

Northeast Cooperative Research Program

NORTH EAST CONSERVATION ENGINEERING NETWORK PLAN

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1. Executive Summary

This report presents the main outcomes of Northeast Conservation Engineering Workshops convened in February and March, 2010 by the Northeast Cooperative Research Program (NCRP). The workshops were organized by John Hoey, Earl Meredith and Carolyn Woodhead from NCRP as part of a search for greater collaboration and networking based efforts by the cooperative research community in addressing the challenges of conservation engineering in northeast fisheries.

The Conservation Engineering Networking Workshops included fishing industry representatives, fishery scientists, managers, and gear manufacturers from the NE region. Don Perkins, President of the Gulf of Maine Research Institute, acted as facilitator for workshops 1 and 2 and Jack Ricchuito of Designing Life providing developmental and planning training and support in network establishment at the second and third workshop.

The purpose of the Conservation Engineering Workshops was to explore and craft the development of a Conservation Engineering Network through identifying and engaging key organizational assets as a means to meet critical conservation engineering needs for a sustainable fishing industry. The rationale for this work stemmed from the planning work undertaken in 2009 leading to the preparation of 'Cooperative Research in the Northeast: A Strategic Direction for 2010-2014' which included the following recommendation:

- Restructure NOAA's Cooperative Research Program to improve performance, efficiency, and adaptability.

Delivery

Develop a comprehensive conservation engineering program to achieve regional co-ordination and technology transfer with industry

1.1 Priority Considerations

Considerations for Conservation Engineering to become more effective were presented at the workshop, including:

- Consider new approaches to optimize outcomes in resolving bycatch challenges
- Improve coordination, integration and collaboration among the Conservation Engineering community
- Meet the requirement for data integration/correlations to assist avoidance strategies
- Improve technology transfer, outreach, adoption and diffusion processes relative to successful bycatch reduction programs resulting from networked program research
- Improve extension process to help industry to adapt and use improved gear or spatial/temporal fleet behaviors to minimize bycatch
- Take steps to meet the imperative for engagement by industry in the process.

1.2 Workshop Focus

The first workshop focused on by-catch issues in the squid fishery and flatfish fisheries and the by-catch and economic opportunity of dogfish as tools to explore the potential of a networking

approach to these issues. The workshop was used as a ‘training tool’ to introduce and get people feeling comfortable and engaged in working through a Network based approach. The second and third focused on the development of a Network through exploring how critical groundfish bycatch challenges could be better addressed through network based collaboration using conservation engineering as an important tool in that process.

Together the workshops enabled discussion and planning on ways to move conservation engineering programs in a direction that will provide higher levels of success, more direct benefit to the commercial fishing industry, and minimize negative economic impacts to sectors and quota-managed species. The workshops aimed to explore how to encourage greater collaboration among all those interested in by-catch reduction, bring appropriate resources and research strengths together to more directly solve by-catch problems, and create an environment of synergy among funding organizations, the fishing community, researchers and managers.

The Workshop Goals were to:

- Engage conservation engineers, fishermen, cooperative research funders, and managers in discussion of how to improve usefulness of their research to management and fishing communities.
- Brainstorm comprehensive solution strategies to reduce by-catch in squid, flatfish, dogfish fisheries and groundfish (sectors) industries.
- Provide an opportunity for fishermen, scientists, managers, and gear manufacturers to explore innovative approaches to reducing by-catch by groundfish sectors and in the squid fishery.
- Provide participants with in-depth understanding of how to organize, develop, and maintain a network to increase conservation engineering collaboration.
- Explore establishment of a conservation engineering network to better progress goals and meet conservation engineering needs in the industry.
- Set stage for next generation of collaborative conservation engineering to maximize impact on by-catch challenges.

1.3 Project Priorities

From the three workshops a number of potential priorities were identified for conservation engineering efforts through the network approach. These priorities fell into several categories:

Developing Conservation Engineering Solutions for small meshed fisheries such as squid, shrimp, whiting:

- Development and implementation of a butterfish bycatch conservation engineering research in the Loligo squid fishery

Developing Conservation Engineering and real time Information Based Solutions for Sectors’ managers to direct their fleets away from high bycatch fishing grounds

- Industry testing, outreach, and extension of proposed technical solutions at industry level (e.g., codend sensors).
- Conservation engineering research to address bycatch issues in underutilized species such as red fish, whiting and hake and non ‘choke’ species such as haddock.
- Reducing habitat impacts from trawl gear and harbor porpoise/gillnet interactions.
- Maximizing use of existing spatial and temporal information to assist industry use avoid strategies (including gathering observer/VTR/trawl survey data, information from industry, and use of GIS mapping).
- Encourage real-time info sharing.

Funding of Mini Grants, Challenge Grants or short term Proof of Concept Projects

- Support highly innovative ideas by providing financial and technical support. Ensure scope for proof of concept projects and integrate positive results into broader network based research and delivery to fishing industry

Network Development and Servicing

- Scope how targeted efforts for network development with industry and among the industry could be delivered.
- Enable extension solutions through network based delivery of research, past and future.
- Ensure that network-based efforts focus on strategic development and solutions for sector based fisheries.
- Research added value and market solutions for underutilized species

1.4 Network Opportunities

Along with the organizational imperative to undertake the restructuring, NCRP has been allocated an additional \$6 million in the 2010 fiscal year with closing date for applications due in early May for projects that could start in Fall, 2010 and Spring 2011, and run one to two years. The Conservation Engineering Network Workshops were also designed to provide information that could inform the RFP call based on a network approach and constituent comments on priorities.

Based on this input, the potential exists to outline terms of reference for Northeast conservation engineering projects with the requirement for a network based approach to conservation engineering efforts.

1.5 Conclusions from the Workshops

The outcome of the planning process has established the following:

- The strategic review of the NE Cooperative Research Program in 2009 established a priority for greater effectiveness, collaboration, and impact for industry which inspired the current workshop and Conservation Engineering Network development efforts.
- While there has been considerable collaboration to date, conservation engineering has not been optimal in addressing bycatch issues in the fisheries in the Northeast. Greater

collaboration and multi dimensional approaches are required to maximize the impact of research and investment.

- The development of a Conservation Engineering Network has the buy-in of those engaged to date and a wide range of expertise related to conservation engineering issues is committed to promoting and supporting the concept and opportunities associated with the network approach
- The emerging Conservation Engineering Network established a range of key questions, potential priorities, short term actions and outline planning process to move forward.
- There is a consensus that industry is not consulted enough and that partnership with industry is critical; an industry panel could be one resource to assist this process.
- There are acute priorities related to squid bycatch issues and a number of researchers already engaged in squid research have committed to collaborate moving forward.
- Sector implementation requires prioritisation for collaborative research solutions to bycatch issues and this should be a focus of work for the NE Conservation Engineering Network.
- There are potentially multiple funding resources that are likely to request a more network-based approach to projects addressing conservation engineering research, while also providing a competitive process.

2 Establishing the NE Conservation Engineering Network

This section presents some of the key components of establishing an effective network, as worked through at the network development workshop¹ followed by the priority and action planning process for the NE Conservation Engineering Network.

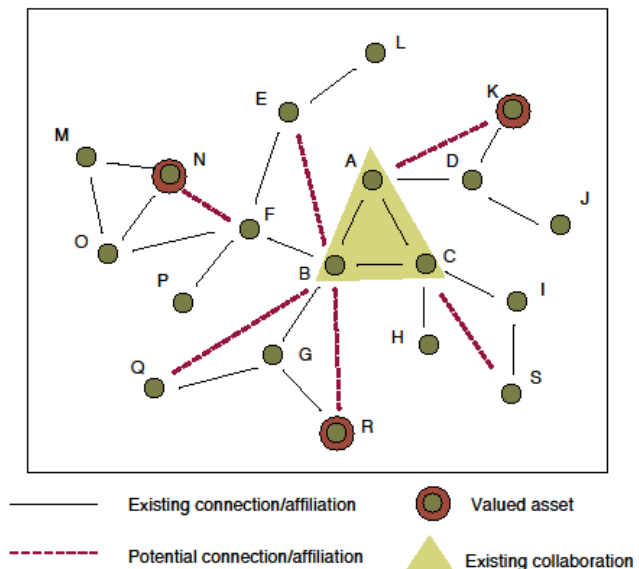
2.1 Principles and Models of Effective Networks

Networks are a dynamic affiliation of people working together in recognition that differences create strength when brought together. They are not hierarchical, but based on the principle of a cross woven structure of working relationships. The cross weaving of a network provides its strength. A robust network is is:

- Self organizing
- Recession proof
- Resilient
- Inventive
- Proactive - visionary
- Pragmatic

So a network is made up of a series of connections reflecting different levels of affiliations, assets and interests. The more connections in a network the more robust and greater the ability to thrive. It is also the connections that are not commonly used that can provide the greatest potential for innovation, creativity and outcomes. The following diagram presents networking based connections as ‘assets’ which can be fully utilized through ‘closing triangles’.

Figure 1: Engaging Assets through Closing Triangles



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¹ The information and diagrams in this section are from Jack Ricchiuto of Designing Life, www.designinglife.com

2.2 Network Fundamentals

Functioning Networks bring together **assets, affiliations** and **aspirations**. Network **assets** include:

Tangible assets

- Buildings
- Natural resources
- Technology
- Equipment
- Vessels
- Budgets

Intangible assets

- Ideas
- Skills
- Talent
- Knowledge
- Experience

The more you share assets the stronger you will be as a network. Sharing is done through having and growing **affiliations** – using and building the network by asking questions such as:

- Who do you go to for ideas
- Who do you go to when you need help
- Who do you have things in common with

Dynamic affiliations are evident when people work together, but are constantly including others in their project, identifying their group's weaknesses, and out sourcing to those who have expertise in the field. Innovation happens more frequently when diverse people are connected.

Maximizing the potential of a network requires **aspirations** with regards to what needs to be achieved. In a strong network, you often see people with shared dreams or vision for the future. We create a vision to see the present differently. The people who see a compelling future will see opportunities in the present that no one else sees.

2.3 Positional Currency in Networks

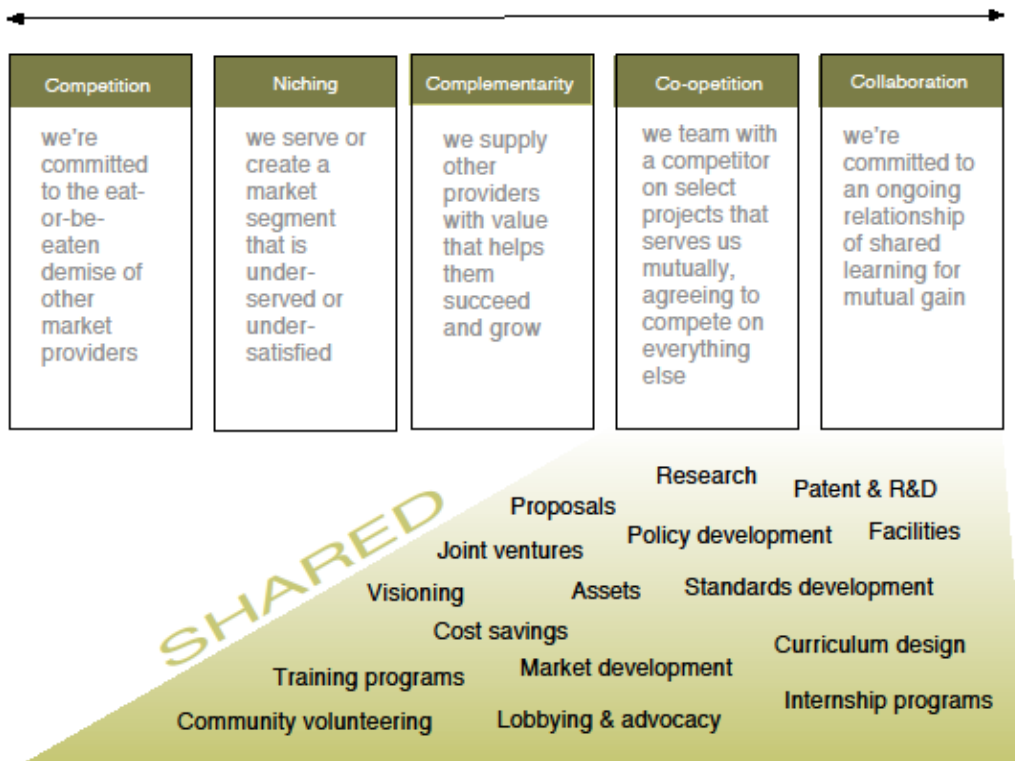
Positional currency in networks refers to the scope, breadth and specific capacity to make up the ‘currency’ of a network. The currency components of a network include:

- Network awareness - the extent of one's knowledge of a network's dreams, gifts, actions, and connections;
- Network niche - the unique value one makes available to a network;
- Network influence - the scope of people in a network with whom one has credibility;
- Network weaving opportunity - the number of "open triangle" opportunities that one has in a network, the opportunities to close those triangles and connect to communities you would not have a connection to;
- Network periphery - the character of connections one has outside of a network.

2.4 Continuum of Market – Network Connections

The following diagram illustrates the increased potential as affiliations move from purely competition based to collaboration.

Figure 2 – The Continuum of Market Network Connections



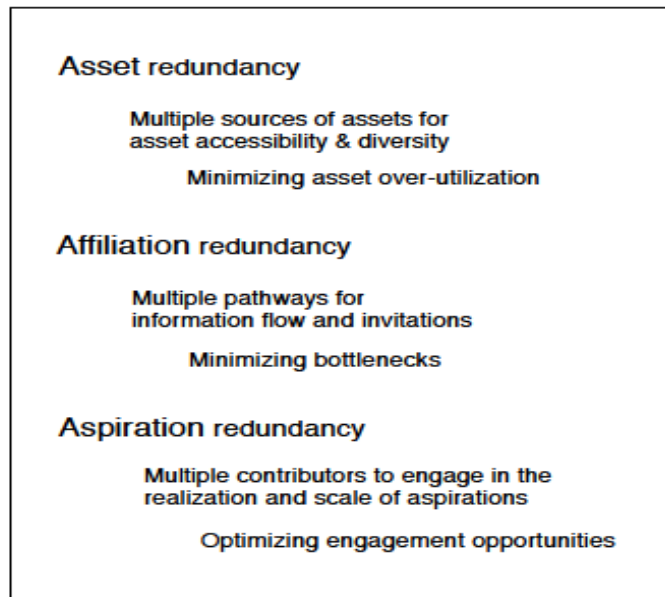
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2.5 Over Supply and Redundancy In a Network

In addition to the requirement for networks to be wide reaching in their search for complementary, niche and influential capacity, a network can also have excess of some assets leading to redundancy. This requires some effort to minimize duplicate asset recruitment, develop strategies to avoid bottlenecks, and energize the search to maximize engagement opportunities.

Figure 3:

The Possibilities & Value of Redundancy in Networks



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2.4 A Conservation Engineering Network – From Concept to Practice

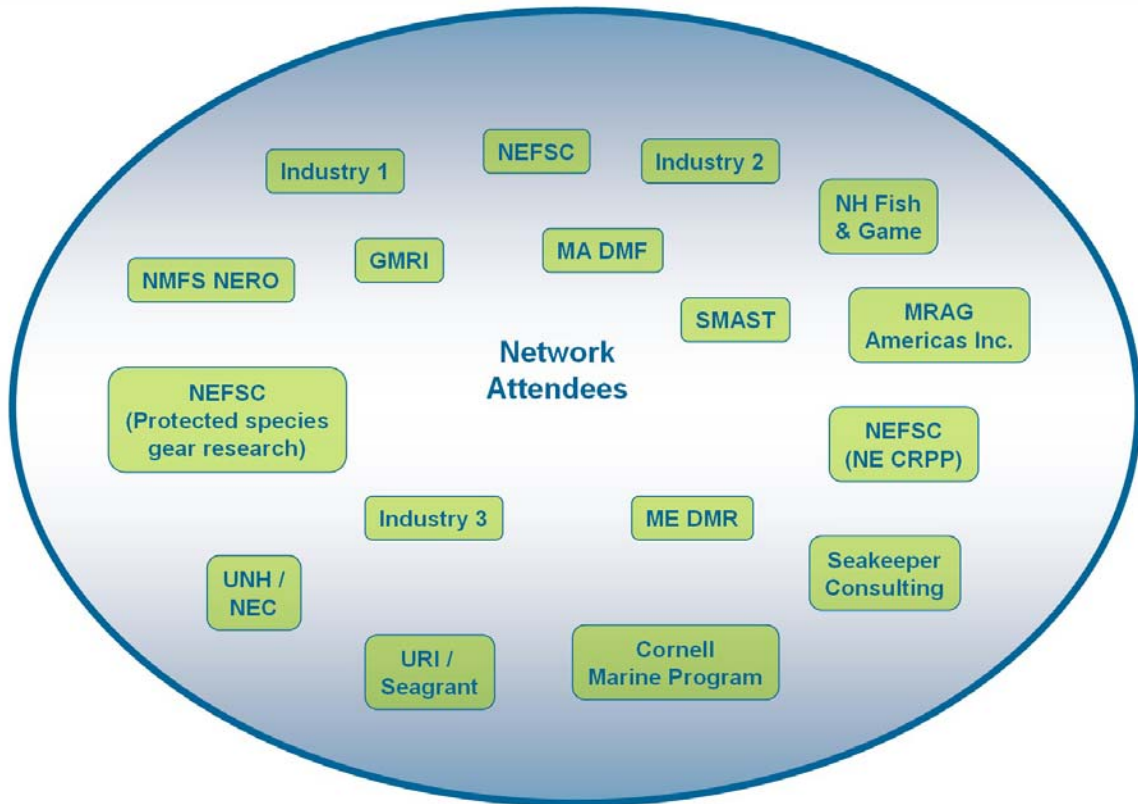
The open meetings presented attendees at the formative Northeast Conservation Engineering Network workshops with an enabling process and challenged them to determine priorities and actions. In addition to teasing out the affiliations and asset base of those at the workshop, attendees also identified the critical questions confronting conservation engineering as identified in the related priorities for action.

The emerging NE Conservation Engineering Network presents an extensive range of affiliations and an existing history of collaboration, with great potential for strength, innovation, and vision. This reflects the capacity that has been built as a result of 10 years of funding for Cooperative Research in the Northeast.

Figure 4 on the following page summarizes the initial participants in the Northeast Conservation Engineering Network.

Figure 4:

Network represented during the 2nd workshop



2.7 Asset and Affiliation Gaps

Industry:

While the emerging Network has a strong foundation of science and research capacity, it was agreed that industry engagement needed to be much stronger and was key to any further conservation engineering efforts. In the groundfish fishery, the establishment of an 'industry panel' was suggested, perhaps taking the form of sector representation. However, the Network also determined that common pool representation should also be contacted.

Net and Gear Manufacturers:

It was agreed that the engagement of net and gear manufacturers at the workshops and in conservation engineering work was essential. They provide deep practical knowledge and a critical 'extension' process.

2.8 Network Organization

Networks need to be self-organizing. The evolution of a network is led by priorities that emerge from key questions to be addressed. Thus those organizations with appropriate asset base (e.g.,

research) and affiliation (e.g., industry) specialties committed to following up on a range of actions in a two week timescale subsequent to the workshop.

2.9 Network Action Planning

For practice using a network approach, the network development process took participants (members) through an exercise of exploring key questions through three levels on a network and ‘open space’ planning basis, as summarized in **Figure 5**. This enabled members to move to whichever question they felt their asset base was most relevant to. It also enabled the merging of questions and the cross referencing of potential actions. The Network action planning questions discussed are presented in **Table 1** and emerging actions in **Table 2** on the following pages.

Figure 5:

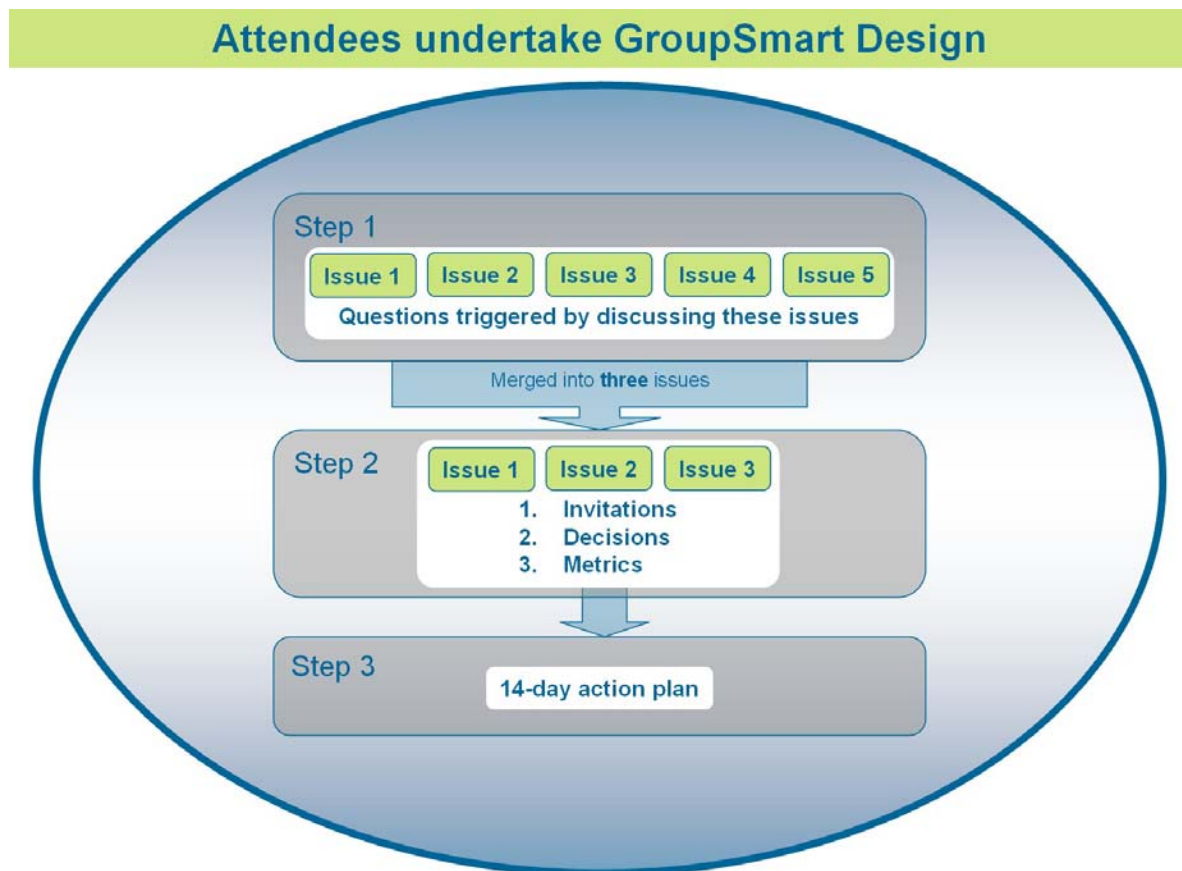


Table 1 - Key Questions Identified in the Network Planning Process

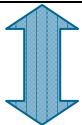



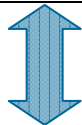
	Merged		Merged	
Question 1	Question 2	Question 3	Question 4	Question 5
<i>What are the affects of targeting only older fish? (e.g. large mesh for cod to avoid bycatch)</i>	<i>What can we do in a legal way to make these laws change?</i>	<i>In light of how Amendment 16 is structured how can the industry be profitable and what are the economics of the markets?</i>	<i>How can Co-operative Research affect the current reality? What is the role?</i>	<i>Given the urgency challenges facing the sectors in setting up how we can engage with them in addressing conservation engineering?</i>
				
<ul style="list-style-type: none"> • What happens to the infrastructure when you kill off the spawning stock? • What does this do to assessments? • What does this do to optimum yields? • Are there other fisheries that have tried this? • How do we fish a more representative mix, sizes and species? • Are basket quotas a solution (multi species catch)? • Which species interactions are most crucial to address? 	<ul style="list-style-type: none"> • Who benefits from the proposed direction? • How can the process be restructured to be less destructive to the industry? • Were sectors just a solution to consolidate the industry? • Where is the fiduciary responsibility of NEFNC & NMFS? 	<ul style="list-style-type: none"> • How can sectors/groups be organized to be more efficient? • How can resources of cooperative research network assist in improving viability? • How can the outcome of capacity reduction be positively managed? • How do we support exiting fishermen with diversity? • What is the fleet vision? 	<ul style="list-style-type: none"> • Can we provide a response for 2010? • Can CR supplement \$ for the industry? • Can CR provide new information? real time? biological/ socio-economic/management. • Can CR address bycatch closures in order to maximize industry without creating new problems? (older age classes) • How should information collected be inserted into the management process? 	<ul style="list-style-type: none"> • How do we overcome delays and blocks to flow of information? • Are key players willing to participate in a network led process? • Are we ready to step up? • How do we engage and build capacity in the network to provide solutions? • How do we facilitate scientist/managers, fishermen collaboration? • How do we engage sectors on regulatory process?

Table 2 - Priority Questions, Decisions and Measurables

	Priority Questions	Invitations	Decisions	Metrics
<p>Question 1 <i>What are the affects of targeting only older fish? (large mesh for cod to avoid bycatch).</i></p>	<ul style="list-style-type: none"> • Impact of killing off the spawning stock? Implication for assessments? • What does this do to optimum yields? • Are there other fisheries that have tried this? • How do we fish a more representative mix, sizes and species? • Which species interactions are most crucial to address? 	<ul style="list-style-type: none"> • Biological - anyone interested in fishery Science. • URI, UNH, SMAST, GMRI, DMF, ICES, Science Center, etc. Regional, national and internationals interested in this discussion. 	<ul style="list-style-type: none"> • Determine if there should be a limit on the maximum mesh size. • Establish what kind of monitoring will be needed. 	<ul style="list-style-type: none"> • Did the fish size mix stay the same or change. • If it has changed is it significant.
<p>Question 2 <i>How can the industry be profitable in respect of market economics and what can we do in light of how Amendment 16 is structured?</i></p>	<ul style="list-style-type: none"> • How do we change 10yr rebuilding approach • How can a capacity reduction process sustain most diverse fishery? • Must this be Survival of the fittest? • How do we support exiting fishermen with dignity? • What is the fleet vision? 	<ul style="list-style-type: none"> • Sector managers early adaptors? • Business operations experts, SBA coop business expert, seafood buyers, restaurant owners. • Marketing experts. 	<ul style="list-style-type: none"> • Workshop bringing in the invitees named together to develop of business plan. • Top down investigation to determine profit. • Temporal/spatial info on fisheries – how to get sectors to share information. • Facilitate discussions on a Sector level re risk of a system crash and what to do. • This is a time for real creativity. 	<ul style="list-style-type: none"> • Sector and industry Survivors vs. bankrupt/giving up on fishing. • How individual costs have been minimized. • Maximize the \$ value of fish per lb.
<p>Question 3 <i>What role and engagement process can Conservation Engineering Research carry out in respect of the reality facing the industry and sectors in particular?</i></p>	<ul style="list-style-type: none"> • Can CR achieve anything in 2010? • What is the role? • What is the affect of the time scale on sectors? • What is the Conservation Research asset - money, socioeconomic data - to address bycatch challenges? • How should solutions be informed by input from the industry, management/science? • How do we access funding to support this work in a timely manner? 	<ul style="list-style-type: none"> • Add Ryan Silva to the FF panel to provide link with regulatory side. • Open up lines of communication – ensure they are diverse, fully representative, not exclusive BUT coordinated. • Communication with state reps explain to the people not involved in the fishery what is going on in this industry. • Invite Sector reps. 	<ul style="list-style-type: none"> • Use Fishermen's Forum panel meeting to inform the network. • Ask questions re: what collaborative research can do to open communication. • GMRI/NEC/CR discuss communication strategy. • Log/summarize Fishermen's Forum session. 	<p>Invitations & communications which include:</p> <ul style="list-style-type: none"> • Communicate with Snow/Collins. • Add Ryan Silva to Fishermen's Forum session panel • Outcome of prioritized use of \$\$ and effort/resources. • Produce 1-2 pager explaining, network and outcomes of this workshop. • Forum participation. • Ensure all sectors are represented.

Table 3 - 14 Day Action Tables

	Actions	Specifics	Who	Date
Question 1 <i>What are the affects of targeting only older fish? (large mesh for cod to avoid bycatch).</i>	<ul style="list-style-type: none"> • Compile existing information 	<ul style="list-style-type: none"> • Request access to observer database to look what gear sizes is being used 	<ul style="list-style-type: none"> • Dan Salerno and Mark S 	03/10/10
	<ul style="list-style-type: none"> • Look at international experience 	<ul style="list-style-type: none"> • Email groundfish scientist in other countries to get their concerns and see what experiences they have had with this. 	<ul style="list-style-type: none"> • Pingguo He 	03/10/10
	<ul style="list-style-type: none"> • Convey message to science centre 	<ul style="list-style-type: none"> • To come from establish fisheries scientist 	<ul style="list-style-type: none"> • Henry Milliken 	03/10/10
Question 2 <i>How can the industry be profitable in respect of market economics and what can we do in light of how Amendment 16 is structured?</i>	<ul style="list-style-type: none"> • Devise a sector Needs Analysis through consultation • Identify a range of potential organizational development resources 	<ul style="list-style-type: none"> • Speak with each sectors lead person • Identify what plans are in place. • See what assistance they already have 	<ul style="list-style-type: none"> • Initial contact: Libby Etrie and Jonathan Labaree (GMRI) RE Vito, Jackie, and Maggie Raymond. 	03/03/10
	<ul style="list-style-type: none"> • Kate to coordinate and liaise with Chris Glass RE Fisherman's Forum and consistent message 	<ul style="list-style-type: none"> • Tease out what would work best for each sector • Meeting management • Trading and networking • Managed effort • By-catch hotspots • Market opportunities • Cost management • Temporal/spatial • Technical/administrative training 	<ul style="list-style-type: none"> • Steve Eayrs Port Clyde Glen Libby and Eric Brazer (Cape Cod). • Secondary contact to 'movers and shakers' – Chris Brown, • Frank Mirachi - John Williamson • Kate Burns and Chris Glass coordinate 	03/10/10 03/02/10
Question 3 <i>What role and engagement process can Conservation Engineering Research carry out with respect to the reality facing the industry and sectors in particular?</i>	<ul style="list-style-type: none"> • Network Capacity building: Populate invitations list 	<ul style="list-style-type: none"> • Collate contact information – attendees name, affiliation, contact info, assets 	<ul style="list-style-type: none"> • GMRI – Patty Collins / Shelly Tallack 	03/05/10
	<ul style="list-style-type: none"> • Internal circulation of workshop summaries to relevant groups 	<ul style="list-style-type: none"> • 1-2 pager (mission statement) • Ensure accurate messaging 	<ul style="list-style-type: none"> • Kate Burns 	03/05/10
	<ul style="list-style-type: none"> • Engage with industry 	<ul style="list-style-type: none"> • Fishermen's Forum Panel as starting point 	<ul style="list-style-type: none"> • Chris Glass 	03/10/10
	<ul style="list-style-type: none"> • Inform decision makers 	<ul style="list-style-type: none"> • Target representatives • Start asking questions: current reality, by-catch • Info dissemination/press release • Websites (UNH CRP/NEC/SNECRI/GMRI) • Others? Questionnaire, blog/comment box 	<ul style="list-style-type: none"> • Snow (Chris)/Collins (Peg Parker RI delegation), Schwab (John H.) • Chris Glass co-ord. (Maggie at UNH) • John H. Carolyn W. Emerson H. Rob J., Mark S., Earl M. Ryan S. Kate B. Laura S. 	03/10/10
	<ul style="list-style-type: none"> • Start research, include non sector needs 	<ul style="list-style-type: none"> • Effectively collate/disseminate database systems • Summarize key questions from the various input meetings/collaborations 	<ul style="list-style-type: none"> • C Glass, K Burns • Kate Burns 	

3 Project Ideas Emerging from the Workshop

Whilst the Network planning exercise identified the need to have more industry consultation in identifying conservation research priorities, industry represented at the meetings informed the workshop of potential priorities on a number of issues. The following section presents the projects that were discussed.

3.1 Squid By-Catch

The squid by-catch discussion largely focused on the challenge of butterfish which is of particular concern to southern New England. Successful conservation engineering solutions on bycatch issues could be fundamental to the survival of the industry.

There is a lack of comprehensive stock analysis of butterfish due to the relative lack of interest in them as a marketable commodity in recent years. Butterfish restrictions to be introduced in 2011 are viewed as relatively restrictive. A precautionary approach is being taken on the amount of butterfish catch allowed because of the lack of comprehensive data. This will put serious constraints on the squid fishery.

Butterfish life span is estimated at around one year with an apparent 45% natural mortality rate and variable recruitment. This creates greater challenge in monitoring stock levels. Industry wishes to partner with researchers to identify bycatch solutions. They also wish to see much more effort and accuracy regarding assessments and limits.

3.2 Suggested collaborative and networked research topics:

Behavioral Research:

Understanding, from a fisheries perspective the:

- Different life histories between squid and butterfish.
- Understanding of distribution behaviors.
- Seasonal trimesters differences between squid and by catch.
- Ways to avoid large discarding events;
 - catastrophic tows;
 - where – depth
 - when, duration
 - conditions – lunar/light
- Inshore winter flounder by-catch versus summer/fall by-catch.

Gear Technology to Research:

There was an interest in the following gear technology research subjects:

- Value of an increase in mesh size
- Use of the “Millionaire Net”
- Catch sensors
- Composite square and color mesh
- Dark tunnel in extension
- Other ideas – blow out panel /zipper lines

Use of Video/Sonar would be important in this research (e.g., to examine impact of net, tunnel and sweep variations, potential catastrophic catch)

3.3 Outcome from the Squid Discussion

1. During the first Conservation Engineering Workshop in Narragansett, several organizations presented their current research interests in the subject. It was agreed that this group should get together and undertake their efforts on a networked and collaborative basis. This included UMass Dartmouth School for Marine Science and Technology, Massachusetts Division of Marine Fisheries, NE Fishery Science Centre, Cornell Marine Program, Superior Trawl and University of Rhode Island Fisheries Centre. The NEFSC offered to make some equipment available
2. It was agreed that there needed to be some 'shake down' proof of concept work followed by greater investment in tools that could have a real impact.

3.4 Groundfish / Flatfish

Discussion on groundfish issues, including sectors, concluded with agreement on the urgency of the by-catch issue given the hard TAC situation for 2010. Industry representatives stressed the need to engage with the industry more broadly– perhaps through an industry panel. It was also felt that there was a very short time to apply existing conservation engineering knowledge and information to support the difficult transition to sectors; time is being wasted.

Potential projects include:

- i. Gather existing research information and disseminate. Use spatial and temporal solutions - focus on data and real time information gathering and dissemination to assist avoidance solutions
- ii. Refine gear
- iii. Develop sector strategies (dealt with at Workshop 2)

Spatial and Temporal

- Map abundance vs. location (eg Scallops in closed areas)
- Seasonality key to bycatch avoidance
- Winter flounder, good distribution info, but holes in data and more research is needed
- March/April/May distribution of winter flounder @ identification of spawning grounds would help
- US/CAN treaty agreement, are there opportunities to use this rather than view it as a negative? This needs to be thought through.
- Seasonality trumps gear in terms of impact

Refine Gear

- Industry would like to test gear through a sectors based approach – eg. sensors
- Other projects require further industry consultation

Develop Sector Strategies

- There needs to be further consultation with industry to identify best options for conservation engineering and bycatch solutions specific to the needs of sectors in both the short and longer term.

Improve assessments

There is a permeating view that assessments need to be continually improved. In addition the sense is that management regulations are not responsive to research findings. Desire was expressed for NMFS to accelerate regulations toward input control with flexibility.

3.5 Outcome from the Groundfish Discussion

1. There is an urgent need to consult further with industry to identify potential projects.
2. Explore the potential of data and information mapping on spatial and temporal issues to inform avoidance strategies.

4 Conclusions

The outcome of the planning process has established the following:

- The strategic review of the NE Cooperative Research Program in 2009 established a priority for greater effectiveness, collaboration, and impact for industry which inspired the current workshop and Conservation Engineering Network development efforts.
- While there has been considerable collaboration to date, conservation engineering has not been optimal in addressing bycatch issues in the fisheries in the Northeast. Greater collaboration and multi dimensional approaches are required to maximize the impact of research and investment.
- The development of a Conservation Engineering Network has the buy-in of those engaged to date and a wide range of expertise related to conservation engineering issues is committed to promoting and supporting the concept and opportunities associated with the network approach
- The emerging Conservation Engineering Network established a range of key questions, potential priorities, short term actions and outline planning process to move forward.
- There is a consensus that industry is not consulted enough and that partnership with industry is critical; an industry panel could be one resource to assist this process.
- There are acute priorities related to squid bycatch issues and a number of researchers already engaged in squid research have committed to collaborate moving forward.
- Sector implementation requires prioritisation for collaborative research solutions to bycatch issues and this should be a focus of work for the NE Conservation Engineering Network.

- There are potentially multiple funding resources that are likely to request a more network-based approach to projects addressing conservation engineering research, while also providing a competitive process.

Appendices

- 1 Input from Industry re: By-catch Issues in Sectors**
- 2 Funding of Collaborative Research and Research Set Aside Projects**
- 3 Summary of Comments from Workshop One Discussion**
- 4 Summary of findings from Workshop sessions on Flatfish and Dogfish**
- 5 List of Participants**

Appendix 1: Input from Industry re: By-catch Pressures in Sectors

During the workshop two industry representatives from the sectors provided a ‘reality check’ to the workshop and presented the critical by-catch factors.

Industry representative one explained that under the Days at Sea system he had purchased three permits at \$100,000; each had 52 days. The days at sea allocations changed year on year from 52 days in year 1, 38 year 2, then 24, and then became worthless with the switch to quota based systems. This means that he, like other fishermen, has a considerable debt from purchase of permits, which are now worthless. This placed an economic burden on the industry in advance of the sectors program.

The value of one of the permits is for the Gulf of Maine catch history – which has been applied to his quota. This provides the following:

- 16,000 lbs cod, 244 lbs haddock, 962 lbs of yellow tail, some blackback and pollock
- His primary permit has 69,000 lbs of codfish 83,700 lbs of black back and some incidental fish.
- In 2009 he caught 7550 lbs of blackback, his allocation for 2010 is 1204 lbs blackback
- He caught 146,000 cod in 2009, his allocation this year is 85,000 cod.

Only those who have a healthy catch history will still be in business at the end of this year - it is what you don't have that will put you out of business... the by-catch allocations are so small.

Industry representative two spoke of the fear and anger the industry was currently experiencing:

There is tremendous uncertainty. There are no young people coming in; those that are in have no catch history and will be the first out. Research has to help find a way forward

He suggested that the system of allocations and by-catch pressures could have a negative impact on how species are fished. For example, schools of big fish will be targeted in cod to avoid haddock – how will this impact on stock age structure?

In addition, he suggested that unless there is an onboard observer, it is highly likely fishermen will dump undesired by-catch – rather than go out of business.

So how do we redistribute the fish, to get the mix we want?

He suggested that the fishery is going to collapse by the end of July, and that there isn't going to be trading that is envisioned because the sectors weren't given enough time to set it up. May 1st deadline for ACL's was madness. It was a shoot/ready/aim approach; too many things were not explained.

Appendix 2: Funding for Collaborative Research and Research Set Aside Projects

Research Category	2000	2001	2002	2003	2004	2005	2006	Total
Industry Based Survey	570.1					1,555.5	5,364.7	7,490.3
Conservation Engineering/SAP	476.8	858.0	1,093.2	374.4	1,785.2	456.9		5,044.5
Cod Tagging							3,781.8	3,781.8
Study Fleet		67.7			2,822.2			2,889.9
Habitat	151.0	212.8		1,513.3		85.0		1,962.1
Resource Dynamics				250.0			215.0	465.0
Outreach/Education						162.2	127.2	289.4
Socioeconomic						98.5	131.9	230.4
Strategic Planning/Scoping	212.2							212.2
Stock ID / Genetic	79.9							79.9
Grand Total	1,490.0	1,138.4	1,093.2	2,137.7	4,607.4	2,358.1	9,620.5	22,445.4

Note: NCRP are updating this summary and conducting a major 10 year review that will attempt to track earmarks as well as the RSA projects that are not included here.

Research Set Aside

In addition to Chart 1 the Research Set Aside - Projects Funded from 1999-2006 were

- Scallop (2001-09).....41 projects @ \$5.40 million
- Monkfish (2005-09)..... 9 projects @ \$1.04 million
- Mid. Atl. RSA (2001-09) ...26 projects @ \$3.40 million
- Herring (2007-09) 1 project @ \$242 thousand

77 total projects valued at just under \$10 million

Conservation Engineering Projects 2000-2006

GEAR	MA RSA	Monk RSA	NCRPP	NEC	SCA RSA	TOTAL
BSB Pot	4					4
Crab Trap			1			1
Fish Pots				4		4
General Gear				1		1
Gillnet		1	1	9		11
Gillnet/MMPA				1		1
Herring Trawl			1			1
Hook			2	5		7
Jonah Crab Trap				1		1
Lobster Trap				2		2
Lobster Trap/MMPA				1		1
Magnets				1		1
MMPA				5		5
Monkfish Trawl			2	1		3
Mortality				1		1
Scallop Dredge				3	13	16
Shrimp Trawl			2	6		8
Small Mesh			2			2
Squid Trawl	4					4
Temporal			1			1
Trawl	1		13	28		42
Trawl/Habitat				2		2
Urchin Dredge				1		1
Video Bycatch				1		1
Grand Total	9	1	25	73	13	121

Appendix 3: Summary of Comments from Workshop One Discussion

Conservation Engineering Drivers

- Need to work more efficiently because there isn't a quick fix to the limited number of research specialists and the funding doesn't go as far as it used to.
- Need to be more effective at engaging and supporting industry – they must take a larger role in deciding what proof of concept or pilot studies should be advanced.
- Must be more effective in helping industry adopt the new technology - what we call extension services.
- Need to take advantage of Sea Grant.
- We need new ideas and new ways of doing things to get deeper impacts with greater reach and help the industry reach for larger impacts.
- We are going to be faced with critical by-catch issue that could impact the future of sectors and it is necessary to come up with gear or processes, behaviors or regulations to keep people fishing.
- Start the dialog at a new model to move forward and solve the Conservation Engineering bycatch issues.

Conservation Engineering Challenges

The challenges to addressing the recommendations of the strategy include:

- Limited number of senior researchers who are dependent on soft funding through annual competitions. This cascades to field staff, and graduate students.
- Many small studies have been spread across different gears, areas, and seasons.
- Little integration of results and data access is a challenge.
- Perception that Cooperative Research is controlled by a small number of researchers (NMFS, State, and Academic) working with a small number of fishermen.
- Solutions must be economically viable for commercial operations, practical and simple.
- Fishermen know gear and operations – their active engagement translates to success.
- Temporal and spatial changes in harvesting can address some problems and enhance gear changes.
- Real solutions will have conservation value, rebuilding stocks and maintaining our fisheries.

Operational Issues

- There need to be a plan so people know that they will not have to spend their time writing and processing proposals.
- Real challenge in meeting the targets and requirements for 2010, with worries about the implications of not succeeding.
- Although there is a push on more collaboration, the competition format hasn't changed and this contradicts what is being suggested.
- There is a clear message that monies should connect with sectors.
- There is a view that as the only place with RSAs in the country, there is a lack of understanding and support for this support mechanism which is worrying.

- Whilst awards must be made in the first half of 2010, projects can go through 2011, 2012 and probably further to 2014. This depends on the methods used to allocate funding – such as to the NE Consortium.

Lessons Learned

- Frequent dialogue among cooperative research partners is essential for success and overall program efficiency.
- Enhanced responsiveness to management and research priorities as well as initial results is needed.
- Early and regular collaboration with NMFS scientists and technical people on Council committees throughout the project makes the results most useful to management.
- Formal cooperative agreements and network arrangements were suggested for investigation so that we could provide greater opportunities to leverage infrastructure, specialized knowledge and overall efficiency.
- Broad regional capacity can be built by sharing products developed and equipment purchased among cooperative research participants.
- Peer review of results is essential prior to consideration of information by the Councils.
- Project data collection Project data must be submitted, reviewed and archived in a timely manner to be most useful to the scientific and management process.

Potential for Collaboration

There was considerable engagement on the potential for collaboration. There are lots of tools & insights that could be brought into a networking based research and usage. Of particular note were the following:

- Documenting and sharing modifications
- Consolidate info and data
 - Spatial
 - Temporal
- Potential for the existing project website and available information to be more fully utilized
- To devise further instrumentation
 - Observing
 - On trawls
- Enabling further extension of proposed technical solutions to be more fully tested at industry level.

Appendix 4 Summary of findings from Workshop sessions on Flatfish and Dogfish

Flatfish

The outcomes from this session are divided into thematic areas: The use, transfer and sharing of information; carrying out a transfer program using previous and existing research results; exploring the use of real time information; and carrying out new research through a collaborative process.

Use, transfer, and sharing of information

- Use methods such as the hake symposium
- Prepare a net inventory by vessel size
- Compile and consolidate past studies (NEC, CRP)
- Real time harvest data
- Share topless trawl info

Communication Targets

- Provide fisherman/sectors with a variety of tools/test results - use sectors as a communication channel.
- Use net and gear manufactures to demonstrate and communicate improved selection technologies.
- Transfer of research outcomes amongst conservation engineers

Research Area - Focus on Avoidance

- Raised trawl/foot – rope
- Boards/ground cables
- Fine-scale data on spatial differences for species
- Carrying net design vs. vessel size (dimensional analysis?)
- Improve Separation: eg. rope separator and black tunnel

Research Area - Life History/Behavior

- Environmental correlates
- Vulnerability of juveniles
- Identify time/place life history & shift from historical closures to finer scale protection
- Seasonality

Research Area - Response Behavior

- Flats/Rounds vs. Sweeps
- Varying trawl speeds
- Depth/visibility vs. visual cues

SECTORS

Discussion on sectors concluded with agreement on the urgency of the by-catch issue given the hard TAC situation. Industry representatives stressed the need to engage with them – through an industry panel. It was also felt that there was 6 months to maximize what knowledge and information is already there as time is being wasted. Largely the discussion determined that there should be a sector focused by catch strategy. The following methodologies were presented:

- Gather existing research information and disseminate.
- Spatial and temporal solutions - focus on data and real time information gathering and dissemination to assist avoidance solutions
- Improve assessments
- Refine gear
- Develop sector strategies

Spatial and Temporal

It was agreed that the collation, presentation and mapping of already gathering data and information on species location by season and area would be a valuable tool for fishery by catch avoidance and effective fishing activities. The following issues were raised:

- Map abundance vs. location (eg Scallops in closed areas)
- Seasonality key to bycatch avoidance
- Winter flounder, good distribution information but there are holes and more research is needed
- March/April/May distribution of winter flounder @ identification of spawning grounds would help
- US/CAN treaty agreement - are their opportunities to use this rather than view it as a negative
- Seasonality trumps gear in terms of impact

Improve assessments

There is a permeating view that assessments need to be continually improved. In addition the sense is that management regulations are not responsive to research findings. It would help if NMFS moved to accelerate regulations toward input control with flexibility.

Refine Gear

The following gear refinement ideas were presented:

- 1st contact with net
- Video analysis
- Non-trawl strategists
 - Scottish seine
 - Gill net
- Look @ 2009 NAFO report done by ICES
- Small whiting mesh vs. flatfish
- Boards/cables off bottom
- Varying bottom contact/weight

DOGFISH

The session on dogfish opened with the general view that although dogfish recruitment is a slow process relative to more other species under consideration, current dog fish stocks are very high and present a real problem to the fishing industry. The discussion fell within the following headings, behavior, information management and economics. Largely it was felt that the strategy should focus on:

1. Management in a predator/prey ecosystem context
2. Should a male fishery be targeted?
3. Improved markets opportunities research needed.

A Male fishery?

There are more male fishes than female and the best way a fishery could work is to target males. To do this more knowledge is needed on the following:

- Greater understanding of dog fish biology
- Do identify ways a fishery can;
 - Find males?
 - Reduce female
 - Address discard mortality?

Behavior

Research is needed on:

- Migration – Time/Area info
 - In/off
 - Vertical
 - Day/night
 - Enviro-correlate
- Schooling behavior – acoustics?
- Electro-magnetic sensitivity
- Not good swimmers
- Don't turn well
- Male/female separation

Potential Conservation Engineering Solutions require research on:

- Selective removal - fishing practices
- Post-capture survival
- Tags
 - Conventional
 - Acoustic
 - Data storage
 - Satellite
- Data returns on females

Avoiding Dogfish

The following gear technology topics could benefit from research:

- Sonar use
- Demersal whiting trawl via grate

- Eliminator trawl
- Rope trawl
- Separator panels
- Smart gear
- Longline bait selection for haddock
- Discard survival (longline)
- Gillnets for vertical separation
- No gillnet size, selective study to date

Economics

As well as avoidance and a targeted fishery solutions, the workshop also concluded that more work was needed to identify market based solutions for dog fish. This included more knowledge about

- Existing fish markets
- How to add value?
- The benefits of an MSC scheme for market enhancement
- Find new markets (e.g., slime eels skins for leather)

Appendix 5: List of Workshop Attendees

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