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THE GHOSTS OF FISHING NETS PAST: A PROPOSAL FOR REGULATING DERELICT SYNTHETIC FISHING NETS

Modern society relies on plastic for many uses. Plastic containers, strapping bands, packaging, household goods, and other products have earned a niche in everyday life. The increasing use of plastics raises the thorny question of how best to dispose of these nonbiodegradable materials.

Each year, staggering amounts of plastic waste are introduced into the world's marine waters.¹ Much of the waste consists of abandoned or lost synthetic nets or net fragments² used by many of the world's fishing fleets. Once this netting becomes derelict, it continues to "ghost" fish indefinitely because the marine environment cannot break down the plastic fibers.³ Before the advent of stronger and more durable synthetic fibers, manufacturers of fishing nets used cotton and other degradable materials that quickly disintegrated in salt water.⁴

The derelict fish net, or "ghostnet," problem only recently has caught the attention of scientists and policy makers. Research has shown that the quantity of derelict netting in the marine environment is increasing. The fishing industry itself now recognizes the problem, causing some individual fishing vessels to take voluntary measures to discard less netting into the sea.⁵ Fishery personnel, however, encounter difficulties in reducing the amount of netting accidentally lost because unforeseen changes in the weather or other conditions make some net loss inevitable. Policy makers outside of the fishing industry therefore must take action to alleviate the ghostnet problem.

This Comment examines the extent of the problem of derelict fishing nets. Derelict netting kills shocking numbers of marine life, including species protected by federal laws. International and domes-

1. According to a National Academy of Sciences estimate, the commercial fishing industry alone pollutes the oceans with about 298 million pounds of plastic nets, lines, and buoys yearly. Conner & O'Dell, *The Tightening Net of Marine Plastics Pollution*, ENV'T, Jan.-Feb. 1988, at 16.

2. "Fishing nets," "net fragments," "ghostnets," and "netting," refer to netting used in commercial fishing, including driftnets, gillnets, purse seines, trawl nets, pound nets, and others, unless specifically stated otherwise.

3. Some forms of plastic might not break down in the marine environment for as long as 450 years. Conner & O'Dell, *supra* note 1, at 17.

4. J. Coe, *Derelict Fishing Gear: Disaster or Nuisance?* 6 (1986) (Master's thesis on file at the University of Washington Oceanography Teaching Library). Japan first started using synthetics in fishing nets about 1949. *Id.*

5. Fowler & Merrell, *Victims of Plastic Technology*, ALASKA FISH & GAME, Mar.-Apr. 1986, at 37.

tic laws could be used to redress the problem. Laws as currently enforced each have shortcomings, however, and share common difficulties. To solve the problem these shortcomings create, a comprehensive derelict net control system must be instituted. This program should include a method of tracking nets so that liability for loss can be assessed, and incentive systems to decrease both intentional and unintentional loss of netting. Failure to institute derelict net controls will result in the deaths of many thousands of marine mammals, birds, crustaceans, and fish.

I. BACKGROUND

A. *Quantity of Derelict Nets and Net Fragments in the Marine Environment*

Foreign and domestic fisheries use an enormous quantity of synthetic fish netting each year. According to one estimate, foreign fishing fleets in the North Pacific set at least 20,500 miles of drift gillnetting nightly during the 1983 and 1984 fishing seasons.⁶ Not all

6. Eisenbud, *Problems and Prospects for the Pelagic Driftnet*, 12 B.C. ENVTL. AFF. L. REV. 473, 477 (1985) [hereinafter Eisenbud, *Problems and Prospects*]. This figure represents the number of nets set nightly multiplied by the length of the nets.

The Japanese drift gillnet fishing fleet in the North Pacific serves as a well-documented example. In 1981, the fleet included four motherships and 172 catcher boats. 46 Fed. Reg. 27,056, 27,063 (1982). Operating along with this fleet were 209 land-based vessels. *Id.* at 27,063. Each of the 381 fishing boats used a gillnet approximately 9.4 miles long and 26 feet deep. *Id.* (These figures are computed in statute miles, using 1.6 kilometers to the mile.) In 1983 and 1984, the level of fishing effort for the fleet was 8395 and 9121 sets, respectively. CENTER FOR ENVTL. EDUC., ENVTL. PROTECTION AGENCY, MARINE WILDLIFE ENTANGLEMENT IN NORTH AMERICA 148 (1986) [hereinafter MARINE WILDLIFE ENTANGLEMENT] (citing testimony of Robert E. Lambertson before the United States Senate Committee on Commerce, Science, and Transportation, Hearing on Pelagic Driftnet Fisheries, Oct. 9, 1985). Thus, in those two years, the fishery actively fished about 164,640 total miles of synthetic netting.

Further, the Japanese squid fishery, consisting of 534 vessels using nets 18 to 19 miles long, set approximately 761,000 miles of netting in 1983, using the same formula set out above. *Id.* (citing testimony of John O. Campbell, Chair, North Pacific Fishery Management Council, before the United States Senate Committee on Commerce, Science, and Transportation, Hearing on Pelagic Driftnet Fisheries, Oct. 9, 1985). The total rose significantly in 1984. *Id.* The Japanese billfish fishery contributed 600 vessels in 1983, introducing approximately 117,889 miles of actively-fished synthetic netting to the North Pacific waters. *Id.* at 149.

Derelict netting hurts the fishing industry itself. It is estimated that the Japanese fleet alone harvests about one million North American salmon each year. *Id.* at 146. About 50% of all fish ensnared in the gillnets died and dropped out of these nets. *Id.* (citing testimony of L. Goodman before the United States Senate Committee on Commerce, Science and Transportation, Hearing on Pelagic Driftnet Fisheries, Oct. 9, 1985). This results in tremendous waste of potentially harvestable fish. *Id.* In one mile in one section of long abandoned driftnet, 99 dead seabirds and 200 dead salmon were found drifting with the net. Eisenbud, *Problems and Prospects, supra*, at 479. Considering the amount of derelict netting in the marine environment, and how long derelict netting may continue to catch fish and other marine species, the potential harm to the

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of these driftnets are lost or discarded. On the contrary, only a very small percentage of the netting becomes derelict.⁷ Nonetheless, because of the tremendous quantity of netting used yearly worldwide, even a small percentage of lost netting results in many miles of derelict nets and net fragments.⁸ According to one estimate, the North Pacific driftnet fisheries alone annually introduce approximately 1624 miles of derelict netting to the marine environment.⁹

Less documentation exists regarding the quantity of netting lost by domestic fishing fleets.¹⁰ Researchers have not calculated the rate of netting loss for many of the different fisheries. For some areas, however, estimates of loss are available. Between January 1985 and August 1986, the groundfish gillnet fishery in New England reported losing approximately forty-eight kilometers, or thirty miles, of synthetic gillnets.¹¹

B. Effects of Entanglement on Marine Life

Recent studies provide strong evidence that derelict synthetic fish netting gravely threatens many marine animal species,¹² including spe-

fishing industry itself caused by derelict netting is clear. See *infra* notes 8–11 and 27–29 and accompanying text.

7. One estimate puts the percentage of driftnetting lost at 0.06% of each net during each set. R. Eisenbud, *The Pelagic Driftnet 4* (unpublished manuscript submitted to the Food and Agriculture Organization World Conference on Fisheries Management and Development, June/July 1984, copy on file with the *Washington Law Review*) [hereinafter R. Eisenbud, *The Pelagic Driftnet*].

8. The Japanese salmon driftnet fishery alone introduced over 51 miles of derelict driftnet into the North Pacific during the 1984 fishing season (9,121 sets using nets 9.4 miles long multiplied by the 0.06% rate of net loss per set). MARINE WILDLIFE ENTANGLEMENT, *supra* note 6, at 148. Assuming the same rate of loss, the Japanese squid fishery lost over 453 miles of monofilament drift gillnetting in 1983. *Id.* Other foreign fisheries lost over four miles of netting each night during the 1981 season, as both Taiwan and the Republic of Korea had squid fisheries in the North Pacific at the same time. Eisenbud, *Problems and Prospects*, *supra* note 6, at 476–77. Assuming a five-month fishing season, these fisheries created about 600 miles of derelict netting. Much of the netting was lost within or near the boundary of the United States exclusive economic zone. MARINE WILDLIFE ENTANGLEMENT, *supra* note 6, at 147–48.

9. R. Eisenbud, *The Pelagic Driftnet*, *supra* note 7, at 4.

10. The various fisheries throughout the United States use different fishing techniques and nets of vastly different sizes, making documentation of lost netting more difficult. See generally MARINE WILDLIFE ENTANGLEMENT, *supra* note 6.

11. CENTER FOR ENVTL. EDUC., ENVTL. PROTECTION AGENCY, *PLASTICS IN THE OCEAN: MORE THAN A LITTER PROBLEM 6* (1987) [hereinafter *PLASTICS IN THE OCEAN*].

12. While the indirect proof is considerable, some commentators feel there is inadequate proof that derelict fishing nets actually harm any marine animal species as a whole. See J. Coe, *supra* note 4, at 46; see also Scordino, *Studies of Fur Seal Entanglement, 1981-84, St. Paul Island, Alaska*, in *PROCEEDINGS OF THE WORKSHOP ON THE FATE AND IMPACT OF MARINE DEBRIS 278-90* (R. Shomura & H. Yoshida eds. 1985) [hereinafter *PROCEEDINGS*].

cies listed as depleted or endangered under federal law.¹³ The best documented encounters between derelict fishing net debris and a particular marine species involve the northern fur seal of Alaska's Pribilof Islands.¹⁴ Scientists estimate that 30,000 or more of these seals perish every year because of entanglement with nets or other plastic debris.¹⁵

Sea turtles, some species of which are protected under the Endangered Species Act, are also prone to entanglement in derelict netting.¹⁶ Scientists have recorded many instances of entangled sea turtles.¹⁷ Floating net fragments reportedly "act like magnets" to sea turtles, which rely on natural floating masses for shelter and food.¹⁸ Moreover, the physical characteristics of sea turtles render them very susceptible to entanglement.¹⁹ The turtles' well defined flippers entangle more easily than those of seals and other pinnipeds.

Many other species of marine animals also have had documented entanglements in derelict fishing nets. Among these are the Hawaiian monk seal,²⁰ various whale species,²¹ manatees,²² stellar sea lions,

13. For a list of endangered and depleted species, see 50 C.F.R. § 17.11(h) (1985).

14. The northern fur seal will be officially listed as a "depleted" species under the Endangered Species Act, effective June 17, 1988. 53 Fed. Reg. 17,888 (May 18, 1988).

15. MARINE WILDLIFE ENTANGLEMENT, *supra* note 6, at 162. The present population of the northern fur seal is declining at a rate of about four to eight percent yearly. Fowler, *An Evaluation of the Role of Entanglement in the Population Dynamics of Northern Fur Seals on the Pribilof Islands*, in PROCEEDINGS, *supra* note 12, at 291. In light of evidence involving, among other things, derelict trawl and gillnet fragments now prevalent in the seals' habitat, one researcher has concluded that the annual mortality rate of the northern fur seal due to entanglement is 5.5%. *Id.* at 292.

16. PLASTICS IN THE OCEAN, *supra* note 11, at 103. Leatherback, hawksbill, Kemp's ridley, green, and olive sea turtles are among the endangered turtle species with recorded entanglements. *Id.* at iii.

17. See generally MARINE WILDLIFE ENTANGLEMENT, *supra* note 6.

18. *Id.* at 163.

19. Balazs, *Impact of Ocean Debris on Marine Turtles: Entanglement and Ingestion*, in PROCEEDINGS, *supra* note 12, at 420-21.

20. The effect of derelict fishing nets on the Hawaiian monk seal, an endangered species under the Endangered Species Act, has been well studied. The present population of this species may be as low as 1000 animals. Lomont, *Marine Debris Killing Wildlife*, SEAWORDS, Nov. 5, 1986, at 4 (published by the Marine Options Program at the University of Hawaii). Between 1974 and 1984, researchers recorded 18 incidences of monk seal entanglement with derelict fishing debris, with eight other incidences signalling entanglement with some variety of debris. Henderson, *Review of Hawaiian Monk Seal Entanglements in Marine Debris*, in PROCEEDINGS, *supra* note 12, at 326-35. In the researcher's judgment, six of these seals would have died but for rescue by the observers. *Id.* Also, derelict netting snags on the coral reefs that surround the Hawaiian islands, and monk seals may be drowning when their curiosity leads them to investigate the nets snagged on the reefs. MARINE WILDLIFE ENTANGLEMENT, *supra* note 6, at 162. Such drownings do not come to the attention of researchers monitoring the species.

21. Documented entanglements have involved minke, humpback, fin, right, gray, pilot, and other large whales. MARINE WILDLIFE ENTANGLEMENT, *supra* note 6, at ii, 9-11, 44-45, 89.

22. *Id.* at 74-75.

northern elephant seals,²³ harbor seals,²⁴ and various species of fish and waterfowl.²⁵ It is very difficult, if not impossible, to determine if an animal became ensnared in a net being fished at the time or one which was discarded or lost. Nevertheless, the sheer quantity of derelict netting in these species' habitats makes it a safe assumption that many of the recorded entanglements were with nonactive nets.²⁶

Studies on the length of time that derelict synthetic fishing nets and net fragments remain hazardous to marine life are few and incomplete. One study in Puget Sound, Washington, involving occasional observations of several derelict salmon gillnets in eighty feet of water, revealed that the nets entangled salmon and other pelagic fish for up to three years.²⁷ After the nets sank to the bottom, they continued to ensnare crabs for over six years.²⁸ Derelict nets which become encrusted with marine organisms, sinking to great ocean depths,²⁹ or snagging on the bottom, have an undocumented effect on marine life and ecosystems.³⁰

C. International Controls

Derelict synthetic fishing nets pose an international problem. Fishing fleets use synthetic fishing nets around the globe. Moreover, a derelict net may move with ocean currents for many years, eventually ensnaring victims thousands of miles from where it was originally lost or discarded.³¹ Despite the magnitude of the problem, international regulations controlling the disposal of plastic nets are not yet in place.

The United States Senate recently took a significant step toward establishing such regulations. On November 5, 1987, the Senate ratified annex V to the Protocol of 1978 Relating to the International Convention for the Prevention of Pollution from Ships ("MARPOL Protocol").³² Annex V flatly prohibits disposing plastics into the sea.³³

23. *Id.* at 161.

24. *Id.*

25. *See id.* at 7-8, 57; J. Coe, *supra* note 4, at 40-47; PLASTICS IN THE OCEAN, *supra* note 11, at 34-39.

26. *See supra* notes 6-11 and accompanying text.

27. J. Coe, *supra* note 4, at 46.

28. *Id.* Even sunken, rolled up nets are hazardous to walking marine life, such as crabs and lobsters. *Id.* (citing High, *Consequences of Lost Fishing Gear*, in PROCEEDINGS, *supra* note 12, at 430-37).

29. *Id.* at 46.

30. *Id.* at 47.

31. Lomont, *supra* note 20, at 3.

32. Regulations for the Prevention of Pollution by Garbage from Ships (Annex V of MARPOL 73/78), S. TREATY DOC. NO. 3, 100th Cong., 1st Sess. (1987) [hereinafter annex V]. Annex V was not ratified by the United States when originally drafted because the Coast Guard feared that it might jeopardize the passage of another annex regulating oil pollution, which it

Most importantly, the annex specifically prohibits the intentional disposal of "synthetic fishing nets."³⁴ With ratification by the United States, the conditions for implementation of annex V have been satisfied, and the annex will come into force within one year.³⁵ Thus, annex V to the MARPOL Protocol will soon provide, for the first time, a clear legal mechanism for controlling the disposal of synthetic fishing nets at the international level.³⁶

D. Domestic Controls

In the United States, regulation of derelict fishing nets and net fragments could be applied through numerous federal statutes. A recent law enacted by Congress, the United States-Japan Fishery Agreement Approval Act of 1987,³⁷ has tremendous potential for redressing the problem. Other possible statutes fall under three categories.³⁸ First, fishery regulations, particularly the Magnuson Fisheries Conservation

considered a higher priority. M. Bean, United States and International Authorities Applicable to Entanglement of Marine Mammals and Other Organisms in Lost or Discarded Fishing Gear and Other Debris 34 (Oct. 30, 1984) (unpublished report to the Marine Mammal Commission, on file with the *Washington Law Review*).

33. Annex V, *supra* note 32, at 2.

34. *Id.*

35. COUNCIL ON OCEAN LAW, OCEAN POLICY NEWS 6 (Aug. 1986) [hereinafter OPN]. Annex V will enter into force one year after a minimum of 15 countries representing 50% of the world's gross shipping tonnage deposit instruments of ratification. *Id.* As of August, 1986, 27 countries, representing 41.86% of the world's shipping tonnage, had ratified the agreement. *Id.* Ratification by the United States, in conjunction with ratification by the U.S.S.R., should satisfy the 50% requirement. *Id.*

36. Annex V is an offspring of the International Convention on Prevention of Marine Pollution by Dumping of Wastes and Other Matter, Dec. 29, 1972, 26 U.S.T. 2403, T.I.A.S. No. 8165 (usually referred to as the London Dumping Convention or "LDC"). The LDC prohibits vessels from transporting certain materials for the purpose of dumping them into the sea. *Id.* at 2408. This limitation makes the applicability of the LDC questionable, because vessels do not go to sea for the purpose of dumping nets. Because annex V unquestionably applies in most situations, and the LDC is plagued with other problems, this Comment will not discuss the LDC at length.

For a history of how annex V is related to the LDC, see INT'L MARITIME ORG., FOCUS ON IMO: THE INTERNATIONAL CONVENTION FOR THE PREVENTION OF POLLUTION FROM SHIPS, 1973, AS MODIFIED BY THE PROTOCOL OF 1978 RELATING THERETO (Mar. 1986).

The United Nations Convention on the Law of the Sea, U.N. Doc. A/Conf.62/22 (1982), reprinted in 21 INT'L LEGAL MATERIALS 1261, also has potential for redressing the problem, but is not yet in force. Because this and other possibly useful international treaties, including regional treaties, are afflicted with problems similar to those of annex V, and are only theoretically applicable to the ghostnet issue, discussion of them is omitted.

37. Pub. L. No. 100-220, 101 Stat. 1458 (1987). The Act contains five titles, all of which concern different aspects of our marine waters. Titles II and IV deal most directly with plastic pollution.

38. See Gosliner, *Legal Authorities Pertinent to Entanglement by Marine Debris*, in PROCEEDINGS, *supra* note 12, at 17.

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and Management Act,³⁹ could control derelict netting. Second, pollution control statutes could also be used to regulate the derelict net problem. The Marine Protection, Research and Sanctuaries Act⁴⁰ serves as an example in this category. The third category is wildlife protection, represented by the Marine Mammal Protection Act⁴¹ and the Endangered Species Act.⁴²

1. The United States-Japan Fishery Agreement Approval Act of 1987

The United States-Japan Fishery Agreement Approval Act of 1987 ("P.L. 220"), which provides the implementing legislation for annex V, could significantly reduce the amount of derelict netting in the marine environment.⁴³ As it specifically relates to fishing nets, P.L. 220 targets driftnets exceeding 1.5 miles in length.⁴⁴ It requires federal officials to evaluate the feasibility of a more sophisticated gear marking system to aid in identifying the vessel that lost or discarded a net or net fragment.⁴⁵ P.L. 220 also calls for a net bounty system which will pay an amount determined by the Secretary of Commerce to persons who retrieve netting, and deposit it with the appropriate governmental body.⁴⁶

2. Fisheries Statutes

The Magnuson Fisheries Conservation and Management Act ("Magnuson Fisheries Act") aims to conserve and manage fishery resources of the United States by creating fishery conservation zones.⁴⁷ The United States assumes exclusive jurisdiction over all fish and fisheries-related activities within the zones.⁴⁸ Congress restricted foreign fishing within the fishery conservation zone ("exclusive economic zone")⁴⁹ to ensure proper management and conservation of fishery

39. 16 U.S.C. §§ 1801-1882 (1982).

40. 33 U.S.C. §§ 1401-1445 (1982).

41. 16 U.S.C. §§ 1361-1407 (1982).

42. *Id.* §§ 1531-1543.

43. United States-Japan Fishery Agreement Approval Act of 1987, §§ 2001-2108, Pub. L. No. 100-220, 101 Stat. 1458, 1460-1464 (1987). Implementing legislation was required for annex V because it was not a self-implementing treaty. President Reagan signed P.L. 220 into law on December 29, 1987.

44. *Id.* § 4003, 101 Stat. at 1477.

45. *Id.* § 4007(a), 101 Stat. at 1479.

46. *Id.* § 4007(c), 101 Stat. at 1480.

47. 16 U.S.C. §§ 1801(b)(1), 1811 (1982).

48. *Id.* § 1801(b)(1).

49. Proclamation No. 5030, 3 C.F.R. 22-23 (1983 Comp.); *see also* RESTATEMENT (REVISED) OF FOREIGN RELATIONS LAW § 514 (Tent. Draft No. 6, 1985).

resources.⁵⁰ Regulations enacted pursuant to the Magnuson Fisheries Act presently include some net-specific restrictions, but do not address lost netting.

One major restriction placed on foreign fisheries that desire to harvest fish within the exclusive economic zone is the requirement that each vessel obtain a permit.⁵¹ The Secretary of Commerce has the power to restrict or condition these permits for any reason related to fishery conservation or management.⁵² Agencies have used this power to expressly prohibit the intentional disposal of fishing gear.⁵³ Further, the Magnuson Fisheries Act mandates that the application for a permit must include specifications of the type and quantity of gear to be used by the vessel.⁵⁴

The Magnuson Fisheries Act also establishes an observer program for foreign fishing vessels.⁵⁵ Observers with the National Oceanic and Atmospheric Administration board the vessels to monitor compliance with permit provisions.⁵⁶ Additionally, observers provide information concerning various aspects of the fishing industry.

The observer program, however, might be limited to foreign vessels.⁵⁷ The Magnuson Fisheries Act so limits the program, opting to regulate domestic fisheries through regional councils that promulgate fishery management plans according to the individual needs of the region.⁵⁸ In 1984, however, the Ninth Circuit Court of Appeals paved the way for observers to board domestic vessels.⁵⁹ The court ruled that a regulation requiring a domestic vessel owner to allow observers

50. Gosliner, *supra* note 38, at 28.

51. 16 U.S.C. § 1821(a)(3) (1982).

52. *Id.* § 1824(b)(7); *see also id.* § 1821(h).

53. 50 C.F.R. § 611.12(c)(2) (1985). Other permit conditions include requiring the foreign fishing vessel operator to immediately notify the Coast Guard upon retrieving derelict fishing gear, and reporting the accidental loss of gear. *Id.* § 611.12(b), (c)(3).

54. 16 U.S.C. § 1824(b)(3)(B) (1982).

55. *Id.* § 1821(i).

56. *Id.* § 1821(i)(3) (Supp. I 1985).

57. Many of the restrictions discussed apply only to foreign fishing vessels, including the prohibition against intentionally discarding damaged nets. In 1984, however, the National Marine Fisheries Service considered a proposal to amend all regions' fishery management programs to include prohibiting the intentional discard of netting by domestic vessels. Gosliner, *supra* note 38, at 28.

58. 16 U.S.C. §§ 1851-1852 (1982).

59. *Balelo v. Baldrige*, 724 F.2d 753, 764-66 (9th Cir.), *cert. denied*, 467 U.S. 1252 (1984). *Balelo* involved domestic yellow-fin tuna fishing vessels. A protected species of porpoise was frequently taken by the tuna vessels incidentally along with the targeted yellow-fin tuna in violation of the Marine Mammal Protection Act. The observers were to be placed on the domestic vessels in accordance with a provision of the Act directing an "immediate" undertaking of a research and development program to devise improved fishing methods and gear to reduce the incidental taking of the porpoises. *Id.* at 756.

on board to collect data potentially useful against the owner in a criminal or civil suit, as a condition for receiving a commercial fishing permit, was not a violation of the fourth amendment.⁶⁰ The holding was based on a provision of the Marine Mammal Protection Act and not on the Magnuson Fisheries Act.⁶¹ Nonetheless, it opens the door for extending the observer program to domestic vessels by removing any fourth amendment objections to such a program.⁶²

The penalty provisions of the Magnuson Fisheries Act provide another useful tool for reducing derelict netting. Civil penalties range up to \$25,000 for each violation of a permit.⁶³ The Secretary of Commerce has wide latitude in assessing the total penalty. Such flexibility allows fairness to the violator by providing the opportunity to plead mitigating factors, while retaining the possibility of a prohibitive deterrent. The Magnuson Fisheries Act further authorizes criminal penalties of up to \$50,000 or six months in prison, or both.⁶⁴ Finally, the vessel may be forfeited, including its gear and cargo, if the operator commits an act contrary to the permit conditions.⁶⁵

3. *Pollution Control Statutes*

A second federal statute that could apply to the synthetic fishing net dilemma is the Marine Protection, Research, and Sanctuaries Act ("Marine Protection Act").⁶⁶ This statute regulates the transportation of material from the United States for the purpose of dumping it into the United States' territorial sea or contiguous zone.⁶⁷ As with the Magnuson Fisheries Act, the Marine Protection Act allows a fishing vessel to avoid penalties if the operator first procures a permit.⁶⁸

The language of the Marine Protection Act prohibits only *transporting* materials for the purpose of disposing the materials into the marine environment. Dumping itself is not prohibited, unless the ves-

60. *Id.* at 764.

61. *Id.* at 762. The decision was based on the Marine Mammal Protection Act because it has emergency provisions tailored to such a situation.

62. Gosliner, *supra* note 38, at 32.

63. 16 U.S.C. § 1858(a) (1982).

64. *Id.* § 1859.

65. *Id.* § 1860(a).

66. 33 U.S.C. §§ 1401-1445 (1982).

67. *Id.* § 1401(e). The territorial sea and contiguous zone of the United States together extend out only 12 nautical miles. *Id.* § 1411(b). This severely limits the applicability of the Marine Protection Act, because much foreign fishing, as well as domestic fishing, occurs beyond this limit. Gosliner, *supra* note 38, at 20.

Further, prohibited materials are those "that adversely affect . . . the marine environment, ecological systems, or economic potentialities." 33 U.S.C. § 1401(b) (1982).

68. 33 U.S.C. §§ 1411(a), 1412-1413 (1982).

sel's crew specifically intends to unload refuse.⁶⁹ In passing the Marine Protection Act, however, Congress apparently intended to prohibit dumping without the predicate of transporting material for that specific purpose.⁷⁰

4. *Wildlife Statutes*

Wildlife laws constitute the third category of statutes potentially applicable in controlling derelict fishing nets. Generally, wildlife statutes prohibit "taking"⁷¹ endangered or depleted species⁷² without a permit. If it can be determined with reasonable certainty that an action will result in taking an endangered species, then wildlife laws prevent such activity.⁷³ This is true even when no "take" is actually recorded.⁷⁴

Two wildlife statutes, the Marine Mammal Protection Act⁷⁵ and the Endangered Species Act,⁷⁶ when construed together, serve as potential entanglement control laws. The Marine Mammal Protection Act attempts to ensure that the population of certain marine species listed under the Endangered Species Act does not diminish beyond the "optimum carrying capacity" for the species within a given ecosystem.⁷⁷ The Endangered Species Act provides programs to conserve the habitats and numbers of such species.⁷⁸ Both statutes contain permit provisions allowing some incidental takes in the course of lawful activity.⁷⁹

The Marine Mammal Protection Act authorized the creation of the Marine Mammal Commission to serve as a research body. The Commission declared that intentional or negligent disposal of fishing nets

69. Gosliner, *supra* note 38, at 20.

70. S. REP. NO. 451, 92d Cong., 2d Sess. 8, reprinted in 1972 U.S. CODE CONG. & ADMIN. NEWS 4234, 4234. The applicability of the Marine Protection Act therefore depends on how broadly one interprets its provisions. One commentator suggests that fishing crews head to sea aware that netting will be lost or rendered useless in the course of standard practice. This knowledge may fulfill the intent element required for purposeful transportation when netting is subsequently lost. See Gosliner, *supra* note 38, at 21; cf. M. Bean, *supra* note 32, at 29.

71. To "take" means "to harrass, hunt, capture or kill or attempt to harrass, hunt, capture or kill any marine mammal." 16 U.S.C. § 1362(12) (1982).

72. Endangered species are listed in regulations promulgated under the Endangered Species Act. 50 C.F.R. § 17.11(h) (1985).

73. Gosliner, *supra* note 38, at 25.

74. *Id.* This doctrine has been applied in manatee protection. See 50 C.F.R. § 17.100 (1985).

75. 16 U.S.C. §§ 1361-1407 (1982).

76. *Id.* §§ 1531-1543.

77. "Optimum carrying capacity" means the highest number of animals of a given species that a habitat can support in a healthy state. *Id.* § 1362(8).

78. *Id.* § 1531(b).

79. *Id.* §§ 1374, 1539.

could constitute a "take" under certain circumstances.⁸⁰ Further, the Commission has regulated fishing techniques that cause undue fatalities.⁸¹ While the Endangered Species Act provisions cover all endangered or depleted species, if the pertinent species is a marine mammal, then the more restrictive provisions of the Marine Mammal Protection Act supersede those of the Endangered Species Act.⁸²

II. ANALYSIS

The pertinent international and domestic laws addressed above all contain provisions useful in addressing the derelict synthetic fishing net issue. They also share many problems. Understanding the strengths and weaknesses of these laws will help to construct a successful derelict net control regulation program.

A. *International Agreements*

Implementing annex V of the MARPOL Protocol is an important step in controlling the derelict fishing net problem. Annex V flatly prohibits the intentional disposal of synthetic fishing nets into the marine environment.⁸³ The ban extends to all United States-registered and foreign vessels within our exclusive economic zone.⁸⁴ Regulation 5 of the annex lists "special areas" requiring extra care in disposing of wastes into the enumerated water bodies.⁸⁵ Utilizing this provision, areas with marine mammal populations peculiarly susceptible to entanglement, such as Alaska's Pribilof Islands, could be set aside as "special areas." The International Maritime Organization or an authorized domestic body could adopt special methods for preventing net loss in these areas.⁸⁶ One possible "special method" would be to increase the penalties assessed for netting found in these areas and traced to a specific vessel.

In its current form, however, the annex presents some clear problems. Perhaps the most difficult of these is enforcement. The

80. PLASTICS IN THE OCEAN, *supra* note 11, at 101.

81. *Id.*

82. 16 U.S.C. § 1543 (1982).

83. Annex V, *supra* note 32, at 2.

84. C. Jarman, Background Paper, A Review of the Legal Structures Enabling Federal or State Enactment of the Various Types of Incentive Systems 7 (draft, Jan. 19, 1988) (on file with the *Washington Law Review*).

85. Annex V, *supra* note 32, at 2-3. In addition to the ban on all plastics, regulation 5 prohibits the disposal into the marine waters of all garbage other than food wastes. *Id.* at 3.

86. Annex V, regulation 1(3) states that having the International Maritime Organization adopt areas as special areas is the proper course of action for a signatory nation to take regarding waters with special environmental problems. Annex V, *supra* note 32, at 1.

annex presents two aspects of this problem. First, it has not been established which jurisdictional approach—flag state,⁸⁷ port state,⁸⁸ coastal state,⁸⁹ or a combination of these—should be used to determine what nation has jurisdiction over a violator of the annex. Second, the question remains whether signatory nations can enforce the annex's synthetic netting provisions at all.

Combining the traditional port state and flag state jurisdictional approaches has proved very successful in enforcing annexes I and II to the MARPOL Protocol,⁹⁰ and has been proposed as a method for enforcing annex V. The Reagan Administration has urged implementation of the flag state/port state jurisdictional scheme to enforce annex V.⁹¹ Under the Administration's proposal, coastal state jurisdiction would apply to vessels in the navigable waters or the exclusive economic zone of the United States that are flying the flags of nonparties to the treaty.⁹² P.L. 220 contemplates utilizing all three possible jurisdictional schemes.⁹³

Various environmental groups⁹⁴ have testified that nations using the combined port state/flag state approach have been too lenient in taking action against their own vessels.⁹⁵ In light of the extremely high

87. Flag state jurisdiction requires a nation to ensure that vessels flying its flag or carrying its registry comply with applicable international rules and standards. This definition is borrowed from the United Nations Convention on the Law of the Sea. United Nations Convention on the Law of the Sea, *supra* note 36, art. 217(1); *see also* RESTATEMENT (REVISED) OF FOREIGN RELATIONS LAW § 502(1)(b)(i) (Tent. Draft No. 6, 1985) (a flag state is to take measures necessary to prevent, reduce, and control pollution of the marine environment).

88. Port state jurisdiction allows a state to undertake investigations of vessels voluntarily within one of its ports. The port state may institute proceedings against the vessel if it finds evidence of an international treaty violation which occurred within the exclusive economic zone or internal waters of the state. United Nations Convention on the Law of the Sea, *supra* note 36, art. 218(1).

89. Under a coastal state jurisdiction plan, a coastal state may require a vessel to identify itself, describe its itinerary, and provide information needed by the authority to determine if a violation has occurred. OPN, *supra* note 35, at 7; *see also* United Nations Convention on the Law of the Sea, *supra* note 36, art. 220. If the authority suspects a violation, it may inspect the vessel. *Id.*

90. Annexes I and II are a part of the London Dumping Convention, a predecessor to the MARPOL Protocol. *See generally* INT'L MARITIME ORG., *supra* note 36.

91. OPN, *supra* note 35, at 7.

92. *Id.* at 6.

93. United States-Japan Fishery Agreement Approval Act of 1987, § 2102, Pub. L. No. 100-220, 101 Stat. 1458, 1461 (1987).

94. The environmental groups are 23 groups comprising the Entanglement News Network. OPN, *supra* note 35, at 8. For a list of these groups, see ENTANGLEMENT NETWORK NEWSL., Apr. 1987, at 1 (available through the Center for Environmental Education, Washington D.C.). The Newsletter itself lists only 22 sponsoring groups. *Id.*

95. OPN, *supra* note 35, at 6.

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rate of compliance with previously-passed annexes,⁹⁶ this fear may be unjustified. However, if the port state/flag state jurisdictional approach does indeed allow for excessive leniency in enforcing compliance, another enforcement scheme should be encouraged. Coastal state jurisdiction, which allows the enforcing state broader authority to enforce regulations at sea, may be the more prudent scheme, as it applies to all vessels within a nation's exclusive economic zone regardless of whether the nation under which they are registered is a signatory to annex V.

Beyond the jurisdictional issue lies another crucial problem with enforcement of annex V. Regulation 6(c) of the annex states that accidental loss of synthetic fishing nets does not violate the annex, if "all reasonable precautions" have been taken to prevent such loss.⁹⁷ Because current deficiencies in gear marking systems render the task of identifying derelict nets almost impossible, the Coast Guard or any other enforcing agency must observe a violation of annex V, or depend on reports from others, before it can enforce the penalty provisions of annex V.

The enforcement problems of annex V will require further actions to fill its gaps and strengthen it. These actions could take the form of amendments to the annex⁹⁸ or of separate international agreements. Although global regulation of derelict nets should be the ultimate goal, perhaps the best solution for the present is for individual nations to enact gap-filling domestic laws concerning the disposal of synthetic fishing nets. Each nation best knows how to fit enforcement regulations to its existing system for marine pollution control; once such measures are studied and implemented, uniform global regulation may be possible. Annex V will, in any event, alert nations to the problem and its magnitude, leading to less plastics in the marine environment, and to more responsible disposal practices.

B. Domestic Statutes

Maritime nations must implement domestic controls to fill the gaps of international agreements and to alleviate the difficulties posed by such controls. In the United States, several existing statutes could be utilized to reduce the quantity of derelict synthetic nets. Implementing

96. Regarding required bookkeeping procedures, compliance with annexes I and II is as high as 95%. IMO NEWS, No. 3, 1986, at 6 (published by the International Maritime Organization).

97. Annex V, *supra* note 32, at 4.

98. Amendments aimed at strengthening annex V are expected once it has entered into force. *Plastics in the Sea*, MARINE POLLUTION BULLETIN, June 1987, at 362 (Selected Papers from the Sixth International Ocean Disposal Symposium).

comprehensive ghostnet controls in the United States becomes more crucial as domestic fleets increasingly enter fisheries that were formerly the domain of foreign fleets.⁹⁹ Unfortunately, these statutes pose problems similar to those accompanying the international agreements.

1. *Recent Legislation*

Passing P.L. 220 provided another crucial step in controlling derelict ghostnets. In addition to implementing annex V of the MARPOL Protocol, title II of P.L. 220 directs the Administrator of the National Oceanic and Atmospheric Administration and the Administrator of the Environmental Protection Agency¹⁰⁰ to conduct public education and outreach programs that will foster greater awareness of the plastic pollution problem in general.¹⁰¹ P.L. 220 encourages volunteer "Citizen Pollution Patrols" to aid in clean up and prevention.¹⁰² P.L. 220 further calls for study regarding driftnet marking, a bounty system, the feasibility of biodegradable net material, and a cooperative driftnet fishing vessel tracking system.¹⁰³

P.L. 220 could serve as an umbrella under which to place further, more detailed ghostnet control laws. In limiting P.L. 220 to driftnets exceeding 1.5 miles in length, however, Congress severely curtailed the scope of the statute. Congress apparently intended to limit the applicability of the statute to foreign vessels, particularly those in the North Pacific.¹⁰⁴ The limitation also excludes other types of nets, such as purse seines, trawl nets, and gill nets. Unfortunately, none of the other proposals currently before Congress addresses the problems with P.L. 220.¹⁰⁵

In P.L. 220, as with other Congressional proposals, policy makers tended to focus on research rather than regulation to combat the derelict fishing net dilemma. The perceived lack of concrete evidence that nets actually harm the population of any marine species,¹⁰⁶ or the reluctance to promulgate regulations which the fishing industry would

99. MARINE WILDLIFE ENTANGLEMENT, *supra* note 6, at i.

100. United States-Japan Fishery Agreement Approval Act of 1987, § 2204(a)(1), Pub. L. No. 100-220, 101 Stat. 1458, 1467 (1987). These authorities are to consult with the Secretary of Transportation. *Id.*

101. *Id.* § 2204(a)(1)-(2), 101 Stat. at 1467.

102. *Id.* § 2204(b).

103. *Id.* § 4007(a)-(d), 101 Stat. at 1479-80.

104. *See supra* note 6 and accompanying text.

105. Members of Congress have introduced no less than eight bills dealing with plastic pollutants and fishing nets in the 100th Congress. Conner & O'Dell, *supra* note 1, at 33.

106. *See supra* notes 12-30 and accompanying text.

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oppose, encouraged the politically safe stance of simply requiring further study of the problem. Experts in the field believe that sufficient evidence of marine wildlife entanglement exists to justify concrete measures controlling the loss of synthetic nets. Congress should therefore take a stronger stance than simply calling for further research.

2. *Fisheries Statutes*

The Magnuson Fisheries Act also promises the potential to construct a derelict net control system. First, modifying the Magnuson Fisheries Act's permit system to implement a reporting/inventory system could ease the most problematic issue involving regulation of derelict nets: controlling accidental loss. Derelict net control regulations must address accidental loss to be successful, because vessels lose the majority of derelict netting unintentionally.¹⁰⁷ By requiring vessel operators to inventory their gear before going to sea and upon return, the government could maintain accurate records of lost gear and penalize the operator accordingly. This regulation would encourage operators to take precautions to prevent losing gear in any manner.

Second, the observer program established by the Magnuson Fisheries Act could help implement a successful derelict net plan. Besides ensuring that fishing vessel crewmembers are penalized for intentionally discarding damaged nets, observers could also report lost nets or net fragments to the Coast Guard or other appropriate authorities for recovery. This information could be further used to accurately determine the true extent of the derelict net problem.¹⁰⁸ Placing observers on domestic vessels would further ameliorate the derelict fishing net problem just as with the foreign vessel observer program. Because case law on the subject does not decisively answer whether the program applies to domestic vessels,¹⁰⁹ the Magnuson Fisheries Act should be amended to explicitly extend the observer program to domestic vessels.

Finally, the Magnuson Fisheries Act extends the zone covered to a full 200 nautical miles from the United States territorial sea.¹¹⁰ Much of the foreign and domestic fishing occurs within this limit.¹¹¹ Any

107. J. Coe, *supra* note 4, at 9.

108. In light of these and other considerations, one commentator has suggested examining and, if necessary, altering observer reporting forms to achieve more accurate reporting of lost gear. M. Bean, *supra* note 32, at 22-23.

109. *See Balelo v. Baldrige*, 724 F.2d 753 (9th Cir.), *cert. denied*, 467 U.S. 1252 (1984).

110. 16 U.S.C. § 1811 (1982).

111. MARINE WILDLIFE ENTANGLEMENT, *supra* note 6, at 147-48.

fishing vessel operating within this zone should be on notice that it is subject to the provisions of the Magnuson Fisheries Act.¹¹²

3. *Pollution Control Statutes*

The Marine Protection Act should be extended to cover the 200 mile exclusive economic zone of the Magnuson Fisheries Act. The Marine Protection Act was passed before the exclusive economic zone was extended to 200 miles,¹¹³ and therefore amending it to the full 200 mile limit would be consistent with current law.¹¹⁴ If Congress did this, the permit system of the Marine Protection Act would help control the quantity of derelict fishing gear in much the same way as the Magnuson Fisheries Act.¹¹⁵ Before adopting such an amendment, Congress should clarify whether the Marine Protection Act prohibits dumping in general or only the transporting of materials for that purpose.¹¹⁶ Such clarification is crucial, because if the Marine Protection Act prohibits dumping, no permit may be issued under the Act if the substance to be dumped is a "persistent inert synthetic or natural material" that could materially interfere with a "legitimate use" of the oceans.¹¹⁷

4. *Wildlife Statutes*

The Marine Mammal Protection Act is due for reauthorization by Congress in 1988.¹¹⁸ If the Act can be used to implement regulations controlling derelict fishing nets, the regulations could be in place in the near future. Whether the grant of authority to the regulatory agency under the Marine Mammal Protection Act will cover derelict net controls, however, is questionable. One major problem is that the Marine

112. Commentators suggest that Congress did not grant sufficient authority in the Magnuson Fisheries Act for derelict net control regulations to be promulgated under it. See Gosliner, *supra* note 38, at 28-29; M. Bean, *supra* note 32, at 22-24. Also, the Magnuson Fisheries Act's emphasis on managing species independently may render it a poor statute for implementing ghostnet controls. C. Jarman, *supra* note 84, at 5. Thus, the applicability and prudence of using the Act to regulate ghostnets might be questionable. Such concern over the applicability of the Magnuson Fisheries Act is confusing, however, in light of the stated purpose of the statute. See *supra* notes 47-50 and accompanying text. If this statement of intent is insufficient, applicability of the statute could be ensured by Congressional amendment.

113. Before Congress acknowledged that the United States could control a 200 mile zone by enacting the Magnuson Fisheries Act, all maritime pollution statutes were limited to 12 miles.

114. PLASTICS IN THE OCEAN, *supra* note 11, at 90.

115. See *supra* notes 52-56 and accompanying text. For the factors considered in granting the permits, see 33 U.S.C. § 1412(a) (1982).

116. See *supra* note 70.

117. 40 C.F.R. § 227.5 (1985).

118. *Marine Wildlife Entanglement in North America*, CEE NEWSLETTER, Sept. 1987, at 7 (available through the Center for Environmental Education, Washington, D.C.).

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Mammal Protection Act, like other wildlife statutes, does not explicitly prohibit derelict nets until after the fact of entanglement.¹¹⁹ The Marine Mammal Protection Act, therefore, would have limited impact from the perspective of reducing the quantity of derelict netting before marine life is actually entangled.¹²⁰

The post-entanglement interpretation of the Marine Mammal Protection Act contradicts the Marine Mammal Commission's declaration that intentional or accidental loss of fishing nets constitutes a take under certain conditions.¹²¹ The Ninth Circuit Court of Appeals has held that takes can be caused indirectly through habitat destruction.¹²² Research has shown that the presence of derelict fishing nets degrades some endangered or depleted species' habitats,¹²³ reducing some species' populations. Case law¹²⁴ and the Marine Mammal Commission's declaration remove doubt that pre-entanglement controls could be implemented under the Marine Mammal Protection Act. Because no permits are granted to take depleted or endangered species,¹²⁵ they should not be granted where there is the chance of entanglement.

C. *Requisites for Successful Derelict Net Regulation*

All of the existing statutes applicable to derelict net control have problems and limitations. First, the general applicability of the laws to the ghostnet problem has been questioned. Most commentators feel, apparently because the germane statutes are not plastic-specific,¹²⁶ that the derelict net issue is beyond the scope of present stat-

119. PLASTICS IN THE OCEAN, *supra* note 11, at 101.

120. *Id.*

121. *See supra* notes 80-81 and accompanying text.

122. *Palila v. Hawaii Dep't of Land & Natural Resources*, 639 F.2d 495 (9th Cir. 1981). *Palila* involved an action brought by the Sierra Club Legal Defense Fund on behalf of the *Palila*, a bird listed as endangered under 50 C.F.R. § 17.11(h) (1976). The Hawaii Department of Natural Resources implemented a plan to fence in about 25% of the birds' natural habitat to protect it from the ravages of feral goats and sheep, which were literally eating away the *Palila*'s habitat. The court found that this constituted a "taking" of the birds, and announced that not only must the fence not be constructed, but the Department had to institute a plan to rid the area of all feral goats and sheep. 639 F.2d at 496-97. The court based its decision on the definition of "harm" under 50 C.F.R. § 17.3(c), finding that "harm" under the Endangered Species Act includes any "activity that results in significant environmental modification or degradation of the endangered animal's habitat." 639 F.2d at 497. The court further held that this definition is consistent with the legislative intent of the Endangered Species Act, since Congress was informed that "the greatest threat to endangered species is the destruction of their natural habitat." *Id.* at 498 (citing *Tennessee Valley Authority v. Hill*, 437 U.S. 153, 179 (1978) (superseded by statute as stated in *Board of Governors v. Dimension Fin. Corp.*, 474 U.S. 361 (1986))).

123. *See supra* notes 12-26 and accompanying text.

124. *See Palila*, 639 F.2d 495.

125. Gosliner, *supra* note 38, at 25.

126. PLASTICS IN THE OCEAN, *supra* note 11, at ii.

utes, with the obvious exception of annex V to the MARPOL Protocol and P.L. 220.¹²⁷ Enforcement presents a second difficulty. Third, agencies are reluctant to develop regulations controlling accidental netting loss. Because the majority of derelict nets and fragments are lost accidentally,¹²⁸ regulations must emphasize this aspect of the problem to be effective.

1. *Scope of Domestic Statutes*

Regarding the first problem, in the three categories of domestic legislation,¹²⁹ fishery laws, pollution control, and wildlife preservation, the statutes give the regulating agency general power, instructing the pertinent regulatory agency to conserve natural resources. Because regulating derelict netting clearly conserves natural resources, the application of derelict net regulations would not exceed any of the statutes' purposes. Also, Congressional proposals indicate that, because plastic pollutant control laws probably will be implemented under the Magnuson Fisheries Act, the applicability of that statute is assured.¹³⁰

2. *Enforcement and Agency Reluctance*

The solutions to the second and third problems lie in the substantive provisions of a ghostnet control program. A proper synthetic fishing net control regime must be widely enforceable and should also control the unintentional loss of netting. A successful ghostnet control program would require at least seven major elements. These include: First, installing a sophisticated gear marking system; second, requiring fishing vessels to secure a permit to use synthetic nets; third, imposing strict liability for lost netting; fourth, establishing a bounty system to reward finders of derelict netting; fifth, encouraging recycling of netting and making it easier to do so; sixth, rewarding private citizens who provide information leading to the assessment penalties for violating these regulations; and seventh, making the system as economically self-sufficient as possible.

a. *Gear Marking*

First, the linchpin to a successful program is a sophisticated gear marking system. The National Marine Fisheries Service is currently

127. See, e.g., Gosliner, *supra* note 38, at 15-16; M. Bean, *supra* note 32, at ii, 52.

128. J. Coe, *supra* note 4, at 9.

129. P.L. 220 is clearly applicable, and thus an exception to the three categories.

130. See United States-Japan Fishery Agreement Approval Act of 1987, tit. II, Pub. L. No. 100-220, 101 Stat. 1458, 1460-69 (1987).

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conducting a study on gear marking methods. It is now possible to implant wire-encoded tags in netting that could contain all the information necessary to track a piece of netting to the original purchaser.¹³¹ This process would probably not be cost prohibitive.¹³² The cheapest point of installing the tags, however, would be at the web manufacturing level.¹³³ The same lot of webbing could be used for myriad fishing purposes; therefore, tracking individual lots to the ultimate consumer would require extensive recording.¹³⁴ The resulting administrative burden of such a system, however, need not prove fatal.¹³⁵ The magnitude of the derelict net problem and the necessity of a sophisticated gear marking system to control the problem demonstrate the need for serious consideration of the encoded wire tagging possibility. P.L. 220 encourages further research in this area.¹³⁶

b. Permits for Using Synthetic Nets

A successful ghostnet control program would require all fishing vessels, foreign or domestic, to secure a permit to use synthetic nets within the exclusive economic zone. These permits should be in addition to present permit requirements of the fishing industry. They could be inexpensive, primarily serving to provide complete gear inventories for the governing agency,¹³⁷ and to notify vessels that they must report any lost netting to the appropriate authority.¹³⁸ The enforcing agency should fine any vessel caught fishing without a valid permit.

131. Telephone interview with James Coe, Director, Marine Entanglement Research Program, National Marine Fisheries Service, Seattle, Washington (Jan. 19, 1988) (notes on file with the *Washington Law Review*).

132. *Id.*

133. X. Augerot, Background Paper for a National Workshop on Fisheries-Generated Marine Debris and Incentive-Based Regulatory Systems 9-10 (draft, Jan. 14, 1988) (on file with the *Washington Law Review*).

134. *Id.* at 9.

135. *Id.* While the administrative burden at first might prove high, as the anticipated problems were solved through experience, the burden would lessen.

136. United States-Japan Fishery Agreement Approval Act of 1987, § 4007(a), Pub. L. No. 100-220, 101 Stat. 1458, 1479 (1987).

137. Under section 10 of the Fishermen's Protective Act, 22 U.S.C. § 1980 (1982), vessels are already required to report inventories in order to collect replacement monies for gear damaged or lost under certain conditions.

138. A possible authority for this purpose would be the National Marine Fisheries Service. An inventory system could require that a vessel operator "check in" with the National Marine Fisheries Service within a specified time to have gear reinventoried. X. Augerot, *supra* note 133, at 7. A fine could be levied at that point for any gear absent in the second inventory.

c. *Strict Liability*

A third component of an effective derelict net control program must address the issue of liability for lost nets. Strict liability for all lost netting is the only method of allocating liability that both would discourage accidental net loss and keep administrative costs at a minimum.¹³⁹ The enforcing agency could determine the amount to fine a vessel that has lost netting, considering factors such as the size of the net or net fragment, the reason lost, whether any marine life was known to have become entangled in the netting, and the estimated length of time that the netting was derelict.¹⁴⁰

The fishing industry will undoubtedly balk at a regulation that automatically imposes liability for derelict netting that can be traced to a specific vessel. Equity demands, however, that we place the cost of reducing this environmental hazard on those contributing to it. The fine would be considered a cost of doing business, just as some pollution control systems use this rationale to place cleanup costs on guilty parties.¹⁴¹

The fishing industry should take notice of this "cost of doing business" rationale. The law presently assesses no costs on the industry for the derelict net pollution it creates. The industry imposes the large social costs, such as fewer marine mammals and fish to enjoy, and polluted beaches and marine waters, entirely on the public. Those outside the fishing industry should no longer bear responsibility for its waste. The United States has declared that certain marine mammal species are valued enough to receive protection under federal law. The

139. Under the Migratory Bird Treaty Act, 16 U.S.C. §§ 701-718 (1982), courts have imposed liability in instances of unintentional treaty violations. *United States v. Corbin Farm Serv.*, 444 F. Supp. 510 (E.D. Cal.), *aff'd*, 578 F.2d 259 (9th Cir. 1978). The court held that the defendants were in a position to prevent the treaty violation using reasonable care, and therefore could be penalized. *Id.* at 535-36 (citing *Morissette v. United States*, 342 U.S. 246, 256 (1952)). This "public welfare offense" argument applies to the accidental loss issue involving derelict netting.

140. A mitigating factor would be whether the vessel discarded the net for human safety reasons. If so, the "human safety" factor could serve as an exception to the strict liability rule, unless the vessel was unacceptably negligent in exposing itself to the situation that culminated in the lost netting. If such an exception is not recognized, the fine imposed would be minimal.

Another possible, but less desirable, enforcement scheme would be to create a rebuttable presumption that all netting lost was intentionally lost. Vessels could rebut the presumption and reduce or eliminate any fine. If not rebutted, the governing agency would impose fines according to the size of the fragment or net lost. If the netting was recovered and returned, additional fines could be imposed according to the reason the netting was lost and other pertinent factors. This scheme is less desirable mainly because of the excessive administrative burden it would create for the governing agency.

141. For examples and discussion of this rationale, see R. STEWART & J. KRIER, *ENVIRONMENTAL LAW AND POLICY: READINGS, MATERIALS AND NOTES* 555-87 (1978).

fishing industry should realize that its profession silently violates that law and the policy underlying it. The law should now impose responsibility for these social costs on the industry creating them.¹⁴²

d. Bounty System

Fourth, an effective ghostnet control program should also include a bounty system.¹⁴³ P.L. 220 encourages the formation of such a system. Rewards to fishermen and private citizens for turning in discarded net fragments would motivate them to pick up net fragments, rather than returning them to the sea.¹⁴⁴ An effective bounty system would require that the rewards be ample enough to provide an incentive for turning in net fragments, but low enough to make the system affordable.¹⁴⁵ Furthermore, only those who find or recover netting should be rewarded. A separate deposit system could be implemented that would allow vessels to turn in retired nets and recover the price of the deposit paid when purchasing the net. A sophisticated gear marking system could guard against "pirating" nets, ensuring that any net returned by a vessel for the purpose of receiving a deposit payment was a net originally purchased by that vessel.

e. Recycling

A convenient and economical means of recycling nets would also reduce the quantity of derelict netting. Newport, Oregon, established a successful recycling system for all plastic marine debris which serves as an incentive for beachgoers and the fishing industry alike to return plastic pollutants instead of discarding them.¹⁴⁶ Recycling will, however, require large expenditures by local governments because port facilities in the United States and abroad are inadequate for handling shipboard plastic wastes.¹⁴⁷

142. For an excellent discussion of the "externality" theory as it relates to environmental law, see *id.* at 317-22.

143. For an example of a bounty system and how it functions, see X. Augerot, *supra* note 133, at 8-9.

144. Trawlers reportedly often recover derelict net fragments in the course of fishing. Gosliner, *supra* note 38, at 32.

145. *Id.* The bounty system could be financed in whole or in part through fines imposed because of permit system violations.

146. *Plastics in the Pacific*, Seattle Times, Nov. 8, 1987, at A1, col. 1. Returning to biodegradable net fibers, another possibility that merits strong consideration, would alleviate the need for recycling and the associated problem of building expensive shoreside facilities for that purpose. See Connor & O'Dell, *supra* note 1, at 34-35.

147. PLASTICS IN THE OCEAN, *supra* note 11, at i. Annex V should improve this problem. *Id.*

f. Rewards for Private Citizens

Sixth, providing rewards for private citizens who furnish information leading to the assessment of penalties against a violator of ghostnet regulations would also help alleviate the problem. A citizen who provides this information would receive a portion of any fine levied. The Endangered Species Act allows for rewards of this nature but is seldom, if ever, invoked.¹⁴⁸ Public education of the problem and of the availability of rewards, however, could increase the use of this provision. P.L. 220 should provide such education.¹⁴⁹

g. Making the System Economically Self-Sufficient

Finally, regulating ghostnet disposal and cleanup will require federal subsidies. Because procuring federal monies for this purpose may prove difficult, efforts must be made to make a ghostnet control system as economically self-sufficient as possible. Channeling any fines received from violators to fund the bounty system, along with the extra funds received by requiring permits to fish with synthetic nets, may provide sufficient funds to operate the disposal and cleanup system.

3. Manner of Creating a Derelict Net Control System

Perhaps the most prudent way to create a derelict net control system is to utilize the rulemaking powers of the Secretary of Commerce and adopt rules under one of the foregoing domestic statutes. Insisting that Congress pass a comprehensive law would lead to political hesitance, at the expense of further derelict net pollution. It may be necessary to amend a statute to preclude any legal challenge to the authority of the appointed agency to promulgate such rules, but this should not encounter the same inertia in Congress that a regulatory bill of the requisite nature would face.¹⁵⁰ The National Marine Fisheries Service may be a logical choice as the agency to formulate derelict fish net regulations, as it is a knowledgeable body concerned with the many facets of this subject.

If the foregoing provisions are adopted, the United States could have an enforceable derelict fish netting control system which could alleviate concerns regarding control of accidental netting loss. Enforceability would be enhanced in that both governmental authori-

148. Gosliner, *supra* note 38, at 32.

149. United States-Japan Fishery Agreement Approval Act of 1987, § 2204, Pub. L. No. 100-220, 101 Stat. 1458, 1466-67 (1987).

150. Similar ideas are developed in C. Jarman, *supra* note 84.

ties and private citizens play a role in the system. Also, the system does not require authorities to discriminate between intentionally and accidentally lost netting. A vessel would have to report lost netting or it would be considered intentionally lost.

III. CONCLUSION

Derelict fish netting poses a serious environmental problem that presently is all but uncontrolled under international and domestic law. Without regulation directed at reducing the amount of netting introduced to the marine environment and providing incentives to clean up the existing nets and fragments, derelict netting will continue to kill hundreds of thousands of marine animals annually. Congress has recently taken steps that will help ease the problem at both an international and national level. More comprehensive laws are needed, and the framework for them is in place. The federal government should now take the final step and pass regulations that will reduce the amount of netting lost both accidentally and intentionally, and eliminate the requirement of catching a vessel in the act of disposing of netting before a fine can be assessed. The fishing industry has imposed this insidious cost of business on those outside of the industry for too long. The time has come for the industry to assume the cost, thereby honoring the intent of marine protection statutes and paving the way for a sustainable fishing industry.

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