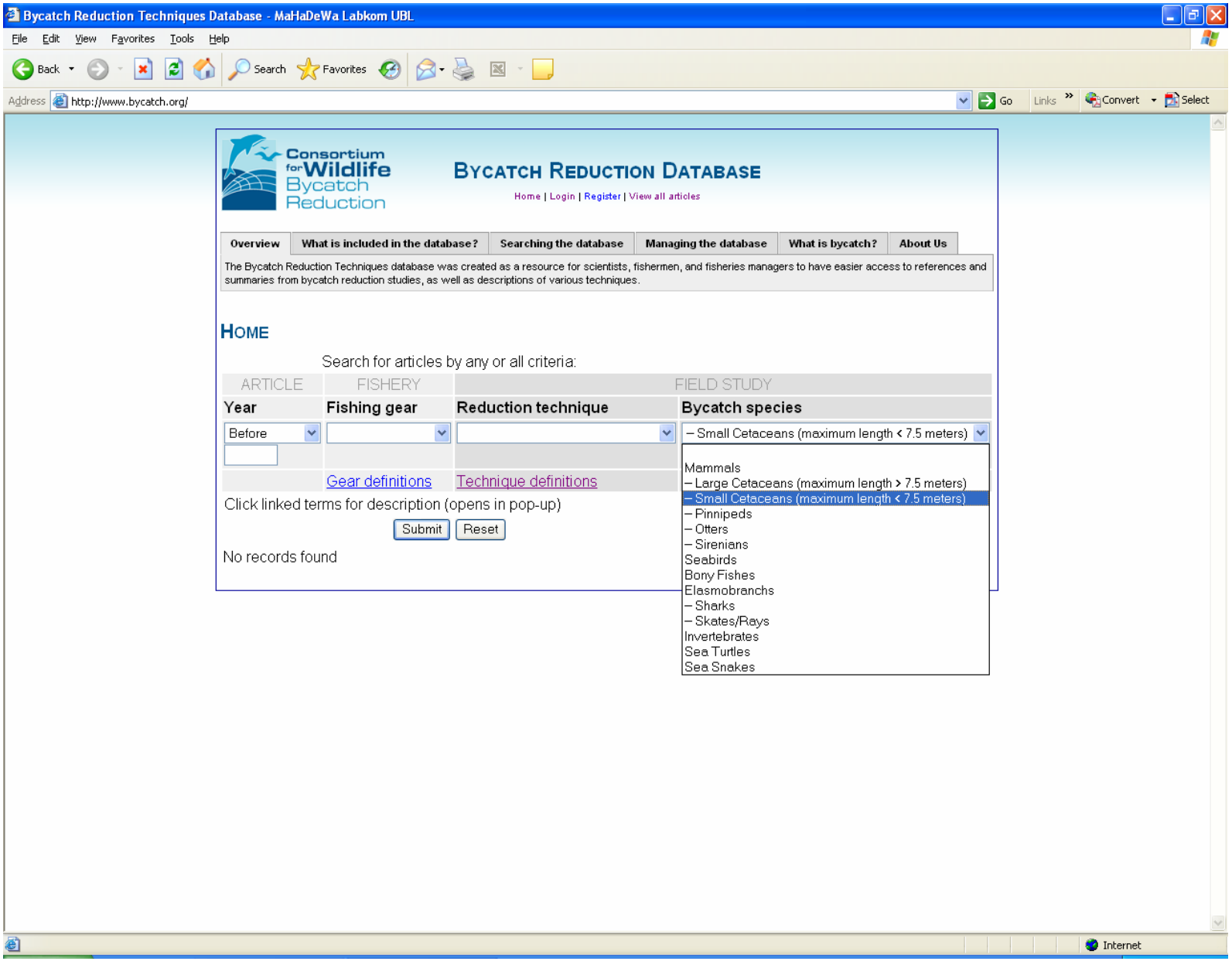
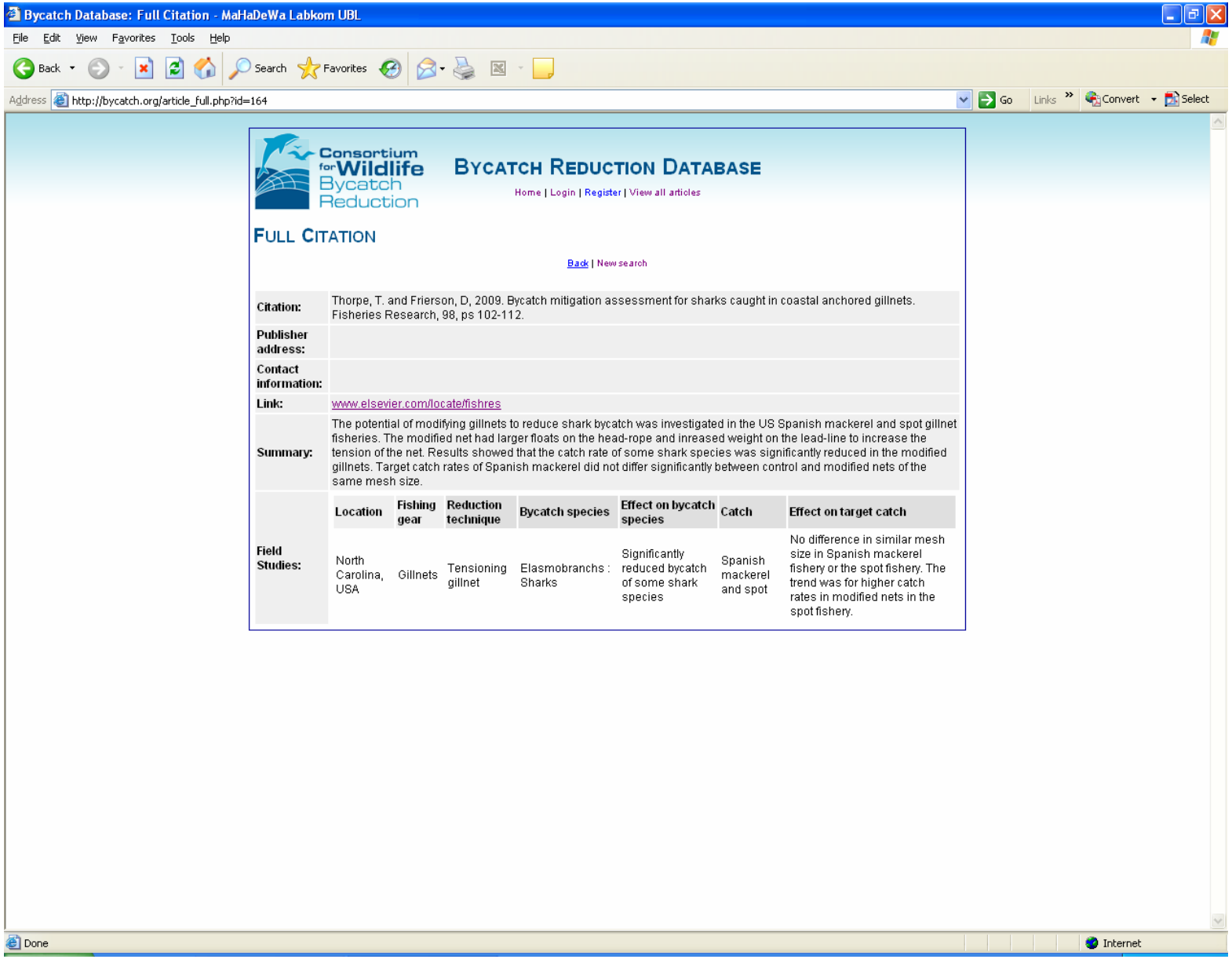


Figure 2. The search page of www.bycatch.org, showing a portion of the drop down menu for selecting a non-target species.



Bycatch Database: Full Citation - MaHaDeWa Labkom UBL

http://bycatch.org/article_full.php?id=164

Consortium for Wildlife Bycatch Reduction

BYCATCH REDUCTION DATABASE

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FULL CITATION

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Citation:	Thorpe, T. and Frierson, D, 2009. Bycatch mitigation assessment for sharks caught in coastal anchored gillnets. Fisheries Research, 98, ps 102-112.
Publisher address:	
Contact information:	
Link:	www.elsevier.com/locate/fishres
Summary:	The potential of modifying gillnets to reduce shark bycatch was investigated in the US Spanish mackerel and spot gillnet fisheries. The modified net had larger floats on the head-rope and inreased weight on the lead-line to increase the tension of the net. Results showed that the catch rate of some shark species was significantly reduced in the modified gillnets. Target catch rates of Spanish mackerel did not differ significantly between control and modified nets of the same mesh size.

Field Studies:

Location	Fishing gear	Reduction technique	Bycatch species	Effect on bycatch species	Catch	Effect on target catch
North Carolina, USA	Gillnets	Tensioning gillnet	Elasmobranchs : Sharks	Significantly reduced bycatch of some shark species	Spanish mackerel and spot	No difference in similar mesh size in Spanish mackerel fishery or the spot fishery. The trend was for higher catch rates in modified nets in the spot fishery.

Done

Internet

Figure 3. An example of a field study summary from the www.bycatch.org database.

B. Consortium Annual Meeting

The 2009 Consortium took place on March 19-20 at the New England Aquarium. The purpose of the meeting was to review the Consortium's progress, and to outline five-year research plans for two specific bycatch challenges that have been targeted by the Consortium: (1) Rope entanglements (from trap and gillnet fishing) of baleen whales and sea turtles, and (2) Conflicts between longlines and cetaceans, sharks, and sea turtles. The meeting agenda, participants list, and presentations are copied in Appendix D, and will be posted on the Consortium's website. The most immediate output from the meeting was a definition of research priorities for the Consortium to carry out with FY2009 funding, developed with input received from participants during the meeting. The longer term (5-year) plans are still under development.

C. Assessment of Endangered Species Bycatch

With support from the Consortium, Dr. Erika Zollett completed a study reviewing endangered species bycatch priorities in U.S. East Coast commercial fisheries. The Consortium contracted Dr. Zollett to undertake this study given the absence of a systematic, multi-taxa bycatch assessment of U.S. fisheries in the Northwest Atlantic. The availability of a comprehensive assessment of bycatch reduction needs in East Coast fisheries is an important reference for the Consortium in identifying and justifying its strategic priorities. Appendix E has the final version of the paper which is now in press in *Endangered Species Research*.

<u>Other - Assessment of Commercially Available Fishing Ropes</u>

One challenge we continue to encounter is the difficulty in drawing any conclusions on entanglement risk and severity as a function of rope type. In general, there is limited information on the characteristics of ropes used in Gulf of Maine lobster pot and gillnet fisheries. For example, what are the ranges of diameters and tensile strengths of the ropes used in these fisheries, and how do those properties relate to entanglement risk and severity? Starting in 2009, the Consortium is proposing a detailed analysis of past entanglement events by combining whale scarring data with a forensic study of gear retrieved from entangled whales. As a general reference for studying the contribution that fishing rope properties make to entanglement risk and severity, the Consortium began collecting baseline information on common ropes used in fixed gear fisheries in the Northeast US. Initially, five different rope types (Appendix G) used as both vertical line, groundline and gillnet ropes were acquired new from IMP (New Bedford, MA) and sent to Southwest Ocean Services (SWOS). Using the same methodology it used for analyzing the breaking strength of Consortium-produced ropes, SWOS assessed three samples of each rope, and the results are presented in Table 1.

Table 1. Results of breaking strength tests of 3 samples each of 5 rope types. Company data are from their respective websites. (See Appendix G for more information).

Prod. Description	Size	Actual Dia.	Overall Length	Overall Elon. 50%	Break Load (lbs)	Overall Elon. Brk.	Company's reported average tensile strength	Break location	CI Std. Wt. 100/ft	Wt. 100/ft
3-Strand Poly Pro,	5/16"	.32"	35.25	9.2%	1,982	22.1%		2 str end taper	1.8 lbs.	2.18 lbs.
Yellow w/Purple tracer,	5/16"	.32"	35.5	10.5%	2,103	25.3%		3 str end taper		
Highliner floating	5/16"	.32"	35.25"	12.7%	2,131	25.5%		3 str end taper		
				Avg.	*2,072*		N/A			
3-Strand Poly Pro,	5/16"	.32"	35.75"	9.1%	2,064	20.9%		2 str end taper	1.8 lbs.	1.88 lbs.
Black w/Green Tracer,	5/16"	.32"	35"	9.3%	1,962	20.7%		2 str end taper		
Hyliner top line gill net	5/16"	.32"	35.5"	7.8%	2,154	21.1%		3 str end taper		
				Avg.	*2,060*		N/A			
3-Strand Pet/PP	5/16"	.30"	35.5"	7.9%	2,683	16.2%		1 str. End taper	2.5 lbs.	2.50 lbs.
Combo Rope	5/16"	.30"	36.25"	6.9%	2,686	15.1%		1 str mid span		
Cotesi Port. Sink	5/16"	.30"	36"	7.6%	2,609	15.3%		1 str. End taper		
				Avg.	*2,659*		*4,850*			
3-Strand Co-Polymer	5/8"	.68"	34"	7.4%	14,174	15.4%		1 str. End taper	7.5 lbs	10.3 lbs.
Green w/wht tracer	5/8"	.68"	34"	6.6%	13,929	13.2%		1 str. End taper		
Polysteel - CA - float	5/8"	.68"	33.5"	10.4%	13,683	15.7%		1 str. End taper		
				Avg.	*13,929*		*10,640*			
3-Strand Co-Polymer	9/16"	.62"	75.5"	7.5%	9,587	17.5%		in splice	6.14 lbs.	9.53 lbs.
Green w/orange-yellow	9/16"	.62"	75"	7.7%	10,665	18.7%		1 str. End taper		
HydroPro polysteel	9/16"	.62"	75.13"	7.5%	9,535	17.1%		1 str. End taper		
				Avg.	*9,929*		*7,950*			
Braided Grn Blk Tan		.36"			1,840			capstan tangent	None	14.16 lbs.
85 lbs./600 ft.		.36"			1,822			capstan tangent		
Novatech CA - sink		.36"		16.7%	1,984			capstan tangent		
				Avg.	*1,882*		*2,000*			

One immediate observation from these data is the relatively large discrepancy for some ropes between what the company's report as the average tensile strength and the results of SWOS tests. This may have to do with the different methodologies used to determine tensile strength, although SWOS uses an industry standard methodology based on guidelines from the Cordage Institute. The results presented here are preliminary and the Consortium plans to carry out further analysis of commercial fishing ropes as part of its future work program. This information would include analyses of fiber content, construction, and linear density of ropes.