

THE WAY FORWARD

their strengths and resources, focusing on the common issues, and helping out where they can means that we do not fight our battle alone, that we have the resources of our battalions gathered here today on call and on line.

There remains one challenge that needs to be addressed and that is the continuing mechanism in which our efforts must become firmly anchored. Further thought will need to be given as to how our forward progress is being planned and monitored. I know that many good people are wrestling with the challenge and further ideas will emerge.

And so we leave here reinvigorated, happy that we answered the call and pledging our full commitment. We might not have achieved all that we set out to do but we all have done an honest day's work. No one, not even Kitty or Allen, can ask for more.

To the people of the United States of America, from all of us from beyond your shores, we thank you for the resources that were provided to make this event happen. Thank you for the initiative and the inspired leadership. You have shouldered the burden of this meeting, as you have continued to do since the first tentative steps were taken over fifteen years ago. To the institutions that have provided the backup support and to the many hands that have made light work of a gigantic task—thank you.

In the small island kingdom many miles to the south where I come from, our national emblem is the sea eagle. This is somewhat of a curious choice given that the sea eagle or 'Lulutai' is never seen in Tongan waters. The answer lies in the sea faring traditions of our people, the "Vikings of the Sunrise" in the words of a great Maori scholar, Te Rangi Hiroa or Sir Peter Buck, sometime Curator of the Bishop Museum, as he addressed the origins of the Polynesians. Tongans became familiar with this great bird in their roving throughout the Pacific. They marveled at its strength, at its fishing capacity, its great endurance, and its freedom of the skies. Inspired, they coined one of the great statements that underpin the culture of Polynesia, "Oku kai 'ae manu vaivai meihe fangota 'ae Lulutai." On the wings of the strong will be carried the burdens of the weak.

And so to the great bald eagle of the United States let me say that your obligation to provide sustenance and protection for this small fledgling movement of ours until it too might take wing was foretold by my ancestors and written in the stars.

May the silver chains of friendship bind us and may He that never sleeps keep you until we meet again. 'Ofa atu fau.

FINAL RECOMMENDATIONS

GROUP A: PREVENTION AND LEGAL ISSUES

Chairs: James M. Coe
CDR Paula S. Carroll

Panelists: Margaret Cummisky
Anamarija Frankic, Ph.D.
Michael Julian
Holly R. Koehler
CDR John W. Koster
Brent S. Stewart, Ph.D.

Facilitators: Todd Jacobs
Jeff Walters, Ph.D.

Rapporteur: Brent S. Stewart, Ph.D.

- A1. Develop an International Plan of Action to regulate discard and loss of derelict fishing gear
- A2. Enlist IMO assistance in addressing the derelict fishing gear issue
- A3. Encourage participation of regional fisheries organizations in addressing the derelict fishing gear problem
- A4. Develop public-private partnerships to assist the implementation of compliance of international agreements and guidelines

PREVENTION AND LEGAL ISSUES: RECOMMENDATION A1.

Title: Develop an International Plan of Action to regulate discard and loss of derelict fishing gear

Concern: Inadequate implementation of provisions for addressing derelict fishing gear in international agreements

Authors: H. Koehler and B. Stewart

I. DESCRIPTION:

All States contributing to, affected by, or otherwise concerned about the impacts of marine pollution by derelict fishing gear on marine life and vessel safety, should motivate and fund FAO to establish a Task Force to accomplish, inter alia, the cooperative development of an IMO/FAO/RFOa International Plan of Action (IPOA) to control and minimize fishing vessel gear loss. This IPOA should be similar to the ongoing joint development by FAO and IMO of an IPOA to address illegal, unreported, and unregulated fishing activities. This IPOA should include, inter alia:

- A. A call for IMO Member States, particularly from the Pacific Rim to: (i) conduct national "assessments" of their implementation of MARPOL 73/78 Annex V and the Guidelines for the Implementation of MARPOL 73/78 Annex V, particularly Chapter 3, and report the results to IMO's MEPCb; (ii) identify implementation impediments to the IMO's MEPC; and (iii) recommend solutions to IMO's MEPC to address these impediments (e.g., amend the Guidelines, make some aspects mandatory if necessary, develop a mechanism for monitoring derelict fishing gear, etc.)
- B. A call for States to condition issuance of domestic and foreign fishing licenses on demonstrated applicant compliance with relevant aspects of MARPOL 73/78 Annex V and the Guidelines.
- C. A call for national governments and regional fisheries management organizations to urge all States that are Parties to MARPOL 73/78 as well as those that have expressed interest in becoming a party to MARPOL 73/78 and especially Annex V and its Guidelines, to be more vigilant in reporting involuntary net losses, in satisfaction of the Annex V Guidelines and appropriate national laws.

RECOMMENDATION A1.

II. METHODS/STEPS FOR IMPLEMENTING ACTION:

- A. States vigorously bring issue to the attention of FAO
- B. States identify and facilitate acquisition of necessary funding for FAO to accomplish the identified tasks

III. TYPE(S) OF ACTION:

Administrative, regulatory and economic

IV. WHERE SHOULD ACTION BE IMPLEMENTED (SPECIFY GENERAL GEOGRAPHIC AREAS)?

The action should be implemented in all areas and habitats.

V. WHO IMPLEMENTS ACTION?

- A. FAO
- B. IMO
- C. National Governments

VI. WHAT IS COST OF ACTION (ESTIMATE)?

One time (Start up) Cost - \$500,000 to \$1,000,000
Annual Operation and Maintenance - Implementation varies by state

VII. WHO FINANCES?

National governments finance the action through voluntary and discretionary contributions (e.g., from fishing license fees).

VIII. WHAT ARE THE BENEFITS (ENVIRONMENTAL OR ECONOMIC) FROM IMPLEMENTATION?

Benefits from implementation are both environmental and economic.

IX. IDENTIFY THE RESOURCES (LIVING OR PHYSICAL) AFFECTED BY ACTION:

Marine life and ocean-going vessels are affected by the action.

**PREVENTION AND LEGAL ISSUES:
RECOMMENDATION A2.**

Title: Enlist IMO assistance in addressing the derelict fishing gear issue

Concern: Sub-optimal action by IMO Member States in addressing the derelict fishing gear issue

Authors: H. Koehler and B. Stewart

I. DESCRIPTION:

IMO Member States should: (a) bring to the attention of IMO's Marine Environment Protection Committee (MEPC) the extent of the problems associated with derelict fishing gear and the lack of compliance with MARPOL 73/78 Annex V and the Guidelines for the Implementation of Annex V of MARPOL 73/78 including the reporting provisions of Article 11a and request that MEPC establish an agenda item regarding this provision; and (b) request IMO Member States (i) demonstrate a more proactive approach in addressing marine pollution from fishing vessels by attending international intergovernmental meetings to raise this issue as one of global concern, and (ii) disseminate MARPOL 73/78 Annex V and Guidelines more widely.

II. METHODS/STEPS FOR IMPLEMENTING ACTION:

IMO Member States take steps to proactively inform the IMO's MEPC of the seriousness of the derelict fishing gear issue and highlight current mechanisms, particularly provisions of MARPOL 73/78, Annex V, and the Guidelines which are not being complied with. Member states actively seek the appropriate input, information, and advice from the IMO. NGOs consider mechanisms to assist in the process.

III. TYPE(S) OF ACTION:

Administrative, regulatory and reporting

RECOMMENDATION A2.

IV. WHERE SHOULD ACTION BE IMPLEMENTED (SPECIFY GENERAL GEOGRAPHIC AREAS)?

The action should be implemented in all areas and habitats.

V. WHO IMPLEMENTS ACTION?

IMO Member States and the fishing industry implement the action.

VI. WHAT IS COST OF ACTION (ESTIMATE)?

One time (Start up) Cost - \$50,000 to \$100,000

Annual Operation and Maintenance Cost - \$10,000 to \$50,000

VII. WHO FINANCES?

- A. Member governments through voluntary and discretionary contributions (e.g., from fishing license fees)
- B. Private-public partnerships
- C. NGOs
- D. Fishing industry support

VIII. WHAT ARE THE BENEFITS (ENVIRONMENTAL OR ECONOMIC) FROM IMPLEMENTATION?

Benefits include substantive and procedural gains in implementing international legal instruments to address marine pollution by derelict fishing gear.

IX. IDENTIFY THE RESOURCES (LIVING OR PHYSICAL) AFFECTED BY ACTION:

Living and physical resources are affected by the action.

**PREVENTION AND LEGAL ISSUES:
RECOMMENDATION A3.**

Title: Encourage participation of regional fisheries organization in addressing the derelict fishing gear problem

Concern: Ineffective use of regional fisheries organizations to address derelict fishing gear issues

Authors: H. Koehler and B. Stewart

I. DESCRIPTION:

Regional and sub-regional fisheries management organizations and arrangements should explicitly incorporate into their mandate and binding conservation measures: (a) a prohibition on discarding fishing gear and related debris, and (b) a requirement to maximize to the greatest practicable extent recovery of any accidentally lost gear.

II. METHODS/STEPS FOR IMPLEMENTING ACTION:

- A. Motivation of regional and sub-regional organizations to incorporate elements into their charters
- B. Sua sponte incorporation of elements by the regional and sub-regional organizations

III. TYPE(S) OF ACTION:

Administrative and regulatory

IV. WHERE SHOULD ACTION BE IMPLEMENTED (SPECIFY GENERAL GEOGRAPHIC AREAS)?

Minimum Spatial Extent: Where the regional and sub-regional fishery organizations operations are housed

Habitat Affected: All habitats

RECOMMENDATION A3.

V. WHO IMPLEMENTS ACTION?

Regional and sub-regional fishery organizations implement the action.

VI. WHAT IS COST OF ACTION (ESTIMATE)?

One time (Start up) Cost - \$100,000 to \$500,000

Annual Operation and Maintenance Cost - \$100,000 to \$500,000

VII. WHO FINANCES?

Private and public donor institutions along with NGOs finance the action.

VIII. WHAT ARE THE BENEFITS (ENVIRONMENTAL OR ECONOMIC) FROM IMPLEMENTATION?

Benefits include the facilitation of effective implementation of international legal instruments to prevent and mitigate loss and discard of fishing gear.

IX. IDENTIFY THE RESOURCES (LIVING OR PHYSICAL) AFFECTED BY ACTION:

Marine life, physical habitat, and vessel safety are affected by the action.

**PREVENTION AND LEGAL ISSUES:
RECOMMENDATION A4.**

Title: Develop public-private partnerships to assist the implementation of compliance of international agreements and guidelines

Concern: Inadequate support for States to implement agreement provisions

Authors: H. Koehler and B. Stewart

I. DESCRIPTION:

Public-private partnerships should be developed with the assistance of various programs, including private and international donor institutions (e.g., the World Bank or the International Monetary Fund) to increase the capabilities of States, particularly developing states, to implement and comply with MARPOL 73/78, Annex V, and the Guidelines.

II. METHODS/STEPS FOR IMPLEMENTING ACTION:

Development of proposals to potential donor institutions. Clarification of identity and capable infrastructure of various private and public institutions that can accept assistance to facilitate objectives. Implementation of strategic plan by selected organizations.

III. TYPE(S) OF ACTION:

Administrative, economic and educational

IV. WHERE SHOULD ACTION BE IMPLEMENTED (SPECIFY GENERAL GEOGRAPHIC AREAS)?

Minimum Spatial Extent: Offices of donor institutions and public and private implementation facilities

Habitat Affected: All habitats

RECOMMENDATION A4.

V. WHO IMPLEMENTS ACTION?

- A. Donor institutions
- B. Private and public implementation institutions

VI. WHAT IS COST OF ACTION (ESTIMATE)?

- One time (Start up) Cost - \$100,000 to \$500,000
- Annual Operation and Maintenance Cost - \$100,000 to \$500,000

VII. WHO FINANCES?

Private and public donor institutions along with NGOs finance the action.

VIII. WHAT ARE THE BENEFITS (ENVIRONMENTAL OR ECONOMIC) FROM IMPLEMENTATION?

Benefits include the facilitation of effective implementation of international legal instruments to prevent and mitigate loss and discard of fishing gear.

IX. IDENTIFY THE RESOURCES (LIVING OR PHYSICAL) AFFECTED BY ACTION:

Marine life, physical habitat, and vessel safety are affected by the action.

GROUP B: REDUCING IMPACTS OF GEAR

Chair: H. Arnold Carr

Panelists: Gerald Brothers
Gary Dunlin
Murray R. Gregory, Ph.D.
Jim Ludwig, Ph.D.
James Maragos, Ph.D.

Facilitators: Brad Barr
Hannah Bernard
Steve Olive, Ph.D.

Rapporteurs: Adam Hill
Jeff Kuwabara

- B1.** Identify, quantify, and reduce the impacts of ghost fishing gear
- B2.** Conduct research on the movement and effects of derelict fishing gear, and other plastics in ecosystems
- B3.** Conduct research to estimate mortality rates and their impacts on affected species caused by derelict fishing gear and other marine debris
- B4.** Assess the interaction of vessels with fishing gear and marine debris

**REDUCING IMPACTS OF GEAR:
RECOMMENDATION B1.**

Title: Identify, quantify, and reduce the impacts of ghost fishing gear
Issues: Lack of data and the effects of ghost fishing on commercial and non-commercial species

Concern: Ghost fishing gear can result in fish mortality equal to or greater than that of the commercial harvest

Theme: Assess the magnitude of the problem so as to determine appropriate responses

Authors: G. Brothers and G. Dunlin

I. DESCRIPTION:

There are some documented estimates of fish and non-fish mortality due to ghost fishing gear. Up until now, there has been little systematic work carried out to analyze this impact on commercial fisheries throughout the world. Comprehensive surveys need to be carried out to establish the cause and extent of gear loss in representative waters.

The physical evolution of gear lost under a wide range of conditions needs to be studied in order to assess the potential for these gears to carry on fishing for prolonged periods.

Using these two research tasks, it should be possible to quantify the impact on mortality to target and non-target marine species. The results of these research areas could be widely disseminated to fishermen and governmental agencies. Information acquired should give them the incentive to do all in their power to reduce gear losses.

II. METHODS/STEPS FOR IMPLEMENTING ACTION:

- A. Carry out ghost fishing cleanup programs to quantify the amount of lost and abandoned fishing gear
- B. Develop model to calculate the amount of fish mortality caused by ghost fishing gear
- C. Identify source of gear losses
- D. Develop awareness campaign, highlighting cost of ghost fishing to fishermen, and thereby provide incentive to reduce losses

RECOMMENDATION B1.

- E. Establish management plan to reduce ghost fishing
1. Zoning—defining fishing period for active and passive fishing gears
 2. Individual quota system
 3. Limit amounts of gear
 4. Gear tagging program
 5. Observer coverage
 6. Mandatory tending of gear
 7. Mandatory reporting of loss of fishing gear

III. TYPE(S) OF ACTION:

Research, regulatory and educational

IV. WHERE SHOULD ACTION BE IMPLEMENTED (SPECIFY GENERAL GEOGRAPHIC AREAS)?

Minimum Spatial Extent: It is difficult to restrict studies to particular areas owing to the global nature of the marine debris problem. The action should be tasked into areas where the problem is identified as such.

V. WHO IMPLEMENTS ACTION?

Government agencies, in cooperation with the fishing industry, implement the action.

VI. WHAT IS COST OF ACTION (ESTIMATE)?

The cost is dependent on the location and magnitude of the problem. Off Atlantic Canada, a program was estimated to cost \$10 million (Canadian). Off the United Kingdom a program in certain targeted waters cost \$900,000.

VII. WHO FINANCES?

Financial responsibility has not been determined.

VIII. WHAT ARE THE BENEFITS (ENVIRONMENTAL OR ECONOMIC) FROM IMPLEMENTATION?

Giving fishermen and managers the incentive to reduce gear losses will result in both environmental and economic benefits.

IX. IDENTIFY THE RESOURCES (LIVING OR PHYSICAL) AFFECTED BY ACTION:

All marine species are affected by the action.

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REDUCING IMPACTS OF GEAR: RECOMMENDATION B2.

Title: Conduct research on the movement and effects of derelict fishing gear, and other plastics in ecosystems

Issues: Persistence; lack of knowledge and data

Concern: Lack of understanding of the breakdown processes: physical, chemical, biological. The lack of knowledge of the ecosystem impact of these products may provide a direct pathway for these substances to be incorporated into the food web at low trophic levels.

Theme: Assess the magnitude of the problem so as to determine appropriate responses

Authors: A. Carr and M. Gregory

I. DESCRIPTION:

As with all other marine debris made with synthetic materials introduced into the marine environment, the persistence of abandoned and derelict fishing gear is impacting marine ecosystems in an ever-accumulating manner. The accumulation of synthetic materials in the marine environment was first recognized in the late-1950s, but little importance was attached to observations at that time. It was considered a minor nuisance. By the 1980s, the increased use and disposal of persistent plastic materials, as is found in fishing gear, was an acknowledged problem of such magnitude that it generated several international conferences. By the late 1990s, the increased use of plastic materials in fishing activities, as well as elsewhere in society, and the resulting casual disposal in the marine environment brought the problem to a global scale.

The first recognition of the impacts of derelict fishing gear and other marine debris in the environment were visual and aesthetic. They were focused on shorelines. As more derelict fishing gear entered the marine debris stream, attention was drawn to the direct biophysical impacts of entanglement and ingestion.

The magnitude of impacts of derelict fishing gear and other marine debris is only recently becoming appreciated. These include:

- A. Alien introductions through attached and associated biota
- B. Degradation of larger debris into microplastics and its assimilation into key parts of the ecosystem (e.g., the sea surface microlayer)
- C. Contaminants (e.g., organochlorines and endocrine-active substances)

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RECOMMENDATION B2.

adhering to microplastics and accumulating in marine organisms (e.g., birds, turtles and fish) upon ingestion - eating plastics may constitute a novel direct pathway into wildlife populations

II. METHODS/STEPS FOR IMPLEMENTING ACTION:

- A. Establish the nature of the degradation pathways
- B. Determine the extent that degradation products are contaminated by other potentially toxic compounds
- C. Devise means to interrupt the pathway of these contaminants into the marine environment (given the pipeline character of marine debris delivery to the marine environment, this will be a long term process - the potential impacts of these types of contaminants are subtle, progressive, accumulative and long term)

III. TYPE(S) OF ACTION:

Research, monitoring, regulatory and educational

IV. WHERE SHOULD ACTION BE IMPLEMENTED (SPECIFY GENERAL GEOGRAPHIC AREAS)?

Minimum Spatial Extent: Global with presently recognized hot spots
Habitat Type Affected: Potentially, all habitats

V. WHO IMPLEMENTS ACTION?

Research institutions supported by government or private funding

VI. WHAT IS COST OF ACTION (ESTIMATE)?

One time (Start up) Cost - \$100,000 to \$500,000
Annual Operation and Maintenance Cost - \$100,000 to \$500,000

VII. WHO FINANCES?

The government and/or private funding would finance the action.

VIII. WHAT ARE THE BENEFITS (ENVIRONMENTAL OR ECONOMIC) FROM IMPLEMENTATION?

Maintenance of quality within ecosystems and the reduced possibility of elimination of species, are the benefits from implementation.

IX. IDENTIFY THE RESOURCES (LIVING OR PHYSICAL) AFFECTED BY ACTION:

The marine ecosystem would be affected by the action.

REDUCING IMPACTS OF GEAR: RECOMMENDATION B3.

Title: Conduct research to estimate mortality rates and their impacts on affected species caused by derelict fishing gear and other marine debris

Issues: Depletion of target and non-target marine species; effects on single species have larger effects on the ecosystem as a whole; structure and function of ecosystems and their food webs could have adverse effects on economic and social benefits

Concerns: Negative economic impact on fishing industries; long-term effects on resource availability and quality of life

Theme: The extent of mortality on the various species affected by marine debris and the population consequences

Authors: C. Fowler, A. Hill, and N. Hoffman

I. DESCRIPTION:

Studies are needed to provide information on the physical and chemical processes that lead to mortality caused by marine debris.

II. METHODS/STEPS FOR IMPLEMENTING ACTION:

Specific methodologies will depend on the question being asked and the species or population of interest and the source of mortality. Not everything can be studied nor can all questions be answered. Species with key roles in their ecosystems and debris that is of suspected concern will determine priorities. Research should include tagging studies, laboratory studies, physiological studies, behavioral studies, population dynamics, and toxicological studies (i.e., endocrine suppression and immune system suppression) to investigate direct effects. Indirect effects would be studied by monitoring to identify long term changes in community composition.

III. TYPE(S) OF ACTION:

Research, monitoring, and assessment

IV. WHERE SHOULD ACTION BE IMPLEMENTED (SPECIFY GENERAL GEOGRAPHIC AREAS)?

Minimum Spatial Extent: It is difficult to restrict studies to particular areas owing to the global nature of the marine debris problem. However, this group identified ecosystems containing commercially valuable species, coral

RECOMMENDATION B3.

reef ecosystems containing species of concern, ecosystems of exceptional diversity, ecosystems where large concentrations of debris occur, and benthic systems potentially altered by the settling of microplastic debris.

V. WHO IMPLEMENTS ACTION?

International, federal, state, and local organizations, and various partnerships implement the action.

VI. WHAT IS COST OF ACTION (ESTIMATE)?

One time (Start up) Cost - >\$1,000,000

Annual Operation and Maintenance Cost - >\$1,000,000

VII. WHO FINANCES?

Initially, the emphasis is on government funding, followed by greater reliance on private lending from trusts and appropriate stakeholders.

VIII. WHAT ARE THE BENEFITS (ENVIRONMENTAL OR ECONOMIC) FROM IMPLEMENTATION?

Benefits from implementation include the production of information that is useful in the education process, which results in both environmental and economic gain. Furthermore, the resulting information can lead to management action.

IX. IDENTIFY THE RESOURCES (LIVING OR PHYSICAL) AFFECTED BY ACTION:

Although species of commercial importance are expected to be better conserved, this action does not exclude other species in marine ecosystems, therefore, all marine life is affected.

REDUCING IMPACTS OF GEAR: RECOMMENDATION B4.

Title: Assess the interaction of vessels with fishing gear and marine debris

Issues: Fishing gear, both active and derelict, and other marine debris can become a hazard to navigation and put mariners and rescuers, their vessels, and consequently the marine environment at risk

Concerns: Fouling of vessel propellers, rudders, keels, thrusters, water intakes; drifting while disabled; crew, passengers and rescuer safety; dangers of going overboard to remove gear; risk to environment from disabled vessel; financial burden to vessel operators from lost time and repair; the generation of derelict gear by vessels becoming fouled in active gear

Theme: Assess the severity of the problem to determine appropriate responses

Authors: B. Barr and L. Johnson

I. DESCRIPTION:

Anecdotal reports and preliminary studies suggest that a problem exists with regard to the interactions of vessels with active and derelict fishing gear, and generally with floating debris in navigable waters. This problem may be particularly significant in areas where derelict debris accumulates due to ocean currents, and where fishing effort is high. Problems may involve the fouling of propellers, keels, rudders, thrusters, and water intakes, requiring the often dangerous task of removing entangled gear at sea. Vessels disabled by fouled gear and other debris may collide with other vessels or icebergs while adrift, or ground when near shore, potentially leading to discharges of oil and fuel. These problems can generate considerable cost to vessel operators in terms of repairs and downtime, and potentially costs related to cleanup of oil and fuel spills. Vessels, large and small, may also generate derelict gear when the fouling incidents occur with active fishing gear, causing potential environmental problems from lost gear.

II. METHODS/STEPS FOR IMPLEMENTING ACTION:

- A. Develop an assessment body, preferably under an existing agency or organization, to address the approach ideas
- B. Increase reporting of fouling incidents:
 - 1. Encourage reporting, through directed outreach to commercial vessel operators, fishing captains, and recreational boaters, involving incidents that meet USCG vessel casualty reporting thresholds
 - 2. Encourage reporting of incidents that fall below USCG reporting thresholds to assist in conducting robust statistical analyses of data collected. The U.S. Coast Guard's Field Incident Reporting System (FIRS) might be used as a model or example for such a mechanism
 - 3. Establish a mechanism for collecting and analyzing data reported that is focused on answering the question "Is this a problem?"
 - 4. Investigate possible economic incentives for reporting (examine models such as gear compensation programs administered by National Marine Fisheries Service)
- C. Initiate the process of engaging the international community on the marine debris issue and coordinate with the International Maritime Organization through Legal Committee's "Wreck Removal Convention" whose chartered mandate includes drifting material that poses a hazard to navigation or threat to the marine environment - focus of coordination would be on quantifying the extent of the problem worldwide, on public safety, and on the economic impacts of fouling incidents

III. TYPE(S) OF ACTION:

Research, monitoring, economic, educational, and assessment

IV. WHERE SHOULD ACTION BE IMPLEMENTED (SPECIFY GENERAL GEOGRAPHIC AREAS)?

Minimum Spatial Extent: Action should focus on vessels that operate in all U.S. waters, particularly where significant fishing effort and/or areas where debris collects and persists

Habitat Type Affected: Principally surface of water column/pelagic environment, but potentially coral reefs and other sensitive near-shore benthic habitats

V. WHO IMPLEMENTS ACTION?

The U.S. Coast Guard may be the best candidate to conduct assessments for U.S. waters in collaboration with other U.S. Federal agencies with related responsibilities (i.e., NOAA). The U.S. Coast Guard is currently responsible for investigating and monitoring marine vessel casualties of the United States and visiting foreign vessels of certain magnitudes.

VI. WHAT IS COST OF ACTION (ESTIMATE)?**For all U.S. waters, assessment may cost:**

One time (Start up) Cost - >\$1,000,000

Annual Operation and Maintenance Cost - \$100,000 to \$500,000

For a regional pilot study:

One time (Start up) Cost - \$100,000

Annual Operation and Maintenance Cost - \$50,000 - \$75,000

VII. WHO FINANCES?

This assessment should be funded through Congressional appropriation to the U.S. Department of Transportation/United States Coast Guard.

VIII. WHAT ARE THE BENEFITS (ENVIRONMENTAL AND ECONOMIC) FROM IMPLEMENTATION?

Benefits from assessment relate to assessing the extent of the problem. There are no direct environmental or economic benefits from assessment. Benefits will accrue from implementation of solutions if they are found to be necessary and appropriate.

IX. IDENTIFY THE RESOURCES (LIVING OR PHYSICAL) AFFECTED BY ACTION:

There are no direct environmental or economic benefits from assessment. Benefits will accrue from implementation of solutions if they are found to be necessary and appropriate.

GROUP C: SOURCE IDENTIFICATION

Chair: John R. Henderson

Panelists: Al Burch
Dave Foley
David King
Rick Steiner

Facilitators: Tom Culliton
Timothy Goodspeed

Rapporteurs: John Kelly
Jarad Makaiau

- C1. Hire a staff person to identify sources of gear — Gear Expert Coordinator
- C2. Establish a Network of Fishing Gear Specialists
- C3. Develop GIS of commercial fishing and aquaculture locations and seasons in the North Pacific
- C4. Create an international reference (targeted) database and gear reference collection, available by region
- C5. Build a constituency for the importance of source identification
- C6. Develop a web site for identification of gear fragments

**SOURCE IDENTIFICATION:
RECOMMENDATION C1.**

Title: Hire a staff person to identify sources of gear — Gear Expert Coordinator

Authors: A. Burch, J. Henderschedt, K. Kelly, D. King, and N. Young

I. DESCRIPTION:

Recommendation:

Hire a staff person whose sole responsibility is to establish a network of gear technologists, establish and manage the standard reference collection for the source identification of fishing gear collected during debris removal efforts.

Qualifications:

The qualifications of this individual should be specialist/coordinator.

Responsibilities:

- A. Establish a network of individuals familiar with fishing gear construction and use in Pacific fisheries
- B. As a priority, coordinate periodic examinations, by gear experts, of intact derelict gear (whole portions of nets or material taken as a result of underwater retrieval)
- C. Maintain records and catalog sub-samples, pictures, and descriptions of individual pieces of gear as part of a national, regional, and international standard reference collection and database
- D. Investigate gear of unknown origin (gear that could not be identified by the experts) that has been retrieved to ascertain sources and verify source determinations of gear experts. Verification should include contact and discussions with potential source fisheries/industries
- E. Provide gear identification information for the web site

NOTE: The intent is that this information will be made available to the public for educational purposes and cannot be used to take enforcement actions against a particular fishery or individual.

II. METHODS/STEPS FOR IMPLEMENTING ACTION:

Secure funding either through federal appropriations or through a private funding source (or combination thereof) for this position. Position should be housed either at NMFS, at an academic institution, or at an organization highly involved in marine debris removal. Position should be filled no later than January 2001.

III. TYPE(S) OF ACTION:

Research, administrative, and assessment

RECOMMENDATION C1.

IV. WHERE SHOULD ACTION BE IMPLEMENTED (SPECIFY GENERAL GEOGRAPHIC AREAS)?

Minimum Spatial Extent: The action should first be implemented in areas that have been identified as priority areas for marine debris/derelict fishing gear removal and where historic removal efforts have occurred (e.g., Hawai'i and Alaska)

Urge other nations to establish a similar position and database capability so as to coordinate efforts internationally.

Habitat Type Affected: Coral reef and pelagic ecosystems and other marine ecosystems throughout the Pacific

V. WHO IMPLEMENTS ACTION?

Depending on the funding source this action will be implemented either through the federal government or a private institution. Other nations should be encouraged to develop a similar capacity or provide support for this position.

VI. WHAT IS COST OF ACTION (ESTIMATE)?

One time (Start up) Cost – Less than \$10,000

Annual Operation and Maintenance Cost - \$100,000 to \$500,000

(Cost estimates include salary and budget for travel, management of catalog, and travel for experts)

VII. WHO FINANCES?

- A. Federal appropriations
- B. Private funding source

VIII. WHAT ARE THE BENEFITS (ENVIRONMENTAL OR ECONOMIC) FROM IMPLEMENTATION?

The immediate benefit would be the development of a more effective and targeted educational program. The goal and objective would be to change behavior, create awareness, and eliminate sources of derelict fishing gear through education and outreach, as well as to provide a clear source of information and a conduit to the fishing community, international experts, and gear manufacturers.

IX. IDENTIFY THE RESOURCES (LIVING OR PHYSICAL) AFFECTED BY ACTION:

Industry: Fishing communities, international gear experts, and gear manufacturers

Environment: Marine life and ecosystems

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SOURCE IDENTIFICATION: RECOMMENDATION C2.

Title: Establish a Network of Fishing Gear Specialists

Concern: There are currently no means to effectively identify sources of derelict fishing gear

Authors: A. Burch, J. Henderschedt, K. Kelly, D. King, and N. Young

I. DESCRIPTION:

The network of fishing gear experts should be familiar with material usage, fishing gear maintenance and construction. The network should be representative of the various international fisheries operating within the Pacific.

Several individuals may be necessary to cover the various fisheries within a geographic area.

The gear experts would be available to assist in the identification of derelict gear, investigate unknown or difficult to identify sources of derelict gear, and provide source information/material for database development.

The gear expert/coordinator would coordinate the efforts of the fishing gear experts (see previous recommendation).

II. METHODS/STEPS FOR IMPLEMENTING ACTION:

Hire the gear expert coordinator to begin to identify candidates for this network.

Develop contacts through fishery organizations and industry, through direct commercial contacts, to find various gear experts and solicit their input or participation.

The initial search should be directed at the fisheries/nations that may be the likely source of the derelict fishing gear.

Invite gear experts to examine gear that has been removed and provide opportunities for these experts to give their input throughout the process.

III. TYPE(S) OF ACTION:

Research and assessment

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RECOMMENDATION C2.

IV. WHERE SHOULD ACTION BE IMPLEMENTED (SPECIFY GENERAL GEOGRAPHIC AREAS)?

Minimum Spatial Extent: Hawai'i and Alaska (areas where removal efforts have been conducted) in conjunction with removal efforts; international throughout the Pacific Basin

Habitat Type Affected: Coral reefs

V. WHO IMPLEMENTS ACTION?

The Gear Expert Coordinator (see recommendation C1) implements the action.

VI. WHAT IS COST OF ACTION (ESTIMATE)?

One time (Start up) Cost – Less than \$10,000

Annual Operation and Maintenance Cost - Budget included in Rec. C1

VII. WHO FINANCES?

- A. Federal appropriations
- B. Private funding source

VIII. WHAT ARE THE BENEFITS (ENVIRONMENTAL OR ECONOMIC) FROM IMPLEMENTATION?

The benefit of these experts would be in the development of a broad-base source of individuals to assist in the identification of gear and the creation and maintenance of the reference database.

Other benefits are discussed in the gear expert coordinator recommendation.

IX. IDENTIFY THE RESOURCES (LIVING OR PHYSICAL) AFFECTED BY ACTION:

Industry: Fisheries, gear manufacturers, federal agencies, and institutions involved in gear removal

Environment: Coral reef and pelagic ecosystems and marine wildlife

SOURCE IDENTIFICATION: RECOMMENDATION C3.

Title: Develop GIS of commercial fishing and aquaculture locations and seasons in the North Pacific

Authors: D. Foley, J. Henderson, and M. Reppy

I. DESCRIPTION:

Create a Geographical Information System (GIS) mapping of fisheries geographic and temporal distribution around the North Pacific Rim, using effort data for each fishery. Include data on distribution and effort of aquaculture.

II. METHODS/STEPS FOR IMPLEMENTING ACTION:

Compile existing data on fisheries from nations fishing in the North Pacific. Update data as new information or reports become available. Possible sources of these data include the Food and Agricultural Organization (FAO) of the United Nations or other similar international organizations.

Incorporate the data into GIS format.

III. TYPE(S) OF ACTION:

Research - initial compilation would be library or literature research, subsequent updates would be monitoring

IV. WHERE SHOULD ACTION BE IMPLEMENTED (SPECIFY GENERAL GEOGRAPHIC AREAS)?

Minimum Spatial Extent: Pacific basin, including waters bordering Pacific rim nations

Habitat Type Affected: Highly variable, including pelagic, continental shelf, coral reefs, and inshore waters (aquaculture)

V. WHO IMPLEMENTS ACTION?

The action should not require a full-time position. Compilation should be performed by a fishery biologist with the National Marine Fisheries Service.

RECOMMENDATION C3.

VI. WHAT IS COST OF ACTION (ESTIMATE)?

One time (Start up) Cost – \$10,000 to \$50,000

Annual Operation and Maintenance Cost – Less than \$10,000

VII. WHO FINANCES?

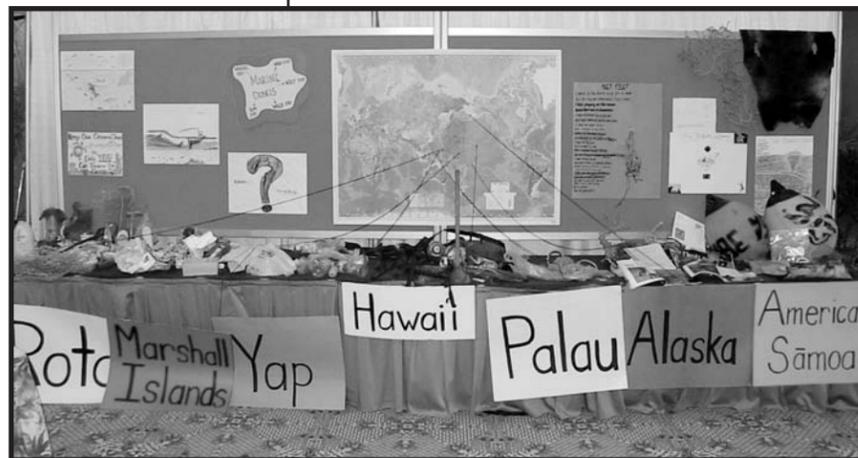
NOAA, NMFS

VIII. WHAT ARE THE BENEFITS (ENVIRONMENTAL OR ECONOMIC) FROM IMPLEMENTATION?

Information is necessary in order to conduct any action implemented as a result of this conference. For example, establishing a database of derelict gear types requires knowledge of where to look and whom to approach to garner information on the types of debris. Any education or outreach organization would need to know where to target their activities. All parties interested in the issue of derelict fishing debris would benefit from this information.

IX. IDENTIFY THE RESOURCES (LIVING OR PHYSICAL) AFFECTED BY ACTION:

No resources are directly affected by the action.



Bob Rock, Marine Debris Communications Committee

This display by the "Trashbusters", a group of students from around the Pacific, demonstrates interest in solving the marine debris problem.

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SOURCE IDENTIFICATION: RECOMMENDATION C4.

Title: Create an international reference (targeted) database and gear reference collection, available by region

Authors: D. Foley, J. Henderschedt, J. Henderson, M. Reppy, and J. Wang

I. DESCRIPTION:

A database should be created and maintained which describes fishing gear and equipment, and fishing practices. The database should include information on gear types and specifications. A cadre of gear experts, ideally distributed regionally among world fishing countries would provide data.

The data would whenever possible be based upon collections of reference materials, maintained and curated regionally. The database would be maintained in a central location.

The data, which is business confidential within the database, will be password protected in order to protect fisheries that have contributed to the database.

II. METHODS/STEPS FOR IMPLEMENTING ACTION:

- A. Identify user groups and obtain their input regarding the types of information required. Potential users include beach cleanup groups, resource managers, fishery agencies, and other interested personnel
- B. Establish standardized protocol for data submission formats, for example: digital images, descriptive texts, refined quantification, measurements, etc. Also establish criteria for submission of samples of derelict gear
- C. Establish infrastructure for data acquisition, processing, and storage
- D. Identify target areas, using fisheries maps for potential sources and input from experts
- E. Have coordinator allocate resources to fill in gaps
- F. Establish (web-based) infrastructure for distribution
- G. Maintain and update regional reference collections and database
- H. FAO provide update to the World Congress on fishing gear and methods

III. TYPE(S) OF ACTION:

Monitoring and educational

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RECOMMENDATION C4.

IV. WHERE SHOULD ACTION BE IMPLEMENTED (SPECIFY GENERAL GEOGRAPHIC AREAS)?

Minimum Spatial Extent: Action could be implemented in any geographic region.
Habitat Type Affected: The action will not directly affect any habitat.

V. WHO IMPLEMENTS ACTION?

The data should be maintained by an international agency, such as the Food and Agricultural Organization (FAO) of the United Nations.

VI. WHAT IS COST OF ACTION (ESTIMATE)?

One time (Start up) Cost – \$500,000 to \$1,000,000
Annual Operation and Maintenance Cost - \$50,000 to \$100,000

VII. WHO FINANCES?

Financial support should be provided by the United Nations.

VIII. WHAT ARE THE BENEFITS (ENVIRONMENTAL OR ECONOMIC) FROM IMPLEMENTATION?

The database would allow outreach and education organizations to identify derelict fishing gear, to better direct their outreach efforts to fisheries that are losing or discarding equipment and gear, and to avoid fisheries that do not have problems with derelict gear. Information could also be provided to fishery agencies.

Implementing this action will in the long run help eliminate derelict fishing gear at its source(s), by increasing the efficiency of outreach activities.

IX. IDENTIFY THE RESOURCES (LIVING OR PHYSICAL) AFFECTED BY ACTION:

The action does not directly affect living resources. However, the action will indirectly benefit all living resources impacted by derelict fishing gear, by helping reduce the introduction of this material into the marine environment.

SOURCE IDENTIFICATION: RECOMMENDATION C5.

Title: Build a constituency for the importance of source identification

Authors: J. Henderson and N. Young

I. DESCRIPTION:

The goal of building a constituency of fishermen, gear experts, and manufacturers is to make these groups aware of the problem of derelict fishing gear, but more importantly, to enlist their support in efforts to identify sources of derelict fishing gear. This is a critical component of any source identification strategy. The trust and support of the fishing community is essential to determining the source of derelict fishing gear.

In addition, it is important to develop a constituency among government agencies, non-governmental organizations, and educators.

II. METHODS/STEPS FOR IMPLEMENTING ACTION:

Fishing Industry

- A. Compose a list of fisheries, fishermen, fishing vessel owner associations, gear manufacturers, and fishermen associations
- B. Conduct workshops or meetings, in cooperation with these groups, in various fishing ports and provide information tailored to the fishing community about derelict fishing gear, removal efforts, and the goals and objectives of source identification efforts. It is important to seek help and cooperation rather than telling the fishery what you want them to do
- C. Work with the industry to identify individuals or associations that can provide a leadership role in organizing source identification efforts and outreach to the fishing community
- D. Consider publicizing efforts either through industry publications and web sites or through a separate newsletter
- E. Establish incentives and other mechanisms to reward and recognize innovative or cooperative efforts

RECOMMENDATION C5.

F. Recognize those fisheries that have an outstanding record related to waste handling, reduction, or recycling

Government and NGOs

- A. Provide general information related to the threats posed by derelict fishing gear to marine life and the marine environment. Clearly articulate the importance of an effective source identification program to target education
- B. Provide government agencies and NGOs with opportunities to partner in removal and source identification efforts
- C. Conduct workshops and provide information tailored to government agencies, NGOs, and educators about derelict fishing gear, removal efforts, and the goals and objectives of source identification efforts
- D. Work with the industry to identify individuals within the agency, Congress, and NGOs, who can provide a leadership role in securing federal and private funding, organizing removal efforts, source identification efforts and outreach to the general public
- E. Publicize these effort through newsletters, web sites, talks and various symposia or workshops

III. TYPE(S) OF ACTION:

Educational and constituency building

IV. WHERE SHOULD ACTION BE IMPLEMENTED (SPECIFY GENERAL GEOGRAPHIC AREAS)?

Minimum Spatial Extent: The action should first be implemented in areas that have been identified as priority areas for marine debris/derelict fishing gear removal and where historic removal efforts have occurred as well as areas that are potential sources of derelict fishing gear (e.g., Hawai'i and Alaska).

It is important that in establishing a constituency, organizers go to the fishing community rather than asking the community to come to them.

RECOMMENDATION C5.

V. WHO IMPLEMENTS ACTION?

The action will be implemented through partnerships with the federal government, international organizations, NGOs, and the industry. The federal government should work closely with these partners to provide the information necessary to conduct effective outreach.

VI. WHAT IS COST OF ACTION (ESTIMATE)?

One time (Start up) Cost - \$10,000 to \$50,000
Annual Operation and Maintenance Cost - \$50,000 to \$100,000

VII. WHO FINANCES?

Financial responsibility has not been determined.

VIII. WHAT ARE THE BENEFITS (ENVIRONMENTAL OR ECONOMIC) FROM IMPLEMENTATION?

The immediate benefit would be the development of an informed constituency to support marine debris monitoring, removal, and education efforts. The result will enable more effective and targeted educational programs to the various constituencies. The goal and objective would be to change behavior, create awareness, eliminate sources of derelict fishing gear through education and outreach, and secure international support for these efforts.

IX. IDENTIFY THE RESOURCES (LIVING OR PHYSICAL) AFFECTED BY ACTION:

Industry: Fishing communities, international gear experts, and gear manufacturers

Government agencies, Congress, international organizations, and environmental organizations

Environment: Marine life and ecosystems

**SOURCE IDENTIFICATION:
RECOMMENDATION C6.**

Title: Develop a web site for identification of gear fragments

I. DESCRIPTION:

Develop and maintain a web site that provides access to gear identification /standard reference collection database. The web site would provide general information on the location of fisheries, photos or keys of gear types by region, standard protocols for gear sampling, definition of terms, contacts for additional information, links to other web sites of organizations associated with gear identification or marine debris removal efforts.

The data, which is business confidential within the database, will be password protected in order to protect fisheries that have contributed to the database.

II. METHODS/STEPS FOR IMPLEMENTING ACTION:

The following actions must be completed prior to the development of the web site:

- A. Build the database
- B. Define terms
- C. Develop standardized collection protocols
- D. Identify individuals to create and maintain the web site

III. TYPE(S) OF ACTION:

Information source

IV. WHERE SHOULD ACTION BE IMPLEMENTED (SPECIFY GENERAL GEOGRAPHIC AREAS)?

Minimum Spatial Extent: Website would be available worldwide

V. WHO IMPLEMENTS ACTION?

Depending on the funding source this action will be implemented either through the federal government or a private institution. Other nations should be encouraged to develop a similar capacity or provide support for this position.

RECOMMENDATION C6.

VI. WHAT IS COST OF ACTION (ESTIMATE)?

One time (Start up) Cost - \$10,000 to \$50,000

Annual Operation and Maintenance Cost - \$10,000 to \$50,000

VII. WHO FINANCES?

Funding for this action could be from the federal government or from a private institution. Other nations could also contribute to the funding for this position.

VIII. WHAT ARE THE BENEFITS (ENVIRONMENTAL OR ECONOMIC) FROM IMPLEMENTATION?

The benefits of this web site are international coordination, access to standardize fishing gear information, and a data source for gear identification for removal efforts.

Additional benefits include greater awareness of the marine debris issue and an avenue to foster international cooperation.

IX. IDENTIFY THE RESOURCES (LIVING OR PHYSICAL) AFFECTED BY ACTION:

Industry: Fishing communities, international gear experts, and gear manufacturers

Environment: Marine life and ecosystems
Researchers in the academic field

GROUP D: INDUSTRY

Chair: Dayton "Lee" Alverson, Ph.D.

Panelists: Jim Cook
 Steven H. Hendrickson
 Peter Leipzig
 Brent Paine
 Robert Zuanich

Facilitators: Steve Olive, Ph.D.
 Jeff Walters, Ph.D.

Rapporteurs: Kevin Kelly
 Cindy Knapman

- D1. Support fishing effort rationalization
- D2. Expand port-receiving sites for fishing gear
- D3. Expand recycling opportunities and facilities for fishing gear
- D4. Expand focus on gear loss reporting and documentation

**INDUSTRY:
 RECOMMENDATION D1.**

Title: Support fishing effort rationalization

Issues: Optimization and control of effort

Concern: Extant gear regimes contribute to gear loss

Theme: Promote fishing practices that minimize gear loss

Authors: L. Alverson, M. Eder, and B. Paine

I. DESCRIPTION:

This recommendation addresses the problem of open access fishing, which often encourages overcapitalization of fleets and gear in competition for resources in limited areas and time periods. Frequently these practices can lead to unnecessary loss of fishing gear. Current FAO efforts to rationalize fishing effort on a global scale should be supported by the U.S. government, and Congressional opposition to this management tool should be reviewed.

II. METHODS/STEPS FOR IMPLEMENTING ACTION:

- A. Inform regional fishery organizations, national and international, of conference position regarding effort rationalization programs, e.g., limited entry, individual quotas, cooperatives, etc. and importance of these programs in the reduction of marine debris
- B. Educate NGOs about the value of effort rationalization programs as a tool to reduce marine debris
- C. Communicate to the U.S. Congress that the current moratorium on the implementation of effort rationalization systems, such as individual quotas is contrary to the goal of reduction of marine debris and the position taken at the International Marine Debris Conference, 2000.

III. TYPE(S) OF ACTION

Regulatory, educational, and policy

RECOMMENDATION D1.

IV. WHERE SHOULD ACTION BE IMPLEMENTED (SPECIFY GENERAL GEOGRAPHIC AREAS)?

Minimum Spatial Extent: Regional, global
Habitat Type Affected: Ocean-wide

V. WHO IMPLEMENTS ACTION?

- A. Fishery organizations
- B. U.S. DOC/NOAA
- C. NGOs
- D. Regional management bodies
- E. International fishery organizations
- F. National and international legislative bodies

VI. WHAT IS COST OF ACTION (ESTIMATE)?

One time (Start up) Cost - >\$1,000,000
Annual Operation and Maintenance - >\$1,000,000

VII. WHO FINANCES?

Government and users finance the action.

VIII. WHAT ARE THE BENEFITS (ENVIRONMENTAL OR ECONOMIC) FROM IMPLEMENTATION?

The ocean environment and ocean users benefit from the implementation.

IX. IDENTIFY THE RESOURCES (LIVING OR PHYSICAL) AFFECTED BY ACTION:

All living resources are affected by the action.

INDUSTRY:
RECOMMENDATION D2.

Title: Expand port-receiving sites for fishing gear

Issues: Logistics are not in place to receive waste and other materials

Concern: Not many port facilities are outfitted in this way—insufficient

Theme: To be able to adequately divert waste and recyclables from being inappropriately dumped at sea and on land according to MARPOL regulations

Authors: A. Burch, L. Chapman, S. Hendrickson, and M. Minton

I. DESCRIPTION:

Despite requirements of MARPOL for nations to provide adequate port disposal facilities, many ports in the Pacific do not provide adequate facilities. Implementation of this recommendation will help make adequate facilities available to dispose of waste including fishing gear.

II. METHODS/STEPS FOR IMPLEMENTING ACTION:

- A. Acquire cranes or other equipment to remove gear from boat to dock
- B. Acquire holding containers for solid and other waste including liquids and recyclables
- C. Develop transportation system from port dock to landfill or other facility
- D. Make waste oil holding facility and testing equipment available.
Containers should be provided. Collection site — charge per gallon or free
- E. Build oily bilge water holding facility, run through water separating systems and storage/holding facilities for other chemicals, paints, solvents, batteries.
- F. Develop incentive program to encourage utilization of services and facilities, free dumping, etc.
- G. Foster recycling opportunities

III. TYPE(S) OF ACTION:

Administrative, monitoring, economic, assessment, educational, and improved disposal

RECOMMENDATION D2.

IV. WHERE SHOULD ACTION BE IMPLEMENTED (SPECIFY GENERAL GEOGRAPHIC AREAS)?

Minimum Spatial Extent: All ports throughout region with efforts focusing on major ports (particularly targeting those home porting net fisheries and then targeting progressively less active ports)

Habitat Type Affected: All associated environments/habitats are affected by reduced waste disposal into the ocean environment and reduced pressure on landfills

V. WHO IMPLEMENTS ACTION?

The action is implemented by all levels of the government along with help from the public sector.

VI. WHAT IS COST OF ACTION (ESTIMATE)?

Per port:

One time (Start up) Cost - \$100,000 to \$500,000

Annual Operation and Maintenance Cost - \$100,000 to \$500,000

VII. WHO FINANCES?

Initially, national government finances with gradual transition of costs to local communities and the private sector (port users, etc.). Funding for monitoring/assessment should be continued.

VIII. WHAT ARE THE BENEFITS (ENVIRONMENTAL OR ECONOMIC) FROM IMPLEMENTATION?

The benefits of implementation include the reduction of improper disposal of wastes, including fishing gear, and other associated impacts.

IX. IDENTIFY THE RESOURCES (LIVING OR PHYSICAL) AFFECTED BY ACTION:

All resources are affected by the action.

**INDUSTRY:
RECOMMENDATION D3.**

Title: Expand recycling opportunities and facilities for fishing gear

Concern: Logistics are not in place to recycle waste from fishing practices

Authors: L. Chapman, S. Hendrickson, and M. Minton

I. DESCRIPTION:

This recommendation is intended to develop a capacity to recycle fishing vessel wastes including netting, gear, oil, plastics, solvents, batteries, cardboard, metals, etc.

II. METHODS/STEPS FOR IMPLEMENTING ACTION:

A. Have appropriate waste handling facilities in place (see industry recommendation D2)

B. Identify recycling facilities and markets and negotiate recycling agreements/contracts

C. In consultation with recycling facilities, develop procedures, protocols and infrastructure to sort, store, and transport materials to recycling facilities

D. Develop an education and outreach program for the fishing community via a community outreach coordinator

III TYPE(S) OF ACTION:

Administrative, monitoring, economic, assessment, and educational

IV. WHERE SHOULD ACTION BE IMPLEMENTED (SPECIFY GENERAL GEOGRAPHIC AREAS)?

Minimum Spatial Extent: All ports throughout region with efforts focusing on major ports (particularly targeting those home porting net fisheries and then targeting progressively less active ports)

Habitat Type Affected: All associated environments/ habitats affected by reduced waste disposal into the ocean environment and reduced pressure on landfills

RECOMMENDATION D3.

V. WHO IMPLEMENTS ACTION?

The action is implemented by all levels of the government along with help from the public sector.

VI. WHAT IS COST OF ACTION (ESTIMATE)?

A successful recycling program is dependent on adequate port disposal facilities (see industry recommendation D2). Costs could vary significantly depending on port(s) and location(s).

Per port:

One Time (Start up) Cost – \$10,000 to \$50,000

Equipment Cost - \$10,000 to \$50,000

Annual Operation and Maintenance Cost - \$50,000 to \$100,000

Note: The coordinator could potentially serve several communities depending on proximity

VII. WHO FINANCES?

Initially, national government finances with gradual transition of costs to local communities and the private sector (port users, etc.). Funding for monitoring/assessment should be continued.

VIII. WHAT ARE THE BENEFITS (ENVIRONMENTAL OR ECONOMIC) FROM IMPLEMENTATION?

The benefits of implementation include the reduction of improper disposal of wastes, including fishing gear, and other associated impacts. There is also an educational benefit associated with raising local understanding and support for recycling and correct waste disposal.

IX. IDENTIFY THE RESOURCES (LIVING OR PHYSICAL) AFFECTED BY ACTION:

All resources are affected by the action.

INDUSTRY: RECOMMENDATION D4.

Title: Expand focus on gear loss reporting and documentation

Concern: Quantification of amount and origin of lost gear

Authors: J. Cook, C. Oliver, and R. Zuanich

I. DESCRIPTION:

This recommendation is intended to establish regional protocols (regulations) at appropriate State, Federal, or other agency levels to require reporting of gear lost that is not immediately retrieved. The protocols would be limited to net gear (trawl web, gill net, etc.) and would require reporting of type, location, amount, etc. Difficulties with other gear types led the group to focus only on net gear.

II. METHODS/STEPS FOR IMPLEMENTING ACTION:

- A. Verify current reporting requirements by region and by various jurisdictions (State, Federal, etc.)
- B. Propose specific regulatory language (for each agency/jurisdiction) to require that all federally permitted vessels submit a report form to the NMFS Habitat Conservation Division. Either require that any loss be reported, or let Council/Industry refine the exact reporting criteria (limiting the regulations to net gear will make it easier to define the minimum reporting criteria)
- C. Reporting could additionally be linked to the IMO web site discussed in other recommendation(s)

III. TYPE(S) OF ACTION:

Monitoring and regulatory

IV. WHERE SHOULD ACTION BE IMPLEMENTED (SPECIFY GENERAL GEOGRAPHIC AREAS)?

Minimum Spatial Extent: Net/trawl fisheries throughout the North Pacific (U.S. Pacific management council areas)

Habitat Type Affected: Reefs, water column, and substrate (potentially all habitats)

RECOMMENDATION D4.

V. WHO IMPLEMENTS ACTION?

- A. Regional Councils
- B. U.S. DOC/NOAA/NMFS
- C. State
- D. Other

VI. WHAT IS COST OF ACTION (ESTIMATE)?

One time (Start up) Cost - \$500,000 to \$1,000,000
Annual Operation and Maintenance Cost - \$50,000 to \$100,000

VII. WHO FINANCES?

Relevant government agencies fund the action.

VIII. WHAT ARE THE BENEFITS (ENVIRONMENTAL OR ECONOMIC) FROM IMPLEMENTATION?

A significant benefit will be having a quantifiable record of the amount and origin of current and future net loss.

IX. IDENTIFY THE RESOURCES (LIVING OR PHYSICAL) AFFECTED BY ACTION:

Resources affected by the action include ocean habitats, protected species and fisheries. Fishermen and the general public will also be affected.

FINAL RECOMMENDATIONS

GROUP E: MONITORING AND REMOVAL

Chair: Mary Donohue, Ph.D.

Panelists: CDR Russell E. Brainard, Ph.D.
Ilse Kiessling, Ph.D.
Tatsuro Matsuoka
Daniel Torres N.
Nina Young

Facilitators: Tom Culliton
Todd Jacobs

Rapporteurs: LT Lane D. Johnson
Linda Paul

- E1. Establish broad based funding to address derelict fishing gear monitoring and removal via a task force comprised of all interested stakeholders
- E2. Establish standardized survey and removal protocols for derelict fishing gear
- E3. Establish a high level intergovernmental and stakeholder Pacific Rim Marine Debris Commission to address the issue of derelict fishing gear, and other marine debris
- E4. Investigate and establish appropriate financial incentives for recovery, return, and recycling of derelict gear
- E5. Continue current derelict fishing gear retrieval, monitoring, and identification analysis efforts at the local, national, and international levels, including the Northwestern Hawaiian Islands

MONITORING AND REMOVAL: RECOMMENDATION E1.

Title: Establish broad based funding to address derelict fishing gear monitoring and removal via a task force comprised of all interested stakeholders

Issues: Derelict fishing gear is currently damaging and degrading coral reefs and other coastal ecosystems and threatening living marine resources, including threatened, endangered, and other protected species. However, no dedicated broad-based funding, including federal U.S appropriation, currently exists to conduct marine debris monitoring and removal.

Concern: Entanglement of living resources in derelict fishing gear; ingestion of derelict fishing gear by wildlife; scouring of coral, live rock, and other substrate by derelict fishing gear; potential transport and introduction of exotic species to novel environments; hazards to navigation. Enhanced information on the nature and quantity of derelict fishing gear is needed to detect marine debris trends and mitigate associated damage.

Theme: Secure permanent funding sources to execute derelict fishing gear removal and monitoring until such time debris no longer poses an ecological and economic threat.

Authors: T. Culliton, M. Donohue, T. Egeland, R. Miyashiro, and N. Young

I. DESCRIPTION:

Establish a task force comprised of individuals from government agencies, the fishing industry, environmental groups, corporations, gear manufacturers, and insurance companies whose task is to identify funding sources, both public and private, which can be used in marine debris monitoring and removal efforts. The goal of this effort is to secure permanent funding sources to promote the assessment, monitoring, and removal of marine debris.

RECOMMENDATION E1.

II. METHODS/STEPS FOR IMPLEMENTING ACTION:

- A. Establish the task force
- B. Develop educational information that highlights the importance of marine debris monitoring and removal efforts

Private Funding Sources

- A. Research and identify possible private (national and international) funding sources
- B. Identify potential corporate sponsors
- C. Develop a merchandizing and marketing strategy using key species (e.g., monk seal plush toys)
- D. Examine sources of funding identified through economic incentive programs

Federal Funding Sources

- A. Identify key leaders in Congress that will support Congressional appropriations for marine debris monitoring and removal efforts
- B. Work with these leaders to ensure that line items for marine debris monitoring and removal are provided for in the federal budget
- C. Work with the agencies that may contribute to these efforts (e.g., U.S. NMFS, U.S. NOAA, U.S. DOD, and USCG) to ensure that monitoring and removal efforts are advanced in their budget requests
- D. Provide educational materials, testimony, and fact sheets to the Congressional appropriations committees to highlight the importance of this issue

III. TYPE(S) OF ACTION:

Economic and regulatory

IV. WHERE SHOULD ACTION BE IMPLEMENTED (SPECIFY GENERAL GEOGRAPHIC AREAS)?

- A. U.S. Congress (Washington, D.C.)
- B. Private Sector

RECOMMENDATION E1.

V. WHO IMPLEMENTS ACTION?

Task Force members implement the action.

VI. WHAT IS COST OF ACTION (ESTIMATE)?

One time (Start-up) Cost - \$50,000 to \$100,000

Annual Operation and Maintenance Cost - \$50,000 to \$75,000

VII. WHO FINANCES?

- A. Each task force member absorbs the cost of participation in the task force
- B. Some seed money provided by each institution may be needed in the initial phase for research and publications
- C. Task force will seek funding to sustain its efforts
- D. Additional funding may be needed if the task force decides to hire a coordinator

VIII. WHAT ARE THE BENEFITS (ENVIRONMENTAL OR ECONOMIC) FROM IMPLEMENTATION?

The benefit from implementation is the prevention of environmental and economic damage through enhanced monitoring and removal of derelict fishing gear from the marine environment.

IX. IDENTIFY THE RESOURCES (LIVING OR PHYSICAL) AFFECTED BY ACTION:

- A. Protected marine species, marine life, essential fish habitat, living coral substrate, and marine coastal and pelagic ecosystems
- B. Recreational beaches
- C. All coastal resources

MONITORING AND REMOVAL: RECOMMENDATION E2.

Title: Establish standardized survey and removal protocols for derelict fishing gear

Issues: Absence of comparable data sets detailing the survey and removal of derelict fishing gear prevents efficient understanding and remediation of the problem

Concern: Inability to assess trends and impacts of derelict gear on a global scale. Inability to meaningfully compare data between regions and existing efforts. Inappropriate removal and monitoring efforts could potentially do more harm than good.

Theme: Determine global status and trends in derelict fishing gear impacts in order to assist in its remediation

Authors: C. Barr, H. Bernard, A. Frankic, W. Gilmartin, and I. Kiessling

I. DESCRIPTION:

Establish guidelines for standardizing monitoring and removal of derelict fishing gear to facilitate assessment of trends, status, and impacts.

II. METHODS/STEPS FOR IMPLEMENTING ACTION:

- A. Develop objective-specific and habitat specific guidelines for derelict fishing gear monitoring and removal

Evaluate methods of existing long-term marine debris recovery programs' methods, such as CMC's Marine Debris Monitoring Program and NMFS Marine Debris Recovery Program in the NWHI for adaptation to other regions. Refinement of existing methodology should include the following elements:

1. Survey and removal efforts must consider the protected species and sensitive habitat of the area. Therefore, appropriate resource management agencies must be consulted, and appropriate regulations observed.
2. Where possible, monitoring efforts should endeavor to collaborate with existing monitoring and survey programs.
3. A cost-benefit analysis should be employed during removal efforts to ensure no additional anthropogenic damage is inflicted by removal

RECOMMENDATION E2.

efforts (i.e., biologically based evaluation of derelict nets incorporated growth into the reef structure by coral should be undertaken to avoid any additional anthropogenic damage).

4. Survey techniques should strive to be comparable, systematic, and quantifiable and be able to measure the rate of accumulation when possible.
5. Survey design, where appropriate, should endeavor to subsample areas affected to use resources most effectively and minimize disturbance to the environment.
6. Long-term or intensive survey and monitoring efforts should avoid sensitive regions (e.g., seal haul-out sites).

B. Regional criteria for prioritizing and identifying removal sites:

Criteria for identifying and prioritizing debris removal sites will be regionally derived, with consideration given to the present degree of removal efforts' impact on the ecosystem, habitat, species, economy, community engagement, weather, habitat usage patterns of people and/or wildlife, etc.

C. International Database (web-based):

Data collection techniques, when possible, should be comparable regionally and internationally. In order to support this goal, a standard data sheet will be designed as described under section A and peer-reviewed by stakeholders.

We propose the standard data sheet be posted on the world wide web. Ideally, this web site would be interactive, allowing visitors to input data. The host agency will analyze these data annually and disseminate results to all interested stakeholders.

D. Establish a "Hotline" for derelict fishing gear:

Determine agencies within each nation/state that will host a Marine Debris Hotline (telephone and internet) to which mariners/beachgoers can report derelict fishing gear. Generate a response paradigm for recovery (e.g., on beach vs. at-sea).

E. Effectively communicate the full impact of the debris problem, as well as progress on removal and prevention.

Engage all stakeholders in derelict fishing gear monitoring and removal activities (especially developing countries); use existing marine related forums (e.g., international conferences on marine mammals, sea turtles, technology, fishing, and insurance companies) as a mechanism for engaging stakeholders.

RECOMMENDATION E2.

Engage advocacy groups in highlighting and promoting funding requirements for derelict fishing gear monitoring and removal.

Encourage industry, NGOs, and governmental organizations to provide links to the aforementioned web site.

III. TYPE(S) OF ACTION:

Monitoring, educational, and assessment

IV. WHERE SHOULD ACTION BE IMPLEMENTED (SPECIFY GENERAL GEOGRAPHIC AREAS)?

Minimum Spatial Extent: Hot spots - based on the degree of impact (e.g., Arafura Sea, Australia, NWHI and Antarctic Peninsula)

Habitat Type Affected: All oceanic ecosystems

V. WHO IMPLEMENTS ACTION?

All interested stakeholders (e.g., researchers, resource managers, fishers, government and non-governmental representatives) implement the action.

VI. WHAT IS COST OF ACTION (ESTIMATE)?

One time (Start-up) Cost - \$500,000 to \$1,000,000

Annual Operation and Maintenance Cost - \$100,000 to \$500,000

VII. WHO FINANCES?

Information not provided

VIII. WHAT ARE THE BENEFITS (ENVIRONMENTAL OR ECONOMIC) FROM IMPLEMENTATION?

Benefits are environmental, cultural, socio-economic, and global in scale. Standardizing monitoring and removal efforts provides an information base for targeted remediation and may determine if regulations such as MARPOL V are effective.

IX. IDENTIFY THE RESOURCES (LIVING OR PHYSICAL) AFFECTED BY ACTION:

Virtually all levels of marine life, including commercial and protected species, are affected.

MONITORING AND REMOVAL: RECOMMENDATION E3.

Title: Establish a high level intergovernmental and stakeholder Pacific Rim Marine Debris Commission to address the issue of derelict fishing gear, and other marine debris

Concern: Lack of international collaboration on the issue of marine debris

Authors: C. Barr, N. Garon, I. Kiessling, L. Paul, R. Steiner, and D. Torres

I. DESCRIPTION:

The Commission should be comprised of top level regional, national, state, and local resource managers and representatives from other stakeholder groups (non-governmental organizations, industry [i.e., gear manufacturers, fishing organizations], scientific community, etc.) The Commission will provide a forum for interregional cooperation and coordination on all aspects of the debris issue. Its principle task will be to develop an action plan to eliminate sources of marine debris and remove existing debris in the Pacific Ocean by year 2010. General objectives will include:

- A. Conduct a comprehensive assessment of debris input sources into the Pacific Ocean and related ecosystems
- B. Prioritize problem sources and location of existing debris
- C. Establish goals, management objectives, and strategies to reduce priority sources and concentrations of marine debris (develop legislation/regulations on enforcement, etc.)
- D. Establish a monitoring program to measure the effectiveness of the action plan
 1. Design sampling protocol
 2. What and how to measure
 3. Reporting format (standardization)
 4. Develop habitat-specific guidelines
 5. Utilize remote sensing
- E. Develop and maintain an international data base to serve investigators and other stakeholders and provide for a consistent protocol
- F. Establish monitoring and removal network and hotline (trash busters)
- G. Regional criteria for prioritizing standard operating procedures
- H. Disseminate information to all stakeholders, including policy makers and fishing industries

RECOMMENDATION E3.

II. METHODS:

- A. The Commission shall meet physically once a year
- B. Teleconference three times a year
- C. Appoint a Secretariat to be based initially at the East West Center, University of Hawai'i, Honolulu
- D. Produce annual report

III. TYPE(S) OF ACTION:

Research, monitoring, economic, educational, administrative, regulatory, assessment, and coordination

IV. WHERE SHOULD ACTION BE IMPLEMENTED (SPECIFY GENERAL GEOGRAPHIC AREAS)?

Minimum Spatial Extent: Pacific basin and associated ecosystems

Habitat Type Affected: All pelagic, benthic, and coastal habitats of the Pacific Ocean

V. WHO IMPLEMENTS ACTION?

National governments via the Commission's umbrella organization

Implementation procedure:

- A. International Marine Debris Conference (IMDC) on Derelict Fishing Gear sends a letter with conference recommendations to the U.S. Department of Commerce, Department of Defense, the Department of Interior, the Department of State, the Department of Transportation, the U.S. Coral Reef Task Force and other resource management agencies in the U.S. and other nations represented at the Conference, Governors of U.S. territories, members of Congress, United Nations Environment Program (UNEP), regional resource management organizations by September 1, 2001 (Facilitated by National Marine Fisheries Service Honolulu Laboratory Marine Debris Coordinator)
- B. Interim IMDC Committee (made up of interested conference presenters) inquiry with assistance of State Department (Holly R. Koehler) and NOAA (Russell E. Brainard) and other agencies into interest of Asia-Pacific Economic Cooperation (APEC), South Pacific Regional Environment Program (SPREP), and other organizations in serving as an umbrella organization to Commission

RECOMMENDATION E3.

- C. State Department and NOAA facilitates, does advance work prior to letter being sent from President
- D. Letter from U.S. President to Pacific Rim Heads of State at end of October 2000
- E. First meeting to be held in Honolulu, Hawai'i at East West Center in March 2001

VI. WHAT IS COST OF ACTION (ESTIMATE)?

- One time (Start up) Cost - \$300,000
- Annual Operation and Maintenance Cost - \$750,000 including:
 - A. Staff: Executive director, fiscal officer, two administrative assistants, four regional coordinators (8 total): \$300,000
 - B. Office and equipment costs: \$100,000
 - C. Annual meeting: \$200,000
 - D. Travel: \$150,000

VII. WHO FINANCES?

- A. Conservation and Reinvestment Act (CARA), currently pending in U.S. Congress
- B. Member country contribution

VIII. WHAT ARE THE BENEFITS (ENVIRONMENTAL OR ECONOMIC) FROM IMPLEMENTATION?

For the first time ever there will be direct and regular dialog and coordinated action throughout the Pacific Basin and a target year of 2010 for eliminating inputs into the Pacific Ocean.

IX. IDENTIFY THE RESOURCES (LIVING OR PHYSICAL) AFFECTED BY ACTION:

All Resources are affected.

MONITORING AND REMOVAL: RECOMMENDATION E4.

Title: Investigate and establish appropriate financial incentives for recovery, return, and recycling of derelict gear

Concern: Lack of financial incentives to retrieve derelict gear

Authors: M. Donohue and R. Steiner

I. DESCRIPTION:

Initiate an investigation of financial incentives—bounties, tax breaks, etc. to encourage the retrieval, return, and recycling of derelict gear found at sea or ashore. Establish such incentives as appropriate.

II. METHODS/STEPS FOR IMPLEMENTING ACTION:

NOAA resource economists develop a concept paper/analysis of options for providing financial incentives for retrieval and assess the feasibility of such options. For those that indicate a feasibility, establish a pilot program with bounty for retrieval, facilitated by NMFS.

III. TYPE(S) OF ACTION:

Economic, research, and administrative

IV. WHERE SHOULD ACTION BE IMPLEMENTED?

Minimum Spatial Extent: Pacific-wide

Habitat Type Affected: All pelagic, benthic, and coastal habitats of Pacific Ocean

V. WHO IMPLEMENTS ACTION?

NOAA provides assessment of options and feasibility. NMFS provides the pilot project.

VI. WHAT IS COST OF ACTION (ESTIMATE)?

- One time (Start up) Cost - \$50,000 to \$100,000
- Annual Operation and Maintenance Cost - \$100,000 to \$500,000

RECOMMENDATION E4.

VII. WHO FINANCES?

- A. CARA (and/or)
- B. Other Congressional Appropriation

VIII. WHAT ARE THE BENEFITS (ENVIRONMENTAL OR ECONOMIC) FROM IMPLEMENTATION?

Reducing derelict gear in the marine environment is the primary benefit from implementation.

IX. IDENTIFY THE RESOURCES (LIVING OR PHYSICAL) AFFECTED BY ACTION:

All resources that are presently affected by derelict gear will be affected by the action.



Jacquelyn Zettles, United States Coast Guard

Students from Pacific Island nations, known as the "Trashbusters", gather in front of sculptures created with marine debris.

MONITORING AND REMOVAL: RECOMMENDATION E5.

Title: Continue current derelict fishing gear retrieval, monitoring, and identification analysis efforts at the local, national, and international levels, including the Northwestern Hawaiian Islands

Issues: Derelict fishing gear is currently damaging and degrading coral reefs and other coastal ecosystems and threatening living marine resources, including threatened, endangered, and other protected species.

Concern: Entanglement of living resources in derelict fishing gear; ingestion of derelict fishing gear by wildlife; scouring of coral, live rock and other substrate by derelict fishing gear; potential transport and introduction of exotic species to novel environments; and hazards to navigation

Theme: Mitigation or prevention of environmental and economic damage by derelict fishing gear removal

Authors: R. Clarke, M. Donohue, T. Egeland, and R. Miyashiro

I. DESCRIPTION:

Institutions that have conducted marine debris monitoring and removal efforts should maintain and expand derelict fishing gear retrieval, monitoring, and identification analysis efforts on beaches and in tidal and subtidal habitats. The continuation and expansion of these existing efforts worldwide are critical for habitat and fisheries enhancement. These efforts should include but not be limited to, the following:

- A. Northwestern Hawaiian Islands (NWHI) Multi-Agency Cooperative Marine Debris Cleanup
- B. Arafura Sea Beach Cleanup and Survey
- C. Center for Marine Conservation International Coastal Cleanup (ICC)
- D. National Marine Debris Monitoring Program
- E. Convention on the Conservation of Antarctic Marine Living Resources (CCAMLR) Environmental Monitoring Program (CEMP) Cape Shirreff, Livingston Island, Antarctica Marine Debris Cleanup Effort

II. METHODS/STEPS FOR IMPLEMENTING ACTION:

- A. Undertake public awareness campaigns surrounding these various monitoring and removal projects with the goal of seeking greater participation to expand these efforts
- B. Involve more partners in monitoring and removal efforts
- C. Allocate funding and seek permanent appropriation to maintain and expand existing efforts
- D. Provide reports or updates in newsletters, and public scientific forums to foster greater awareness of these programs
- E. Establish, where appropriate, a public relations strategy to complement monitoring and removal efforts with the goal of garnering greater public support and participation

III. TYPE(S) OF ACTION:

Monitoring, research, education, mitigation (removal) of derelict fishing gear, and outreach to the public

IV. WHERE SHOULD ACTION BE IMPLEMENTED (SPECIFY GENERAL GEOGRAPHIC AREAS)?**Minimum Spatial Extent:**

- A. Northwestern Hawaiian Islands
- B. Arafura Sea
- C. All coastlines
- D. Antarctica

Habitat Type Affected: Nearshore and coastal resources worldwide, including coral reefs, temperate, subtropical, and tropical beaches (urban and remote), and Antarctic and subarctic shorelines

V. WHO IMPLEMENTS ACTION?

- A. Multi-Agency Cooperative Task Force including Federal, State and non-governmental partners
- B. World Wide Fund for Nature (World Wildlife Fund), Dhimurru Land Management Aboriginal Corporation and Australian Trust for Conservation Volunteers
- C. Center for Marine Conservation and partners
- D. Instituto Antartico Chileno

VI. WHAT IS COST OF ACTION (ESTIMATE)?

- A. \$U.S. 1,435,000 per 30 day two ship research cruise
- B. \$U.S. 10,000 per approximately 9 km of beachfront cleanup
- C. \$U.S. 200,000 for coordinated volunteer effort
- D. \$U.S. 6,000 per approximate 3 month season annually

VII. WHO FINANCES?

Presently, as outlined below. Additional permanent funding is critical to sustain these efforts

- A. No dedicated budget, all in-kind contributions from multi-agency working group
- B. Australian Federal and State governments and in-kind services from various agencies
- C. Non-profit organization revenues
- D. Instituto Antartico Chileno

VIII. WHAT ARE THE BENEFITS (ENVIRONMENTAL OR ECONOMIC) FROM IMPLEMENTATION?

Prevention of environmental damage through permanent removal of derelict fishing gear from the marine environment

- A. Coral reef restoration including, enhancement of U.S. Essential Fish Habitat, protection and restoration of U.S. National Wildlife Refuge beaches, tidal and subtidal habitats and protection of endangered species critical habitat
- B. Ensure subsistence resources for indigenous peoples
- C. Aesthetic improvement of coastal beaches and enhancement of marine and shoreline habitats
- D. Removal of marine debris at Antarctic fur seal (*Arctocephalus gazella*) rookeries and penguin nesting colonies

IX. IDENTIFY THE RESOURCES (LIVING OR PHYSICAL) AFFECTED BY ACTION:

- A. Endangered Hawaiian monk seal (*Monachus schauinslandi*), threatened and endangered sea turtles, migratory seabirds, living coral substrate
- B. Aquatic turtles, indigenous peoples subsistence resources
- C. All coastal resources
- D. Antarctic fur seal (*Arctocephalus gazella*) and penguins (*Pygoscelidae* species)

GROUP F: EDUCATION AND OUTREACH

Chair: Emily Morgan
 Panelists: Gael Arnold
 Hung Chi-Liao
 MCPO Linda J. Reid
 Seba B. Sheavly
 John Wang
 Christine Woolaway

 Facilitators: Brad Barr
 Timothy Goodspeed

 Rapporteurs: Christina Meller
 Lynn Nakagawa

- F1. Reestablish and institutionalize funding for MPPRCA mandate MDIO (CG, EPA, Commerce) in U.S. and similar institutions in other countries
- F2. Hire and train peer group representatives to actively deliver derelict fishing gear marine debris message within priority groups (including fishing vessel captains, port captains, enforcement personnel, gear manufacturers)
- F3. Produce training/informational video on MARPOL and gear disposal
- F4. Education of public resource managers, administrators, legislators, the fishing industry, and conservation organizations of the true character and impacts of marine debris is important, especially in developing countries. Both the nature of the problem, and mitigation actions taken by governments, NGOs, and the fishing industry, should be noted.
- F5. Use source identification to target education
- F6. Engage industry in the development of programs to ensure effectiveness
- F7. Tailor education programs to regional circumstances and culture; use respected community leaders

**EDUCATION AND OUTREACH:
 RECOMMENDATION F1.**

Title: Reestablish and institutionalize funding for MPPRCA mandate MDIO (CG, EPA, Commerce) in U.S. and similar institutions in other countries

Authors: K. Blue, C. Fowler, C. Meller, S. Sheavly, and C. Woolaway

I. DESCRIPTION:

The following U.S. national program is to serve as a model for an international approach to address derelict fishing issues with the intention that the IMO will serve as a clearinghouse.

The U.S. Congress mandated that the Department of Commerce National Oceanic and Atmospheric Administration and the Environmental Protection Agency conduct an education program as part of MARPOL Annex V enacting legislation for the Marine Plastic Pollution Research and Control Act (MPPRCA) of 1987. Funding was appropriated to NOAA to conduct this effort. NOAA contracted with the Center for Marine Conservation from 1989 to 1995 to operate two marine debris information offices. The function of these offices was to establish and maintain a clearinghouse and distribution center for information and materials to educate various stakeholders, including the general public and marine user groups, about the impacts of marine debris and their roles in its creation, removal and proper disposal. Due to the shift of program emphasis, appropriations were cut shutting down the program in 1996.

Currently, the only federal agency supporting marine debris education is the Environmental Protection Agency through its involvement with the International Coastal Cleanup and the National Marine Debris Monitoring Program.

The U.S. Coast Guard (USCG) is responsible for enforcing MARPOL Annex V. The approach utilized by the USCG is one of education and prevention implemented through the Sea Partners program. Funding from the Department of Transportation is needed to support USCG efforts related to this issue.

There is inadequate national support in existence to maintain ongoing educational efforts to address the issue of marine debris—including derelict fishing gear.

II. METHODS/STEPS FOR IMPLEMENTING ACTION:

- A. Secure long-term national funding through:
 - A. U.S. Department of Commerce/NOAA
 - B. U.S. Department of Transportation, (USCG)
 - C. U.S. EPA
- B. Integrate marine debris issues into current legislation at the national and state level
- C. Develop an action plan for USCG to put pressure on the IMO to strengthen efforts for enforcement of MARPOL Annex V in the member states
- D. Set national implementation for fiscal year 2002
- E. Modify CARA appropriations to require state-level marine debris programs
- F. Require a port fee of entry for marine pollution education programs similar to insurance programs required on boats entering U.S. ports
- G. Partners: Center for Marine Conservation, Coastal State Organizations, NOAA, Sea Grant, CZMP, NMFS, USFWS, USCG, MEP, Sea Partners, EPA, Regional Fisheries Councils, Local and Regional NGOs

Challenges:

1. Fundamentally no one entity has overall authority to manage this issue
2. Intra and interagency conflicts on funding, authority, and implementation
3. Inadequate and inconsistent funding from Congress to address the issue of marine debris

III. TYPE(S) OF ACTION:

Educational, economic, administrative, and assessment

IV. WHERE SHOULD ACTION BE IMPLEMENTED (SPECIFY GENERAL GEOGRAPHIC AREAS)?

Minimum Spatial Extent: Nationwide (U.S.) and all throughout the U.S. Exclusive Economic Zone (EEZ)

Habitat Type Affected: Marine and coastal communities

V. WHO IMPLEMENTS ACTION?

A Presidential Executive Order or Congressional action/appropriation forms a National Working group composed of representative government agencies, conservationists, community members, and industry organizations with experience in addressing marine debris issues related to derelict fishing gear to implement the action.

VI. WHAT IS COST OF ACTION (ESTIMATE)?

One time (Start-up) Cost - \$500,000 to \$1,000,000

Annual Operation and Maintenance Cost - \$500,000 to \$1,000,000

VII. WHO FINANCES?

- A. Modify CARA appropriations to require state level marine debris programs
- B. Require a port fee of entry for marine pollution education programs similar to insurance programs required on boats entering U.S. ports

VIII. WHAT ARE THE BENEFITS (ENVIRONMENTAL OR ECONOMIC) FROM IMPLEMENTATION?

- A. Change human behaviors
- B. Reduction of presence of derelict gear
- C. Reduction of impacts to marine wildlife from derelict gear
- D. Improve survival of commercially valuable species
- E. Enhance cultural exchanges regionally

IX. IDENTIFY THE RESOURCES (LIVING OR PHYSICAL) AFFECTED BY ACTION:

Marine wildlife, including fish, mammals, and birds, as well as human health and safety, are affected by the action.

**EDUCATION & OUTREACH:
RECOMMENDATION F2.**

Title: Hire and train peer group representatives to actively deliver derelict fishing gear marine debris message within priority groups (including fishing vessel captains, port captains, enforcement personnel, gear manufacturers)

I. DESCRIPTION:

Target Audience: Harbormasters, port authority, wastehaulers, boaters, owners/operators, fishers, boating crew, coastal government

II. METHODS/STEPS FOR IMPLEMENTING ACTION:

- A. ID state (national, international) program to house and sponsor the training program
- B. Create local forum to address the needs/problems and a local trainer/leader/facilitator will arise — this person then needs to be trained about proper derelict fishing gear issues and disposal in the target community
- C. Provide facilitator with educational methods
- D. Assist facilitator with program implementation

III. TYPE(S) OF ACTION:

Educational

IV. WHERE SHOULD ACTION BE IMPLEMENTED (SPECIFY GENERAL GEOGRAPHIC AREAS)?

Minimum Spatial Extent: Coastal fishing communities

V. WHO IMPLEMENTS ACTION?

Coastal Zone Management or equivalent international representatives implement the action.

RECOMMENDATION F2.

VI. WHAT IS COST OF ACTION (ESTIMATE)?

One time (Start-up) Cost - \$10,000 to \$50,000
Annual Operation and Maintenance Cost – has not been determined

VII. WHO FINANCES?

- A. State/National (i.e., CARA funding); or
- B. The fishing industry in state/national program partnership

VIII. WHAT ARE THE BENEFITS (ENVIRONMENTAL OR ECONOMIC) FROM IMPLEMENTATION?

Strong direct outreach and education of user source are the benefits from implementation.

IX. IDENTIFY THE RESOURCES (LIVING OR PHYSICAL) AFFECTED BY ACTION:

Affected resources have not been determined.

**EDUCATION AND OUTREACH:
RECOMMENDATION F3.**

Title: Produce training/informational video on MARPOL and gear disposal

Authors: E. Morgan, L. Reid, and C. Yokota

I. DESCRIPTION:

Produce training/informational video on MARPOL and gear disposal that meets the following objectives:

- A. Target audience is fishermen
- B. Easy to show; relatively inexpensive to reproduce and distribute
- C. Includes possibility of translating to reach international audience
- D. Tailored to fishermen's culture, using respected or easily identifiable representatives in the video
- E. Not overly bureaucratic or technical
- F. Complete, accurate, timely
- G. Appealing; attention-retaining
- H. Makes the emotional connection to why it is important to properly manage fishing gear (i.e., good stewardship, impact on future generations)
- I. Features positive examples of compliance, successful models

II. METHODS/STEPS FOR IMPLEMENTING ACTION:

- A. Review availability of existing videos for applicability; investigate sources such as U.S. Coast Guard, U.S. Navy, Sea Grant, industry, etc. (e.g., U.S. Coast Guard currently has in stock "A Fisherman's Guide to a Clean Sea," "Guardians of the Sea")
- B. Confer with fishermen and fishing trade representatives to review what is currently available, recommend what is usable and what needs to be created
- C. Define conceptual video message and script in consultation with fishermen and fishing trade representatives
 - 1. Use existing videos or portions, if possible
 - 2. Keep to 15-20 minutes.
 - 3. Consider creating stock footage that can be overdubbed for use by many countries
 - 4. Consider using kids to make emotional connection to good stewardship
 - 5. Feature fishermen doing "right thing" – as successful model

RECOMMENDATION F3.

- D. Contract and produce
- E. Determine distribution needs and method
- F. Assess whether successful in changing fishermen's behavior in MARPOL compliance and decreasing amount of derelict fishing gear in our oceans
- G. Revise video if needed

III. TYPE(S) OF ACTION:

Educational

IV. WHERE SHOULD ACTION BE IMPLEMENTED (SPECIFY GENERAL GEOGRAPHIC AREAS)?

Minimum Spatial Extent: All commercial fishermen, focused especially in areas with worst derelict fishing gear problem (per source identification input)

V. WHO IMPLEMENTS ACTION?

The U.S. Coast Guard, along with assistance from other agencies and organizations, implements the action.

VI. WHAT IS COST OF ACTION (ESTIMATE)?

One time (Start-up) Cost - \$10,000 to \$50,000
Annual Operation and Maintenance Cost – less than \$10,000

VII. WHO FINANCES?

Funding for this action has not been determined.

VIII. WHAT ARE THE BENEFITS (ENVIRONMENTAL OR ECONOMIC) FROM IMPLEMENTATION?

Benefits from implementation have not been determined.

IX. IDENTIFY THE RESOURCES (LIVING OR PHYSICAL) AFFECTED BY ACTION:

Affected resources have not been determined.

EDUCATION AND OUTREACH: RECOMMENDATION F4.

Title: Education of public resource managers, administrators, legislators, fishing industry, and conservation organizations of the true character and impacts of marine debris is important, especially in developing countries. Both the nature of the problem, and mitigation actions taken by governments, NGOs, and the fishing industry, should be noted.

Authors: K. Blue, C. Fowler, S. Sheavly, and C. Woolaway

I. DESCRIPTION:

Education of derelict fishing gear stakeholders.

There are several audiences related to commercial fishing and derelict gear issues. The core of this group consist of fishers ranging from single, subsistence individuals who may or may not own their own boats to crews on large trawlers. Business and industry associated with equipment and boat manufacturing and marketing are also part of this audience as they are responsible for the production and sales of the materials used by fishers. Individuals who are part of the fish processing industry including marketing are also part of this group including the consuming public. And last but not least, are the governmental regulatory and resource management entities, which are needed to complete the entire scope of this issue.

II. METHODS/STEPS FOR IMPLEMENTING ACTION:

- A. Empowered Organization: National work group (in recommendation to reestablish and institutionalize funding for MPPRCA mandate...) should empower an entity with broad experience and outreach related to marine debris and derelict gear issues to develop, implement, and maintain a continual educational program.
- B. Access past and current educational programs targeting derelict gear stakeholders to develop and implement national program.
- C. Following a successful U.S.A. national program, make materials available by adaptation for international agencies and organizations.

RECOMMENDATION F4.

- D. Funding will be through national support from U.S. EPA, USCG, NOAA combined with industry, corporate and private foundations.
- E. The program will start directly following the establishment of the national working group as defined previously.
- F. Partners and contributors to the 2000 International Marine Debris Conference are responsible to take recommendations to the next level for action implementation. Activities should be implemented within one year of this conference.
- G. Challenges to this process include the degree of cooperation between all agencies, organizations, and stakeholders in this issue; and creating appropriate educational materials for targeted groups particularly taking into consideration specialized needs of stakeholder groups.

III. TYPE(S) OF ACTION:

Educational

IV. WHERE SHOULD ACTION BE IMPLEMENTED (SPECIFY GENERAL GEOGRAPHIC AREAS)?

The action should begin with the U.S. national program then move to international program development after successful models have been developed and implemented in the United States.

V. WHO IMPLEMENTS ACTION?

The action should be implemented by the partners and the contributors of the International Marine Debris Conference, the National work group, and the entities empowered with implementation by the National work group.

VI. WHAT IS COST OF ACTION (ESTIMATE)?

One time (Start-up) Cost - \$100,000 to \$500,000
Annual Operation and Maintenance Cost – \$100,000 to \$500,000

RECOMMENDATION F4.



Bob Rock, Marine Debris
Communications Committee

Pictured left to right,
Cindy Knapman and
Gael Arnold participate
in the Education and
Outreach Working Group.

VII. WHO FINANCES?

- A. U.S. EPA
- B. U.S. Coast Guard
- C. NOAA
- D. Industry
- E. Corporations
- F. Private Foundations

VIII. WHAT ARE THE BENEFITS (ENVIRONMENTAL OR ECONOMIC) FROM IMPLEMENTATION?

- A. Change human behaviors
- B. Reduction of presence of derelict gear
- C. Reduction of impacts to marine wildlife from derelict gear
- D. Improve survival of commercially valuable species
- E. Enhance cultural exchanges regionally

IX. IDENTIFY THE RESOURCES (LIVING OR PHYSICAL) AFFECTED BY ACTION:

Marine wildlife, including fish, mammals, and birds, as well as human health and safety, are affected by the action.

**EDUCATION AND OUTREACH:
RECOMMENDATION F5.**

Title: Use source identification to target education

I. DESCRIPTION:

Development of a website that includes a GIS map of commercial fishing and aquaculture (map to be developed according to recommendation C3 from the Source Identification Working Group) would allow the education component to:

- A. Identify the users of the web site
- B. Identify 'dirty dozen' list of gear in your community
- C. Identify species that are most impacted by derelict fishing gear
- D. Identify closest disposal sites and proper methods of disposal plus local/national/international regulations of disposal and efforts/availability of recycling and reuse opportunities

II. METHODS/STEPS FOR IMPLEMENTING ACTION:

Identify University/NGO who will oversee the project and create the web site

III. TYPE(S) OF ACTION:

Educational

IV. WHERE SHOULD ACTION BE IMPLEMENTED (SPECIFY GENERAL GEOGRAPHIC AREAS)?

Minimum Spatial Extent: Identified geographic regions which will be documented using GIS technology

V. WHO IMPLEMENTS ACTION?

The action should be implemented by a University or a NGO (e.g., in the U.S. this entity could be state Sea Grant Programs).

RECOMMENDATION F5.

VI. WHAT IS COST OF ACTION (ESTIMATE)?

Cost has not been determined for website development
(For cost of GIS map see Recommendation C3 from the Source Identification working group)

VII. WHO FINANCES?

Financial responsibility for the website has not been determined.

VIII. WHAT ARE THE BENEFITS (ENVIRONMENTAL OR ECONOMIC) FROM IMPLEMENTATION?

The primary benefit from implementation is the information that will be gained which can be used in outreach and training campaigns.

IX. IDENTIFY THE RESOURCES (LIVING OR PHYSICAL) AFFECTED BY ACTION:

Affected resources have not been determined.

**EDUCATION AND OUTREACH:
RECOMMENDATION F6.**

Title: Engage industry in the development of programs to ensure effectiveness

Authors: E. Araki, G. Arnold, C. Knapman, M. Minton, L. Nakagawa, and G. Salmonson

I. DESCRIPTION:

Work with fishing industry to develop an educational model that can be translated internationally and tailored to fit culturally to effect a positive behavioral change.

II. METHODS/STEPS FOR IMPLEMENTING ACTION:

- A. Identify and work with fisheries associations and other stakeholders to develop guidelines and educational materials
- B. Utilize existing programs to get the message out, if possible
- C. Contact National Fisheries Institute - the Responsible Fisher's Society
- D. Partners and contributors to the 2000 International Marine Debris Conference are responsible for taking recommendations to the next level for action and implementation within one year of this conference

III. TYPE(S) OF ACTION:

Educational, economic, administrative, and assessment

IV. WHERE SHOULD ACTION BE IMPLEMENTED (SPECIFY GENERAL GEOGRAPHIC AREAS)?

Minimum Spatial Extent: Throughout the Pacific

V WHO IMPLEMENTS ACTION?

- A. Non-government agencies
- B. private sector
- C. fishing industry
- D. government
- E. existing organizations and programs
- F. IMO
- G. FAO

RECOMMENDATION F6.

VI. WHAT IS COST OF ACTION (ESTIMATE)?

One time (Start-up) Cost - \$500,000 - \$1,000,000 (for U.S. alone)
Annual Operation and Maintenance Cost – cost would be considerably lower to continue the program annually

VII. WHO FINANCES?

- A. IMO
- B. FAO
- C. WorldBank
- D. Manufacturers

VIII. WHAT ARE THE BENEFITS (ENVIRONMENTAL OR ECONOMIC) FROM IMPLEMENTATION?

Educational materials developed with the input of the industry will be more effective resulting in the continued reduction and prevention of fishing gear loss. This will result in reduced environmental and economic impacts associated with derelict fishing gear.

IX. IDENTIFY THE RESOURCES (LIVING OR PHYSICAL) AFFECTED BY ACTION:

All resources are affected by the action (e.g., benthic habitat, species of concerns, marine mammals, sea turtles, sea birds, vessel disablement, commercial species, impacts to tourism, etc.).

**EDUCATION AND OUTREACH:
RECOMMENDATION F7.**

Title: Tailor education programs to regional circumstances and culture; use respected community leaders

I. DESCRIPTION:

When addressing derelict fishing gear issues, there is a need to be more objective. Solutions may vary depending on the local situation.

II. METHODS/STEPS FOR IMPLEMENTING ACTION:

Identify an umbrella organization/entity to house and promulgate information/community training. This organization will be responsible for identifying coastal fishing communities/regions and for providing program development and support.

Umbrella organization will develop at least one internationally recognized logo/symbol/slogan that encompasses derelict fishing gear issue (Remember to incorporate messages into appropriate language for each country).

Each community/region needs to identify the appropriate stakeholders to serve on oversight committee; a local spokesperson (facilitator) that will promote the local education program should be identified. The umbrella organization will ensure that the spokesperson (facilitator) receives adequate training.

Local oversight committee develops a campaign theme that is culturally specific/relevant/significant and determines what is going to pull people into the message.

Umbrella organization will develop educational campaign materials (visual, audio) based upon locally identified needs/themes.

The educational message will be designed to target industry, community and local government—a three-tiered approach) using multiple educational marketing tools and strategies.