APPENDIX 1 TERMINOLOGY

Contaminants

Sewage

The largest point source of sewage is the discharge of municipal wastewater from wastewater treatment plants, stormwater sewers or combined sewers. In some areas of Canada, industrial wastewater is co-discharged with municipal wastewater. Effluents from municipal areas can be complex mixtures, their composition depending upon inputs. Inputs can include metals, oil and grease, persistent organic pollutants (POPs), nutrients, viral and bacterial pathogens, plastics, floatables, solids, and suspended and dissolved substances that exert a biological oxygen demand. Non-point sources of sewage include animal wastes (manure) from agricultural lands and leakage from septic systems along the coast or entering freshwater systems discharging to marine waters. Non-point sources generally carry nutrients and viral and bacterial pathogens.

Pathogens from either point or non-point sources result in human health problems through exposure via bathing waters or through ingestion of contaminated shellfish. The closure or restricted use of shellfish growing areas has likewise cost millions of dollars in lost fisheries and has contributed to unemployment, declines in tourism, restriction of aquaculture activity, lost amenities and higher prices to consumers (Environment Canada, 1996).

Possible disruption of the reproductive characteristics of fish and shellfish through endocrine disruption is also a recent concern around sewage outfalls. These impacts are generally local in nature with some transboundary implications.

Persistent Organic Pollutants

Persistent organic pollutants are characterized as toxic, and persistent in the environment (slow to be metabolized by organisms into inert or innocuous substances). They also bioaccumulate. They are generally synthetic organochlorine compounds and other organic compounds that are manufactured for use as pesticides or other uses (e.g., HCH, HCB, PCBs, TBT and DDT). They are formed as unintended by-products (e.g., dioxins and furans), or derived from incomplete combustion either naturally or by human activities (e.g., PAHs). Other POPs are toxic metabolites of a parent compound (e.g., DDE and DDD from DDT).

POPs are characterized by low water solubility, high fat solubility and frequently by high volatility. They are generally transported in water by being attached to organic particles (sediments) or in the fat of organisms. In the atmosphere, they can be transported long distances as volatile gases or bound to dust particles. Anthropogenic emissions, both point and diffuse, are associated with industrial processes, pesticide or product use and applications, waste disposal, leaks and spills, and combustion of fuels and waste materials. The primary transport routes into the marine and coastal environment include long-range transportation via the atmosphere or oceans, surface runoff, and point source discharges.

Radionuclides

This category refers to radioactive substances (i.e., materials containing radionuclides) that enter the marine or coastal environment directly or indirectly, as a result of human activities. These activities include production of energy, reprocessing of spent fuel, military operations, nuclear testing, medical applications and other

operations associated with the management and disposal of radioactive wastes and the industrial processing of natural materials. Other activities, such as the transport of radioactive material, pose risks of such releases.

Heavy Metals

Many metals are essential to life (e.g., copper, zinc, iron, chromium) but are toxic in excess amounts. Other metals, such as cadmium or mercury, are biologically non-essential and are toxic at relatively low concentrations. Organic metals such as organotin also are toxic in small amounts. Metals and their compounds, both inorganic and organic, are released to the environment as a result of a variety of human activities. However, metals also enter the environment through the natural weathering of rock. The main anthropogenic sources of metals are various industrial point sources, including present and former mining activities, foundries, smelters and incinerators; and diffuse sources such as eroded piping, product constituents and combustion by-products. Relatively volatile metals and those that become attached to airborne particles can be widely dispersed. Metals conveyed in aqueous and sedimentary transport (e.g., river runoff) enter the normal coastal biogeochemical cycle and are largely retained in the sediments of nearshore and shelf regions.

Oils/Hydrocarbons

Most oils from land-based sources are refined petroleum products or their derivatives. They enter the environment through operational and accidental discharges and emissions from oil exploration, exploitation, refining and storage facilities; urban and industrial runoff; vehicular use; and the inappropriate disposal of used lubricating oils. The main pathways to the marine environment include atmospheric dispersion of volatile fractions; storm sewers and sewage treatment works; and rivers. Some oils are volatile or easily degraded and disappear rapidly from aquatic systems, but others may persist in the water column or in sediments.

Nutrients

Nutrients are chemical elements or simple compounds formed from these elements (e.g., nitrogen or phosphorus compounds, which are needed by plants for growth and reproduction). Nutrients are available to plants from the air, soil and water, and are both naturally present and added by human activity. In general, eutrophication, caused by the presence of excessive nutrients, is usually confined to the vicinity of coastal discharges. Sources of excessive nutrients may be sewage, surface runoff from agricultural lands, and various industrial processes, especially waste products from food manufacturing plants or aquaculture operations.

Contaminated Sediments

Metals and POPs of toxic concern can be found in dissolved form or attached to particulate matter. Chemicals with low water solubility are primarily found adsorbed to particles. Whether chemicals enter the marine environment in dissolved or particulate form, they eventually become part of the bottom sediments or incorporated into biological organisms. Sediments are commonly viewed as sinks for contaminants where they accumulate over time. Once chemicals are in sediments they are generally less available to organisms or for transport to other areas unless disturbed and resuspended. However, benthic organisms can be subject to contamination and can be a major pathway for contaminants in sediments to enter food chains.

Sources for contaminated sediments are those activities outlined for sewage, POPs and heavy metals. Dredging may cause resuspension of contaminated sediments, and improper disposal of contaminated dredge spoils will increase contaminant exposure. Effects are generally

local in nature, but transboundary impacts may occur in some areas where littoral currents carry sediments across international boundaries. The impacts of contaminated sediments are similar to those described for POPs, heavy metals and oil.

Litter

Litter or marine debris is any persistent manufactured or processed solid material that is discarded, disposed of or abandoned in the marine and coastal environment. Sources include poorly managed or illegal waste dumps adjacent to rivers and coastal areas, windblown litter from coastal communities, resin pellets used as industrial feedstocks, and litter that is channelled to the marine and coastal environment through municipal stormwater systems and rivers. Marine litter is also caused by dumping of garbage into the marine and coastal environment by coastal communities, as well as by recreational and commercial vessels.

Litter threatens marine life through entanglement, suffocation and ingestion and degrades the visual amenities of marine and coastal areas with negative effects on tourism and general aesthetics. Litter in the marine environment can also damage coastal habitats, foul fishing and aquaculture gear, and create navigational hazards.

Physical Alteration and Destruction of Habitat

Shoreline Construction/Alteration

This includes urban development, ports, harbour works, erosion control, wharves and breakwaters, etc. In general, this category is meant to capture those alterations that stabilize coastal features largely for the purpose of human development. Protective measures intended to harden shorelines against natural erosive forces are included, since they are often required to protect human amenities that were placed in vulnerable locations.

Loss and/or degradation of shoreline habitat generally results from a widespread and cumulative process involving many small-scale activities that, considered in isolation, do not appear to have a significant impact on the marine environment. The net consequence of these activities taken over many years, however, has been a growing and irreversible loss of fish and wildlife habitat, loss of primary productivity, alteration of sedimentation regimes, and loss of potential economic opportunities. Large-scale alterations of shoreline habitat, while infrequent, have massive impacts when they occur.

Inter-tidal and Sub-tidal Alteration

This includes some aquaculture/fisheries structures and habitat-altering activities such as ice breaking and log holding, etc. Only onshore structures or those attached to the shore and used in fisheries or aquaculture activities are included in this category. Other forms of devices used offshore in fisheries and aquaculture are not included.

Siting of, and physical effects related to, fixed fishing gear and certain types of land-fast aquaculture devices and facilities may cause loss or degradation of critical habitats, including areas required for the migration and spawning of, as well as nurseries for, some native fish and shellfish species. Break-up of land-fast ice to permit marine transportation in the Arctic can have an impact on subsistence hunting, on the safety of human transportation over sea ice and on migratory, particularly breeding, populations of marine mammal species. Harvesting of marine plants from the inter-tidal and sub-tidal zone can be considered a habitat-altering activity if loss of this vegetation constitutes significant alteration of habitat for other species, or threatens biodiversity or the survival of the

marine plants themselves. Log holding and transport on the West coast causes loss of habitat in the holding areas but also results in degradation of benthic habitat due to the accumulation of bark.

Mineral and Sediment Extraction/Alteration

This category includes harbour and channel dredging within nearshore waters, sediment disposal, sand and gravel extraction and coastal mining. It is similar to shoreline construction and alteration in that the activity can be habitat-altering with similar impacts. Sea disposal of dredge spoils taken from shoreline facilities is not considered a land-based activity, though the dredging activity itself is included.

Dredging can affect the stability of the seabed and cause siltation problems, particularly in shallow areas. Once disturbed, bottom sediments may be resuspended into the water column by waves and currents. Short-term effects include a decrease in phytoplankton production, increased egg and larval mortality, impaired feeding and respiration of adult fish, and the smothering of benthic organisms. Dredging and sediment extraction may also result in long-term negative effects including increased erosion and permanent alteration of seabed topography, which may permanently destroy critical habitat areas such as spawning grounds.

Wetland and Saltmarsh Alteration

This includes dyking, drainage, some forms of waterfowl habitat development and vegetation removal/harvesting, etc. Substantial alteration of coastal wetlands and marshes, mainly for agricultural or industrial development purposes, has resulted in significant and irreversible losses of these highly productive marine habitats. Wetlands provide vital habitat and play an essential role in the life cycle of many species because of the water cover and associated vegetation they provide. They serve as spawning grounds and nurseries for fish and as nesting grounds, staging areas and migration stop-overs for birds. Many populations that are normally widely dispersed concentrate in these areas during critical stages of their life cycle. Some forms of habitat alteration are also undertaken for beneficial reasons (e.g., creation of migratory waterfowl habitats); however, these activities may not always result in benefits to all marine habitats and ecosystems.

Marine Waters and Coastal Watershed Alteration

This includes damming, water intakes (marine and freshwater), thermal pollution, diversion and extraction, etc. The category also includes extractive use of water for industrial purposes, which may occasionally harm free-swimming species through entrapment or entrainment. Barriers to migration (physical, thermal, salinity) may also be included in this category.

Damming and alteration of marine waters and coastal watersheds can alter the salinity, temperature and, in some instances, the nutrient and sediment loads of marine waters and coastal watersheds. These changes can directly affect native species and alter habitat conditions.

Natural sedimentation and siltation are important in the development and maintenance of numerous coastal habitats. Habitats requiring sediment input include coastal wetlands, lagoons and estuaries. Reduction in natural rates of sedimentation can compromise the integrity of these habitats, as can excessive sediment loads, which may bury benthic communities and threaten sensitive habitats such as nursery areas, seagrass beds and rocky substrates through either direct impact or reduced light levels.

Biological Alteration

This category includes accidental or deliberate introduction of genetic materials and/or alien species, including pathogens, parasites and toxic algae, etc. (see Sewage, above). A potential source of alteration of both genetic and species diversity in coastal ecosystems and of disease for both marine species and humans who consume them, this category takes a number of forms. There is a close association with the aquaculture industry, though for the purposes of the NPA, one must distinguish between aquaculture facilities that fit the description of a land-based activity (e.g., hatcheries, cages adjacent or fixed to shore) as opposed to those that are really marine facilities (e.g., salmon "ranching" net pens, offshore cages). Another problem relates to transfer of species in ballast water. This is generally excluded here because it does not, for the most part, fall within the definition of land-based activity, the exception being incidents where ballast water exchange occurs in a port or harbour facility.

The introduction of more tolerant and competitive exotic species has directly affected native species, thereby reducing biodiversity and the functioning of marine and coastal ecosystems. Similarly, reductions in genetic diversity, whether through the use of genetic engineering or the introduction of non-native species, has resulted in increased species vulnerability to environmental change, both natural and anthropogenic. These biological changes together have tended to reduce the overall resilience, complexity and diversity of marine ecosystems, placing them at greater risk.

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APPENDIX 2 LIST OF ACRONYMS/ ABBREVIATIONS

ACAP	Atlantic Coastal Action Programme
ACZISC	Atlantic Coastal Zone Information Steering Committee
AEPS	Arctic Environmental Protection Strategy
AMAP	(Arctic Council Working Group on) Arctic Monitoring and Assessment Programme
APEC	Asia-Pacific Economic Cooperation
AREET	Arctic Regional Environmental Emergencies Team
ARET	Accelerated Reduction and Elimination of Toxics
ATV	All-Terrain Vehicle
BOD	Biological Oxygen Demand
CAFF	(Arctic Council Working Group on) Conservation of Arctic Flora and Fauna
CEAA	Canadian Environmental Assessment Agency
CEC	Commission on Environmental Co-operation
CEPA	*Canadian Environmental Protection Act*
CLURE	Commission on Land Use and Rural Environment
CSD	Commission on Sustainable Development
DDE	p,p'- 2, 2-Bis (4-chlorophenyl) - 1, 1-dichloroethylene
DDT	p,p'- 1, 1-Bis (4-chlorophenyl) - 2, 2, 2-trichloroethylene
DEW	Distant Early Warning
DFO	Department of Fisheries and Oceans
DIAND	Department of Indian Affairs and Northern Development
DNA	Deoxyribonucleic Acid
DND	Department of National Defence
EEM	Environmental Effects Monitoring (Programme)
EIA	Environmental Impact Assessment
EMAN	Ecological Monitoring and Assessment Network
EPPR	(Arctic Council Working Group on) Emergency Prevention, Preparedness and Reponse
GBEI	Georgia Basin Ecosystem Initiative
GERLED	(Programme de) gestion et de réhabilitation des lieux d'élimination des déchets dangereux [hazardous waste disposal site management and rehabilitation programme]

GNWT	Government of the Northwest Territories
GPA	Global Programme of Action (for the Protection of the Marine Environment from Land-based Activities)
GPAC	Global Programme of Action Coalition
GY	Government of Yukon
HAB	Harmful Algal Bloom
ICZM	Integrated Coastal Zone Management
IMO	International Maritime Organization
ISO	International Standards Organization
LRTAP	Long-Range Transboundary Air Pollution
MACA	Municipal and Community Affairs
MPA	Marine Protected Area
NAAEC	North American Agreement on Environmental Co-operation
NAFTA	North American Free Trade Agreement
NARAP	North American Regional Action Plan
NCP	Northern Contaminants Program
NEI	Northern Ecosystems Initiative
NGO	Non-Government Organization
NPA	National Programme of Action (for the Protection of the Marine Environment from Land-based Activities)
ODA	Official Development Assistance
PADEM	Programme d'assainissement des eaux municipales [municipal water treatment programme]
PAERLES	Plan d'action pour l'évaluation et la réhabilitation des lieux d'enfouissement sanitaire [sanitary landfill site evaluation and rehabilitation action plan]
PAEQ	Programme d'assainissement des eaux du Québec [Quebec water treatment programme]
PAH	Polycyclic Aromatic Hydrocarbon
PAIA	Programme d'aide à l'investissement en agroenvironnement [agri-environment investment support programme]
PAME	(Arctic Council Working Group on) Protection of the Arctic Marine Environment
PARE	Plans d'action et de réhabilitation écologique [ecological rehabilitation action plans]
PCB	Polychlorinated Biphenyl
POP	Persistent Organic Pollutant
PRRI	Programme de réduction des rejets industriels [industrial discharges reduction program]

RPA	Regional Programme of Action (for the Protection of the Arctic Marine Environment from Land-based Activities)
SDS	Sustainable Development Strategy
SD	(Arctic Council Working Group on) Sustainable Development
SLAP	St. Lawrence Action Plan
SOP	Strategic Options Process
TBT	Tributyltin
UN	United Nations
UN-ECE LRTAP Convention	United Nations Economic Commission for Europe Convention on Long-Range Transboundary Air Pollution
UNEP	United Nations Environment Programme
ZIP	Zone d'intervention prioritaire [Priority Intervention Zone programme]

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These contacts are available to provide additional information or answer questions you may have regarding the NPA.

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