Introduction

Nearly two decades after the world began learning that tropical forests and their biological diversity are being devastated, it is difficult to imagine that another severe human disturbance of even greater extent could occur almost unnoticed by scientists, the media, and political leaders. But there is one: fishing on the seabed with towed gear such as trawls and dredges.

Since our first experiences on trawlers in 1987 and 1971, respectively, we have wondered how use of mobile fishing gear affects benthic ecosystems. As we talked with other scientists and combed the literature, we uncovered a trickle of information, mainly from Europe and Australia, suggesting that mobile gear could have important effects on marine biodiversity, including fisheries, and we agreed that this topic merits closer scrutiny.

To learn more, the Marine Conservation Biology Institute held a scientific workshop at the University of Maine's Darling Marine Center in June 1996. We were joined by other marine ecologists, fishery biologists, biogeochemists and geologists: Peter Auster (University of Connecticut, U.S.A.), Jeremy Collie (University of Rhode Island, U.S.A.), Paul Dayton (Scripps Institution of Oceanography, U.S.A.), Eleanor Dorsey (Conservation Law Foundation, U.S.A.), Jonna Engel (Moss Landing Marine Laboratory, U.S.A.), Donald Gordon (Department of Fisheries and Oceans, Canada), Michel Kaiser (Fisheries Laboratory, Ministry of Agriculture, Fisheries, and Food, U.K.), Richard Langton (Maine Department of Marine Resources, U.S.A.), Larry Mayer (University of Maine, U.S.A.), Cynthia Pilskaln (University of Maine, U.S.A.), Ian Poiner (Commonwealth Scientific and Industrial Research Organisation, Australia), Peter Schwinghamer (Department of Fisheries and Oceans, Canada), Simon Thrush (National Institute of Water and Atmospheric Research, New Zealand), Page Valentine (U.S. Geological Survey, U.S.A.), and Waldo Wakefield (Rutgers University, U.S.A.). Twenty-five other people from academia, government agencies, the fishing industry, environmental organizations, and the media observed the proceedings, and brief accounts of the workshop have already appeared (Kaiser 1996; Raloff 1996; Norse 1997; Russell 1997).

In the following papers, workshop participants and others paint a compelling picture: trawling and dredging affect commercial fisheries, benthic species composition, spatial structure, community function, and biogeochemistry of the water column. The content of the papers is disturbing, and the vast extent of the effects of mobile fishing gear has not been reported previously. Use of mobile fishing gear is on a par with agriculture as humankind's most important physical disturbance of the biosphere (Fig. 1).

Because bottom trawling and dredging generate money and jobs for the fishing industry and food for humanity, their impact on biodiversity and fisheries will be hotly debated. But the stakeholders go far beyond those in the industry. We hope these papers will spur scientists, gear technologists, fishers, environmental advocates, managers, and political leaders to find effective ways to lessen the impacts of mobile fishing gear.

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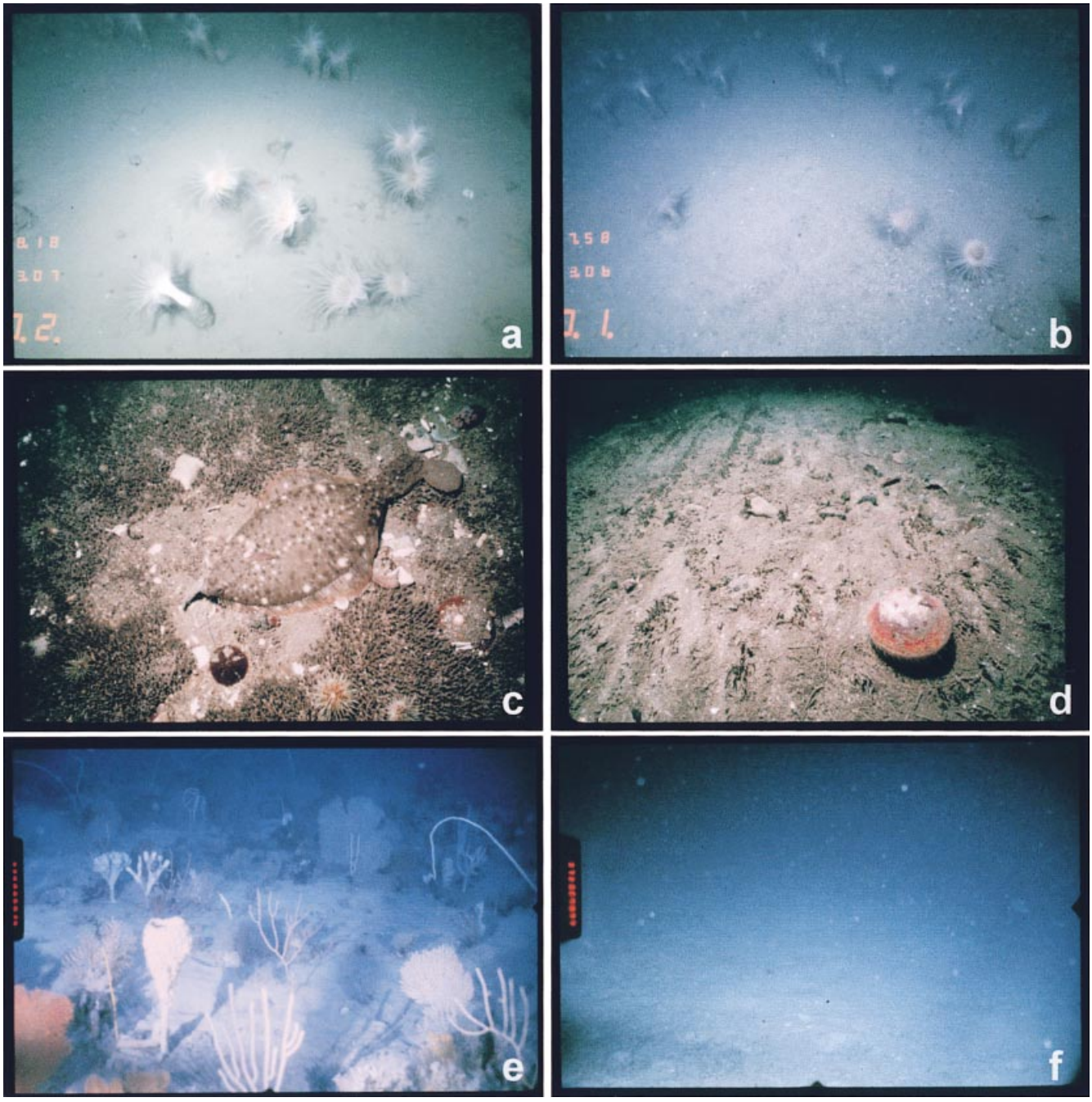

Figure 1. A comparison of three areas of the seabed known to be affected by mobile fishing gear: (a) and (b) are Cashes Basin, Gulf of Maine, U.S.A., water depth approximately 120 m; (a) an area where no recent dragging had occurred and (b) an area where trawl marks are visible (larger forms, such as cerianthid anemones, are undisturbed, but the fine surface layer of sediment has been removed); (c) and (d) are near Swans Island, Gulf of Maine, water depth about 30 m; (c) before a scallop dredge was used in the experimental area and (d) after one pass of the dredge (most surface-dwelling, small invertebrates and their tubes have been removed); (e) and (f) are Australia, North West Shelf, water depth about 70 m; (e) an area where trawling has been prohibited and (f) an area heavily trawled by pair-trawlers (catch rate of sponges was about 500 kg/hour in the mid-1970s but declined to a few kilograms/hour a decade later). Photos by Les Watling (a and b), Peter Auster (c and d), and Keith Sainsbury (e and f).