Derelict Fishing Gear and Related Marine Debris: An Educational Outreach Seminar Among APEC Partners

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Seminar Report

Background

1. The APEC Budget Committee approved APEC Fisheries Working Group project 03/2003 in September 2002. The purpose of the project was to hold an outreach seminar on the persistent and difficult issue of derelict fishing gear and related marine debris in order to promote constructive dialogue and information exchange, knowledge building, technical assistance, and capacity building.

2. Derelict fishing gear and related debris are responsible for broad degradation of the Pacific region's economic and ecological resources. The problems with derelict fishing gear and related debris can be generally grouped into three areas. First, floating derelict fishing gear is a hazard to vessel navigation and poses a threat to life and property when encountered at sea by water-craft of all sizes. Second, some lost or discarded derelict fishing gear continues to function as designed, catching target commercial species without economic benefit but with economic cost. This "ghost fishing" of commercial stocks is undocumented and not integrated into stock management models, potentially threatening the long-term viability of carefully managed stocks. Third, derelict fishing gear also regularly entangles protected and threatened marine species, hampering recovery actions, and destroying habitats of these and other species. In addition to the Pacific wide impact of derelict fishing gear noted above, the problem of derelict fishing gear in the Pacific is exacerbated by oceanographic surface currents which ultimately concentrate much of the debris from the greater North Pacific Ocean in ecologically sensitive regions.

3. The regional scale and multi-national scope of the problem of derelict fishing gear and related debris that is being experienced in the Pacific region necessitates efforts to (1) raise awareness of the existence of this problem and its impacts, examine ways in which derelict gear and related debris occurs, how such debris is concentrated in the ocean, and what international frameworks are in place to address disposal or accidental loss; (2) review regulatory and infrastructure mechanisms pertinent to derelict fishing gear and other debris to determine what, if any, international policies and legal frameworks are in place; and (3) identify policy and legal gaps and obstacles and determine action that could and should be taken.

4. APEC Economies represented at the seminar were: Australia, Chinese Taipei, Japan, Republic of Korea, Mexico, New Zealand, Peru, Thailand, and the United States of America. Inter-governmental and non-governmental organizations represented included: Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR), Inter-American Tropical Tuna Commission (IATTC), the UN Food and Agriculture Organization (FAO), Sea Fish Industry Authority (SeaFish), South Pacific Regional Environment Program (SPREP), the Northwest Straits Commission (NWSC), and The Ocean Conservancy. Participants in the seminar represented a broad range of interests and included fishermen, industry leaders, policy-makers, Economy representatives, researchers/scientists, and resource managers. The list of participants is at Annex 1 of this report.

5. The seminar was composed of five regional case studies (United States – Hawaiian Islands; Republic of Korea; Australia, Chinese Taipei, and Japan) and four panels (Science and Policy; Fishing Gear and Practices; Ports, Recovery, and Disposal, and International and Domestic Regulatory Structures). The seminar agenda is at Annex 2 of this report.

Welcoming Remarks and Opening Ceremony

6. The seminar was opened by with a traditional Hawaiian ceremony. Ms. Kitty Simonds, Executive Director, Western Pacific Regional Fishery Management Council (WPRFMC), welcomed the participants to Hawaii for this meeting and emphasized the need to work cooperatively and internationally to address the problem of derelict fishing gear and related marine debris in the Pacific. Ms. Simonds also provided background on the International Marine Debris Conference, held in August 2000, upon which this APEC seminar builds. Mr. Stetson Tinkham, Lead Shepard of the APEC Fisheries Working Group, who served as Chairman of the seminar, also welcomed the participants to the meeting and provided an overview of the role and purpose of APEC and the objectives guiding the seminar.

7. Ms. Simonds' remarks are at Annex 3 of this report.

Plenary Session

8. Ms. Seba Sheavly of The Ocean Conservancy presented the global scope of marine debris related to the world's oceans and waterways. She reviewed the various sources of debris related to land and ocean-based activities, highlighting derelict fishing gear and other debris. She described five categories of the impact of marine debris: human health and safety; aesthetics and economics; animal entanglement and ingestion; habitat destruction; and vessel disablement. Ms. Sheavly outlined a paradigm to address the problem through education and outreach, monitoring and data collection, stakeholder engagement, business and industry involvement, innovations and incentives, and regulations and enforcement, as well as provided an overview of the 2002 data collected from the International Coastal Cleanup and data from 1997-2003 for the National Marine Debris Monitoring Program coordinated by The Ocean Conservancy. She suggested mechanisms through which marine debris problems can be addressed, described steps already being taken, and assigned five tasks for the participants of the meeting to take away from the seminar:

- Know what marine debris is;
- Know its sources;
- Know existing programs to deal with marine debris;
- Build technical expertise in solutions; and
- Identify gaps in public policies.

Ms. Sheavly's presentation and background paper are at Annex 4 of this report.

Regional Case Studies

9. *United States.* Dr. Mary Donohue of the University of Hawaii Sea Grant College Program and Mr. Gregory Schorr from NOAA Fisheries' Coral Reef Ecosystem Investigation presented a case study on conditions that lead to the collection of marine debris in the Main and Northwestern Hawaiian Islands (NWHI) in the United States. Dr. Donohue discussed oceanographic and geographic factors that cause lost fishing gear and debris to accumulate on these fragile and remote islands and atolls, as well as the associated impacts on the endemic coral reef ecosystems and endangered and threatened marine species. Mr. Schorr described the removal effort achieved through a broad-based coalition of organizations that

have worked to document and remove 330 metric tons of debris since 1998. He described the particular damage the fishing gear component of debris (predominately trawl and seine nets) can cause to coral reefs and the dangerous and costly efforts to study and remove the derelict fishing gear using standardized procedures. He also discussed the need for preventative measures to reduce the gear striking land given Dr. Donohue's research, which has documented up to 165 new fishing net fragments per square kilometer recruiting back into the NWHI each year.

10. *Republic of Korea.* Dr. Dong-Oh Cho of the Korea Maritime Institute described how discarded fishing gear had caused a passenger ferry in Korea to sink, with significant loss of life. He went on to describe remarkable clean-up work undertaken along the Han River, through shared funding by local jurisdictions and the Korean Government. He also described a growing Korean Government incentive program that rewarded fishermen for returning marine debris they encounter and collect to ports for disposal or recycling. Dr. Cho also described the range of education and outreach programs developed by the Korean Government and the types of research and survey work it is undertaking.

11. *Australia*. Dr. Ilse Kiessling of the Australian National Oceans Office described how, along the sparsely populated northern Australian coast, there is a significant marine debris problem with some areas recording up to 4,100 items counted per mile. In contrast to much of the rest of Australia, a remarkable 99% of this marine debris is likely to be from marine-related sources. Much of this debris is also believed to be of foreign origin. In many parts of northern Australia, fishing related debris comprises the largest proportion by weight of debris washing ashore and having the greatest obvious impact on marine species and many coastal communities. The very large amount of debris washing ashore in northern Australia is possibly due to oceanographic features of the region, the presence of major shipping routes, and the proximity of high levels of fishing activity in the Arafura and Timor Seas. She described efforts to identify the sources of the debris and the impacts on vessels, sea turtles and marine mammals in the region, as well as Australian clean-up efforts and the options it is considering to address the issue. Dr. Kiessling emphasized that this is a key issue for Australia, which must be addressed regionally and internationally.

12. *Chinese Taipei*. Dr. Don-Chung Liu presented information on steps Chinese Taipei is taking to solve marine debris problems in coastal waters and within 200 miles of its coast. He described the roles of agencies with marine debris responsibilities. He also discussed the large numbers of volunteers who are involved in collection and removal of marine debris in Chinese Taipei. Other approaches include buybacks of fishing gear, recycling, better understanding of oceanographic factors, and perhaps the application of GPS-radio buoys. He revealed that Chinese Taipei is considering consolidating the activities of marine-related agencies into a new "Ministry of Maritime Affairs," which may result in better coordination in addressing debris issues.

13. *Japan.* Mr. Toshihiro Watanabe of Japan's National Research Institute of Fisheries Engineering reported on his work with the red queen crab trap fishery in the Sea of Japan and on Japan's assessments of marine debris in the North Pacific since the 1980s. Japan's results showed that about 50% of surface marine debris was plastics, Styrofoam and petrochemical products and only about 12% was fishing nets and other derelict gear from capture fisheries. Mr. Watanabe reported also that Japan was investigating the utility of using natural fibers, like silk, in crab pots, which would biodegrade. However, he noted, that the use of any such technology would only be feasible if fisherman had confidence that the catching efficiency was the same as traditional gear technologies.

14. The abstracts and presentations are at Annex 5 of this report.

PANEL 1 – Science and Policy

Moderator: Dr. Tatsuro Matsuoka (Japan)

15. Dr. Murray Gregory of the University of Auckland presented information on derelict fishing gear (and other marine debris) as a vector for movement of alien species around the Pacific Ocean. Dr. Gregory provided examples of alien species being found in New Zealand.

16. Mr. Jeff June, a consultant to the Northwest Straits Commission in Puget Sound, offered detailed information on how science and policy work together successfully to address the derelict fishing gear problem in the Puget Sound area of the United States. Mr. June outlined the steps taken to assess and remove the derelict gear, both to minimize costs and damage to habitat, as well as to secure the involvement of industry and other stakeholders. He explained how their research revealed that lost gear was killing 10% of the total allowable catch of crabs in one bay and thus how the removal effort had an impact on policy-making and fisheries management through economic incentives.

17. Dr. Tatsuro Matsuoka from the Faculty of Fisheries, Kagoshima University, in Japan presented his work on ghost fishing. His presentation included methods for quantifying and estimating ghost fishing mortality. He talked about lost gear retrieval, about designed degradation of ghost fishing gear and listed several areas for necessary future studies.

18. Dr. Mary Donohue, of the University of Hawaii Sea Grant College Program, showed oceanographic data that illustrated interannual and seasonal variations in the convergence zone north of the Northwestern Hawaiian Islands over time and how this promotes the accumulation of debris in that area, as well as the possible "seeding" of debris from other areas of the Pacific. She also showed a digital video on the derelict gear retrieval operations in the Northwest Hawaiian Islands. Dr. Donohue presented information on the possibilities of invasive species transfer, by describing an alien species that has been discovered during the derelict gear removal effort in Hawaii. On this issue, she echoed Dr. Murray's call for more research on the impacts of invasive species transported by derelict fishing gear and other marine debris.

19. Dr. Anthony L. Andrady, of the Research Triangle Institute in North Carolina (U.S.), presented the differences between degradation of plastics, including fishing gear, at sea as opposed to on land. He emphasized that the full "mineralization" of plastics must be taken into account in the marine environment, because of the potential for bio-transfer of toxins into all levels of the food web. Dr. Andrady raised the possibility that plastics might absorb organic pollutants. He presented preliminary research that lower trophic level animals could ingest the plastic particles. If these organisms also could ingest contaminated particles, this might in turn serve as a pathway for entry of the harmful compounds into the food web. While noting that this has not yet been conclusively demonstrated scientifically, Dr. Andrady opined we should consider the precautionary approach.

20. The abstracts and presentations are at Annex 6 of this report.

PANEL 2 – Fishing Gear and Practices

Moderator: Dr. Don-Chung Liu (Chinese Taipei)

21. Mr. Brent Paine, of United Catcher Boats, described the U.S. Marine Conservation Alliance efforts to clean up derelict fishing gear in the Pribilof Islands in the Bering Sea portion of the U.S. exclusive economic zone. Mr. Paine discussed the multi-stakeholder alliance and the types of gear

retrieved (trawl, crab buoys and line as well as other plastics). He noted that this effort was focused on clean-up as opposed to research and that any mitigation efforts need to involve net manufacturer companies.

22. Mr. Philip MacMullen of the Sea Fish Industry Authority in the United Kingdom provided the European experience on the issue of derelict fishing gear and related marine debris. Mr. MacMullen reported on recent lost fishing gear work by a coalition of six European fishing states (UK, Spain, Portugal, France Norway and Ireland). He described the causes of losses, study design, industry involvement, survey technologies, economic cost benefit analyses, and the methods they were exploring to mitigate losses. He also reported that the group had designed a code of best practices designed to minimize the loss of fishing gear. Mr. MacMullen also recommended the creation of special forums where specific issues could be discussed among stakeholder groups, such as for deep-water losses. He also showed a video that illustrated his work.

23. Mr. Jim Cook of the Hawaii Longline Association described recent developments in the Hawaii longline fleet, particularly changes in the types of gear used by the fleet. For instance, the fleet has moved from disposable light-sticks, which once littered beaches and atolls, to other non-disposable sources of light. Mr. Cook noted that the Association works to make fishermen more aware of the regulations. He also described encounters with lost webbing and the resulting lost fishing time and damage to set gear. Because of such entanglements, many fishermen now collect the gear at sea and return it to Hawaii for disposal.

24. Mr. Ernesto Altamirano of the Inter-American Tropical Tuna Commission (IATTC) described recent analysis of IATTC observer data on sightings of floating objects, which includes derelict gear and man-made fish aggregating devices (FADs). Mr. Altamirano reported that from a very informal analysis of the data from 1992-2002 sightings of derelict fishing gear appeared to have increased, but a more detailed analysis, including standardization of data for the change of the rate of observer coverage and the seasonality and distribution of the fishery would be needed to support this statement. He reviewed the type of derelict gear noted in the observer reports during 2002 (mostly longline) and the use of FADs by the tuna fleet in the 10-year period described above. Mr. Altamirano discussed problems in identifying the “owners” of a given FAD and showed fishing patterns in the fisheries in recent years. Mr. Altamirano also described typical FAD construction as used by the tuna fleet as including large amounts of fishing net fragments. He noted that data on the convergence of currents like that presented earlier by Dr. Donohue, could be useful in determining if derelict gear moves into other parts of the Pacific.

25. Mr. Kiyokazu Inoue of the Fisheries Agency of Japan’s Ecosystem Conservation Office discussed Japan’s approach to the issue of derelict and drifting fishing gear and marine debris. Japan has an active coastal cleanup program, it surveys the types of debris found on the shore and it cleans up fishing grounds contaminated with items washed from land-based sources. He noted that Japan encourages fishermen to return used nets for disposal on shore. His presentation also covered Japan’s efforts to collect derelict fishing gear and efforts to prevent complications in terms of areas of operation between different types of fisheries, as well as Japan’s efforts at plastics recycling for Styrofoam (often from aquaculture operations).

26. The abstracts and presentations are at Annex 7 of this report.

PANEL 3 – Recovery, Ports and Disposal

Moderator: Mr. Howard Wiig (United States)

27. Mr. Howard Wiig of the State of Hawaii Department of Business, Economic Development and Tourism and Mr. Jim Banigan, President of Hawaii Metals Recycling Inc., described efforts in Hawaii to make use of discarded nets as fuel to generate energy, since there was a lack of landfill space in Hawaii. Through the efforts of many people, they demonstrated that Hawaii Metals could prepare (chop into small bits) the nets so that they could be burned in a garbage to energy plant to create enough energy to supply 42 homes for one year. This occurred because a variety of fees and charges were waived. Mr. Banigan noted that 177 tons of net debris had been processed in a two-year period.

28. Ms. Seba Sheavly (The Ocean Conservancy) and Eric Kingma (WPRFMC) showed a video of a processing machine manufactured by GENSCO, Inc. that could be used to chop recovered derelict nets into smaller pieces suitable for incineration. Mr. MacMullen mentioned that he knew of a net recycling program that has just begun in Denmark.

29. Mr. Joe Schmidt and Mr. Gary Wood described the efforts that led to the establishment of the Northwest Straits Commission, to its successful competition for funding and legislative change, and its work in net and crab pot removal in the region. These involved the use of side-scan sonar, divers, existing records, and cooperative efforts with local officials and local fishermen. Mr. Wood described the importance of establishing a “no fault” paradigm so fishermen would report losses and assist with clean-up and mitigation efforts. Mr. Schmidt and Mr. Wood reported that based on studies of removed gear, it could be estimated that approximately 10% of the total allowable catch of crabs in some areas had been lost to derelict pots.

30. Mr. Sefanaia Nawadra, Marine Pollution Advisor at the South Pacific Regional Environment Program (SPREP), presented information on efforts to address the full range of marine pollution problems facing small islands states in the South Pacific. He noted that 90% of the fishing effort in the region consists of purse seiners and longliners from distant water fishing nations. SPREP reviewed marine pollution issues in the region and found that solid waste management was the number one issue in the Pacific Island States. He described the special concerns of small island developing states in the Pacific, specifically with respect to a lack of port reception facilities and land-based disposal options. Mr. Nawadra also noted the funding needs for pollution prevention infrastructure in his region. He reported on the development of regional arrangement centers for waste from ships, which have been recently approved by SPREP and the International Maritime Organization.

31. Ms. Fran Recht of the Pacific States Marine Fisheries Commission, described efforts at gillnet collection and recycling in the Pacific Northwest region of the United States. She noted that due to lack of small amounts of funding, collection and recycling efforts decreased from 11 or 12 participating ports to 7 or 8 participating ports. Net materials are sent overseas to Chinese Taipei where they were recycled into such products as pulleys for exercise machines, umbrella handles, combs, toothbrush handles, computer chair wheels, bicycle seats, and zippers. She reported on techniques that fostered the sustainability of net recycling efforts in ports, including the presence of local community coordinators, minimizing the number of times the nets are handled or moved, and placing collection containers in convenient locations. She also reported on the economics of net recycling, noting that since the value of nylon is high, if net materials are kept clean and baled or densely packed into shipping containers, recycling efforts can be economically viable. Ms. Recht also noted the need for small amounts of funding, primarily for community coordinators, to keep such programs going.

32. The abstracts and presentations are at Annex 8 of this report.

PANEL 4 – Domestic and International Regulatory Structures

Moderator: Ms. Holly Koehler (United States)

33. Ms. Lindy Johnson of the NOAA General Counsel's Office of International Law, U.S. Department of Commerce, proposed an analytical framework for approaching potential legal and policy solutions to the issue of derelict fishing gear and other marine debris. First, she stated that a clear objective is needed for an effective solution and outlined a range of possible options. Second, she discussed issues relevant to the provision of an effective legal solution. This included a notation of the differences between "soft law" (non-binding) and "hard law" (binding) regimes and the benefits and drawbacks of each. Ms. Johnson used several examples of existing legally binding and non-binding instruments to assess their strengths and weaknesses in providing an effective solution. She then discussed whether there are international institutions where this issue may be addressed in a variety of ways. Finally, she noted that there are several actions that could and should be taken and outlined possible short, medium and long-term actions to address the problem in a variety of fora and organizations.

34. Mr. Eric Appleyard of the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR) described the Commission's experiences with gear marking as a means to protect against lost fishing gear. He described the types of derelict gear and marine debris observed in the CCAMLR area by observers and the beach surveys conducted by the Commission. Mr. Appleyard also noted that illegal fishers constitute a large component of fishing effort in the CCAMLR region, and that their gear is often lost or discarded, making prevention of illegal fishing an important element in reducing derelict fishing gear in the region.

35. Mr. Sefania Nawadra (on behalf of the International Maritime Organization (IMO) representative, who could not attend) presented a description of the IMO's pollution control regime for the shipping sector. He also described the "clean ships" program envisioned under IMO's MARPOL annexes. Mr. Nawadra presented the view that an integrated comprehensive approach was needed to address this problem, in addition to getting waste reception facilities in all ports and encouraging better reporting by countries, as required by the IMO. He emphasized the need to work cooperatively with the plastics, shipping, and fishing industries, particularly given the safety of life at sea component of this issue.

36. LCDR Chris Curatilo of the U.S. Coast Guard described his agency's efforts in controlling marine pollution, particularly in the Hawaiian Islands and the Western Pacific Ocean, and enforcing U.S. domestic laws implementing MARPOL. He emphasized education to children as an effective way to change views on littering and pollution. LDCR Curatilo echoed other speakers in noting the need for a regional plan to get adequate port reception facilities in the Pacific that have correspondingly adequate disposal options on land. Such facilities must be capable of accepting the waste from ships and be able to either process it or dispose of it safely.

37. Mr. Ed Araki of the Honolulu Agency described the difficulties in implementing the "clean ships" program in islands, particularly islands visited by large cargo and passenger ships. He also noted the range of regulations that apply in the U.S. and the challenge for foreign vessels in meeting those requirements. Mr. Araki proposed the creation of a fund that all fishing industries would pay into in order to be used for clean-ups and debris removals around the Pacific. He also emphasized the need for good port reception facilities that can be used by all vessels that come into port.

38. Mr. Rick Steiner of the Alaska Sea Grant Program presented his views on how APEC could contribute to the solution of the marine debris and derelict fishing gear problems in the Pacific Ocean by creating an APEC Marine Debris Control Initiative, which would establish a 5 year taskforce funded by

all Economies to address only this issue. Mr. Steiner offered that the goal of this taskforce would be to reduce the amount of marine debris in the Pacific by 50% by 2010.

39. The abstracts and presentations are at Annex 9 of this report.

40. On January 13, the participants had the opportunity to view a Japanese documentary on the derelict gear and marine debris problem in the NWHI, which was filmed by the Asahi Television Company. Ms. Sohbi Reynolds introduced the film, described the project, and noted that 11 million people in Japan had seen it in September 2003. Ms. Reynolds also informed the participants that the film was being translated into English and that it could be used for educational programs and events.

Closing Remarks and Ceremony

41. Ms. Holly Koehler of the U.S. Department of State, Office of Marine Conservation, delivered closing remarks. Ms. Koehler provided some of the history behind the genesis of the APEC FWG project and how the objectives for the seminar evolved. She emphasized that the participants had more than met those objectives through the detailed panel presentations, case studies, and ensuing discussions. Ms. Koehler thanked the participants for attending the seminar and participating so constructively, as well as APEC and those U.S. government agencies, non-government organizations, and industry groups that contributed to and supported the meeting. Lastly, Ms. Koehler highlighted the two key messages she took away from the seminar. The first was that although the global problem of marine debris is not unique to any of the participants, the local and regional solutions can be and are. A variety of arrangements and organizations are available to address the problem, and cooperation should be sought from industry, fishers, non-governmental organizations, and Economy representatives. The second take away message was that addressing this issue will take time and she hoped that the participants left the seminar committed to continuing to work on this issue both in the way they had been and now, as a result of the seminar, in new and different ways. The Seminar closed with a traditional Hawaiian ceremony.

42. A list of websites relevant to the issue of derelict fishing gear and related debris, generated by the workshop participants, is at Annex 10 to this report.

43. A Fishermen's Pledge for A Clean Ocean, first adopted by the North Pacific Rim Fishermen's Conference on Marine Debris held in Hawaii in 1987, and subsequently adopted or endorsed by five related conferences and meetings, is at Annex 11 to this report.

44. A press article dated January 6, 2004, which reports on the November 2003 meeting at the Bellagio Conference Center in Italy where experts discussed a blueprint for the conservation of sea turtles in the Pacific Ocean is provided at Annex 12 of this report for the information of participants.

Conclusions and Recommendations

45. Derelict fishing gear and related marine debris is recognized as a critical problem in the marine environment and for living marine resources because it causes economic loss in terms of the long-term sustainability of fish stocks due to ghost fishing and habitat loss, safety of navigation, and a further decline in endangered and other marine species that are killed or maimed from entanglement or ingestion. As such, and taking into account the precautionary approach, the Seminar recognized the need and calls on the APEC Economies to take action at the national, regional, and global levels, and to secure adequate funding to do so. Additionally, the Seminar recognized the need for a standing body of people from concerned APEC Economies to dedicate time to addressing this issue.

46. The participants in the seminar also recommended a series of specific actions or activities APEC Economies, regional fisheries management organizations, regional bodies, inter-governmental and non-governmental organizations, and individuals should pursue in order to make progress on this issue at a local, national, regional, and global level. These recommendations have been grouped into eight categories:

(1) Outreach and education;
(2) Monitoring/data collection and research;
(3) Engaging stakeholders;
(4) Business and industry involvement;
(5) Innovation and incentives;
(6) Economic impacts;
(7) Regulations, compliance, institutions, and infrastructure; and
(8) Financing mechanisms.

47. Outreach and education.

- Optimize existing programs for marine debris and regionally, by, for example: increasing the level of participation in the annual International Coastal Clean-up (ICC); sharing data collected in beach clean-ups or surveys with the ICC program, the U.S. National Marine Debris Monitoring Program (NMDMP) (see Annex 10 for the ICC and NMDMP web addresses), and other programs; using the ICC, NMDMP or other programs as a model to start clean-up efforts and data sharing where none exists; and by using existing sources of data and other information for use in education and outreach programs

- Develop project proposals to submit to the APEC Fisheries Working Group (FWG) and/or the APEC Marine Resource Conservation (MRC) Working Group to assist APEC Economies in exchanging information, building capacity, raising awareness, and gaining training or education relevant to derelict fishing gear and marine debris and its prevention, assessment, removal, and mitigation. APEC Economies should seek opportunities to work together and cosponsor such projects.

- Seek ways to regularize the exchange of scientific research and data on derelict fishing gear and related debris.

- Promote the wide dissemination of information on the impacts and costs of derelict fishing gear and related marine debris, such as through PACON meetings, scientific journals, academic list-serves, websites, and meetings of regional fisheries management organizations and relevant UN bodies (i.e., the Marine Environment and Protection Committee of the IMO). Encourage the publication of information on derelict fishing gear and marine debris in peer-reviewed literature.

- Disseminate widely information pertaining to incidents of vessel disablement, lost revenue or property, or loss of life or injury due to interactions with derelict fishing gear and related marine debris. This information could be made available via a website or through regional fisheries management organizations, FAO, IMO, or industry and stakeholder association meetings. Explore how this information could be reported to, and made available through, a centralized location such as a well publicized website.

- Extend education and outreach programs to those countries not from the Pacific Region, but which engage in fishing activities there.

- Develop and disseminate guidelines for preventing loss of fishing gear during fishing operations.

48. Monitoring/data collection and research.

- Promote data and information exchange among APEC Economies, regional organizations, and other fishing nations, particularly data on ocean currents, surface wind time series data, fishing effort and gear types, and any non-native species in association with derelict gear or marine debris. If possible, these data should be provided on a regional, fishery, or seasonal basis.

- Compile and share existing data on key oceanographic variables and fishing effort and gear types (e.g., the use of fish aggregation devices (FADs) or other gear types), by region and fishery, for use in raising awareness and working within regional organizations to achieve a specific goal (e.g., a change in gear type, behavior or practice).

- Consolidate existing data on debris types, amounts, and sources and integrate these into one database (like the ICC database), which can be accessed by all interested groups.

- Identify the factors leading to aggregation, distribution and degradation of derelict fishing gear and associated marine debris.

- Research and compile information pertaining to the use of FADs, including the materials used, the operational practices employed, and if possible, the number of FADS lost per year.

- Request the FAO to reprint and disseminate widely the 1991 FAO Fisheries Report No. 485 on the Marking of Fishing Gear and consider whether it would be useful to revise the Report based on recent discussions of gear marking in other fora, as well as advances in gear technology.

- Revise and update the Supplement to FAO Fisheries Report No. 485 given current technologies for gear marking and identification as well as best practices to minimize gear loss and methods of recovering derelict fishing gears.

- Encourage the use of the ICC “data card” to expand upon and standardize the collection of marine debris information, by incorporating elements of the data card into existing observer or survey forms used by nations or regional organizations and bodies, or by encouraging the voluntary use of the data card.

- Map wind, current, and drift patterns on a regional basis.

- Identify the factors contributing to losing fishing gear under normal fishing operations and explore possible mitigation measures.

49. Engaging Stakeholders.

- Establish a clearinghouse mechanism or hotline for reporting the loss of fishing gear or sightings of gear at sea, which would assume “no fault” to the individual making the report. Prompt

reporting could facilitate cleanup efforts, reduce costs and impacts to habitat, vessels, or set fishing gear, and result in gear being returned to the owner.

- Establish mechanisms to promote "micro communications" among stakeholders, such as crab fishermen and tug boat operators, to provide an opportunity to exchange information and ideas that will prevent or mitigate gear loss or damage. These "micro-communications" could take place through inviting representatives of other stakeholder groups to regular association or industry meetings and vice versa.

- Establish a taskforce, that will include both national and international counterparts, either under the umbrella of an existing organization, like APEC, or on an ad hoc basis using a network of experts, relevant domestic and international agencies and organizations, and concerned stakeholders, to serve as a focal point for work on derelict fishing gear and related marine debris (i.e., coordinate information exchange, hold outreach meetings, pool resources and leverage funding, submit project proposals etc.)

- Develop, through regional and global organizations, an integrated regional approach to waste management (like the SPREP model approved by the IMO in 2003), which optimizes capacities and infrastructure to process both land-based and vessel-based sources of solid waste and involve shipping agents, fisheries sectors, port authorities, governments, and local communities.

- Establish "net collection points" on a national or regional basis, which could be used to support recycling or net-to-energy conversion programs that could then support other entrepreneurial activities, such as selling the recycled material to be converted into function items (e.g., bicycle seats and office furniture in Chinese Taipei).

- Establish gear repair, re-use, and recycling centers at key ports or nodes of fishing activity (e.g., re-supply, landing, off-loading, and transshipment sites) on a regional basis throughout the Pacific.

50. Business and industry involvement.

- Inform the insurance industry of the issue and how it translates into increased risk to insured vessels and property. Through this mechanism, insurance companies could complement existing channels of information and educate owners and operators about pollution regulations, as well as improve waste reception facilities and disposal options in port.

- Work with net manufacturers to promote net recycling programs as well as the development of nets which are designed expressly to be recycled into other products, i.e. up-cycling the net materials as opposed to down-cycling them.

- Establish new or strengthen existing linkages between business sectors in order to build a harmonized approach to addressing derelict fishing gear and related marine debris, such as involving industry representatives and individuals directly in removal and assessment efforts (e.g., the NW Straits Commission and Hawaii Metals Recycling, Inc.).

- Establish a fund for derelict fishing gear and related marine debris cleanups into which the relevant industries, from all Pacific economies and fishing nations, would be required to pay. This international cleanup fund would be similar to that developed for oil spill disasters.

- Investigate industry accreditation of fisheries or other marine-related sectors based on gear use and handling, record of compliance with domestic and international laws and standards, and community involvement in cleanup and outreach efforts that benefit the use of ocean resources (e.g., the Marine Stewardship Council, see Annex 10).

51. Innovation and incentives.

- Promote the development of economic incentives for proper disposal, such as deposit systems, recycling programs and net to energy operations (via incineration). Developing such programs, particularly in developing States and small islands States, could meet a variety of needs, including energy, job-creation, and solid waste/pollution reduction.

- Research alternative technologies for use in fishing gear and accessories.

52. Economic impacts.

- Undertake economic and environmental analyses to quantify the costs of lost fishing and shipping time, due to immobilization; fouled gear; damaged vessels; and habitat loss or damage. Compile this information in a central clearing house with public access.

- Quantify the value of fish or seafood lost to derelict gear and the relationship to any existing regulations, such as a seasonal total allowable catch (TAC) or bag limit.

53. Regulations, compliance, institutions, and infrastructure

- Bring this issue to the attention of the IMO, through the appropriate subcommittee, such as the Marine Environment Protection Committee (MEPC). One mechanism would be through information papers or a standing agenda item.

- Analyze existing law (i.e., binding and non-binding) and policy initiatives to determine their ability to address all aspects of derelict fishing gear and related marine debris, including prevention, remediation, monitoring, and enforcement.

- Through the collaboration of policy makers, scientists, and attorneys, identify a clear list of objectives, and develop and implement a strategy aimed at effective solutions to this issue. This strategy should include the benefits and potential drawbacks to pursuing various courses of action (e.g., including impediments, timing issues, resource constraints). Its components should include policy and legal options, as well as outreach and education, and have short, medium, and long-term milestones.

- Request that all APEC Economies, and other IMO Member States as appropriate, undertake efforts to determine the level of implementation of MARPOL Annex V and its Guidelines in each of their jurisdictions, as well as any impediments to its implementation. This information should be presented to IMO's Marine Environment Protection Committee, along with any appropriate amendments to MARPOL Annex V and its Guidelines to overcome identified impediments or to

strengthen compliance; these amendments may include the integration of select provisions from guidelines into the Annex itself.

- Take action through national, regional, and global institutions to address the issue of derelict fishing gear and related marine debris. Information should be gathered on how to proceed (e.g. rules of procedure or other administrative rules), what types of action can be taken through an institution, and an identification of the appropriate entity to bring such action. The action to be taken should include outreach and education (such as bringing attention to the need for compliance with MARPOL Annex V Guidelines), and legal and policy initiatives regarding the adoption of appropriate conservation and management measures.

  - Global institutions could include the U.N. General Assembly or other UN bodies, the United Nations Environment Program, IMO (e.g., the Maritime Safety Committee and the Subcommittee on Safety of Navigation), FAO, and any industry or non-governmental organization meetings.

  - Regional organizations would include regional fisheries management organizations or arrangements.

  - National institutions may include government agencies such as those responsible for fisheries or the environment, fisheries councils, industry groups, and interested non-governmental organizations.

- Urge the IMO to disseminate the relevant regulations and Annex V implementation Guidelines more widely.

- As a member of a regional and sub regional fisheries management organization or arrangement, Economies should request these organizations to address this issue within their mandate through adopting appropriate conservation and management measures, such as prohibiting the discard of fishing gear and related fishing debris at sea. Furthermore, if their mandates do not currently include addressing the issue of derelict fishing gear and related debris, regional and sub regional fisheries management organizations and arrangements should be encouraged to expand their mandates to do so.

- Explore, both at a domestic level and through regional fisheries management organizations and arrangements, the use of observer programs to collect information on derelict fishing gear and related marine debris (either sightings or incidents of accidental loss or intentional disposal at sea) (e.g., CCAMLR and IATTC programs). This information could be incorporated into one database, across fisheries, for analysis.

- As a general matter, and as a member of a regional and sub regional fisheries management organization or arrangement, Economies should examine, as a matter of priority, the use and design of FADs (i.e., the size, method of construction, net type, the length of net hanging below the FAD, net mesh size, deployment and retrieval rates etc.) to determine if improvements to FAD construction or use could be made or management measures adopted to minimize incidental catch, entanglements, loss or abandonment, and breakdown into derelict pieces.

- Encourage regional fisheries management organizations and arrangements, as appropriate, to make their members and other entities fishing within its area of competence aware of the problem of derelict fishing gear and related marine debris and to seek their cooperation in addressing it.

- Each APEC Economy and any other State located outside the Pacific Region but engaging in fishing activities within it should examine its existing domestic regulatory structure and infrastructure to determine whether the issue of derelict fishing gear and related marine debris is being addressed; action should be taken to strengthen any existing measures or infrastructure if necessary and, if the issue is not being addressed, action should be taken to do so.

- Strengthen the policies and legal framework at the national, regional, and global level in order to make them more effective at monitoring and enforcing rules that maintain a healthy marine environment.

- Encourage the practice of application of area and time partitioning between different types of fisheries.

54. Financing mechanisms.

- Encourage the development of public-private partnerships or enlist the aid of international donor institutions (e.g., the World Bank or the International Monetary Fund) to increase capacity in Economies, particularly developing Economies, so they can adequately address the issues that may lead to derelict fishing gear and comply with MARPOL and any other policies and regulations deemed effective to solve this issue. Such action should include the financing of adequate reception facilities for the proper disposal of fishing nets.

- As members of regional organizations (such as the Secretariat of the Pacific Community, SEAFDEC, SPREP, and APEC), Economies should assess the ability of each to deal with derelict fishing gear and related marine debris, and then develop infrastructure, regulatory mechanisms, and overall capacity to address this issue.

- For high cost initiatives, develop a Global Environment Facility (GEF) project, to support a regional or sub-regional effort (i.e., port reception facilities in small island Economies or ports that serve as regional shipping or fishing nodes).

- Seek diverse and non-traditional sources of funding, particularly to support micro-projects (i.e., small scale recycling and disposal centers), from national/global businesses, or other locally or regionally based businesses, local and national grant programs, and the fishing industry for “in-kind” contributions.