

IAATO Assessment of Potential Impacts & Mitigation Measures

Ship and Voyage Potential Impacts Matrix

Activity		Output	Impacts					
Nature	Duration		Nature	Scope	Persistence	Intensity	Probability	Importance
Burn Fuel	Seasonal/ Constant	Hydrocarbons, Heat, Trace, Chemical	Contamination/ Pollution	L	L	L	H	L
Fuel Spill	Seasonal/ Constant	Fuel	Contamination/ Pollution	L	M-L	H	L	H
Waste Oil	Seasonal/ Constant	Oil	Contamination/ Pollution	L	M-L	L	L	H
Waste Generation	Seasonal/ Constant	Sewage Grey water	Nutrient Enrichment/ Contamination	L	S	L	L	L
	Seasonal/ Constant	Garbage	Pollution	L	S	L	L	M
	Seasonal/ Constant	Batteries	Heavy Metal Pollution	L	S	L	L	H
	Seasonal/ Constant	Poultry	Infect Birds	L	M-L	H	L	H
Incinerate	Seasonal/ Constant	Emission	Contamination/ Pollution	L	S	L	L	H
Discharge Ballast	Seasonal/ Constant	Ballast	Introduced Species	R	L	H	L	H
Litter	Seasonal/ Constant	Waste	Aesthetic	L	M	L	M	M
Use Lights	Seasonal/ Constant	Light	Disturbance	L	S	L	L	L
Transit Ocean			Disturbance/ Aesthetic	R	M	L	H	L
Breaking Ice	Nov, Feb, Mar/Hours	Noise Disruption	Contamination/ Pollution	L	S	L	L	L
Maneuvering	Seasonal 1-3 days	Noise/ Turbulence	Feeding/ Distribution	L	M	L	H	L
Wildlife Watching	Nov-Dec/ Hours	Noise/ Turbulence	Contamination/ Pollution	L	S	L	M	L
Anchoring	Seasonal/ 4-12 hours		Disturbance Benthos/ Turbulence	L	M-L	M-L	H	M-H
Entering Protected Areas	Seasonal/ 4-12 Hours		Disturbance/ Affect Science	L	S-M	S-M	L	H

Scope L=Local, R=Regional

Probability L=Low, M=Medium, H=High

Persistence L=Long, M=Medium, S=Short

Importance L=Low, M=Medium, H=High

Intensity L=Low, M=Medium, H=High

Note: This preliminary presentation of potential impacts of tour ships and voyages was developed at the IAATO Workshop on Environmental Assessment 1997 along with tables for impacts of boat activity and shore activity.

Nesting Penguins and Potential Impacts

The primary method of ensuring that any impacts are no more than minor or transitory is through avoidance and proper management of visits. ATCM Recommendation XVIII-1 will be observed at all times.

Species	Potential Impact	Action Taken
Adélie Penguin	Disturbance of readily accessible colonies at nest site, at landing beaches, and of molting birds.	Remain outside periphery of rookeries during nesting period; give penguins right of way at landing beaches; move slowly around molting birds
Chinstrap Penguin	Disturbance of nests (often in small groups on steep ground up to 100 meters in elevation), at landing beaches, and of molting birds	Remain outside periphery of rookeries during nesting period; give penguins right of way at landing beaches; move slowly around molting birds.
Gentoo Penguin	Disturbance of easily accessible nests, at landing beaches, and of molting birds	Remain outside periphery of rookeries during nesting period; give penguins right of way at landing beaches; move slowly around molting birds.
Macaroni Penguin	Potential disturbance of birds due to its rarity in the region. This species is a rare local breeder, nesting on Elephant Island, and in small numbers at Hannah Point.	Maintain distance from nesting individuals; avoid surrounding birds, post staff at site to supervise. Remain outside periphery of rookeries during nesting period; give penguins right of way at landing beaches; move slowly around molting birds.

Nesting Flying Birds and Potential Impacts

The primary method of ensuring that any impacts are no more than minor or transitory is through avoidance and management of visits. ATCM Recommendation XVIII-1 will be observed at all times.

Species	Potential Impact	Action Taken
Southern Giant Petrel	May be particularly vulnerable to disturbance at nests, which are often exposed.	Identify nesting areas in briefings, post staff on site and maintain distance from nests. Birds will vigorously defend eggs and chicks
Southern Fulmar	Nil, nest on inaccessible ledges	Observe with binoculars at sea
Cape Petrel	Unintentional disturbance of hidden nests	Most colonies inaccessible, view from Zodiac or small boats or approach colonies on inland cliffs in company of staff only
Snow Petrel	Nil, uncommon summer breeder high on cliffs or nunataks	Generally observed with binoculars at sea in areas of pack ice
Antarctic Petrel	Nil, transient in region	Generally observed with binoculars at sea
Wilson's Storm Petrel	Unintentional disturbance of hidden nesting sites	Avoid scree, glacial rubble and other potential nest sites, view from Zodiac
Antarctic Blue-eyed Shag	Unintentional disturbance at colonial nest sites, usually conspicuous and often accessible	Maintain distance and watch for threat displays. Incubating or brooding birds tend to hold fast to nests
Greater Sheathbill	Unintentional disturbance at nests, usually solitary and in crevices or overhangs near penguin rookeries	Locate and maintain distance from nest sites. Disturbed birds will often run from nests and vocalize
South Polar Skua	Unintentional disturbance at difficult-to-see, scattered nests on open ground. Chicks camouflaged.	Avoid wandering, particularly on high, snow-free ground. Pay attention to vocalizing birds and back off. Skuas will dive-bomb intruders
Brown Skua	Unintentional disturbance at nest scrapes, usually near penguin rookeries.	Avoid wandering, particularly on high, snow-free ground. Pay attention to vocalizing birds and back off. Skuas will dive-bomb intruders
Kelp Gull	Unintentional disturbance at nest sites, often colonial in rocky areas near the sea	Avoid nest sites, watch for calling gulls. Birds will easily fly-off nests and not defend from skuas and other predators
Antarctic Tern	Unintentional disturbance of nests, often on pebbly ground above high tide. Typically colonial.	Avoid nesting areas. Birds will loudly advertise and dive-bomb if approached too closely. Suffer predation

Marine Mammals and Potential Impacts

The primary method of ensuring that any impacts are no more than minor or transitory is through avoidance, Zodiac guidelines for operating around wildlife, instructions to captains, and management of visits. ATCM Recommendation XVIII-1 and the Marine Mammal Protection Act will be observed at all times.

Species	Potential Impact	Action Taken
Seals		
Antarctic Fur Seal	Disturbance on non-breeding or post-breeding individuals at landing beaches in February and March	Avoid landing at beaches with numbers of fur seals, view from Zodiac. Maintain distance from individuals encountered ashore, do not block egress to sea
Crabeater Seal	Disturbance on individuals resting on ice floes or rarely ashore	Follow Zodiac guidelines around wildlife, maintain distance ashore, do not block egress to sea
Leopard Seal	Disturbance of individuals resting on ice floes, trailing Zodiac or rarely ashore	Follow Zodiac guidelines around wildlife, maintain course and speed, maintain distance ashore, do not block egress to sea
Weddell Seal	Disturbance on individuals resting on ice floes or ashore	Follow Zodiac guidelines around wildlife, maintain distance ashore, do not block egress to sea
Southern Elephant Seal	Disturbance of pups ashore early in season and of molting groups ashore later in season	Maintain distance ashore, do not block egress to sea, post staff at wallows
Whales		
Orca	Disturbance of groups at bow wake of vessel	Maintain vessel course and speed
Minke Whale	Disturbance of individuals encountered while in Zodiac or small boat or in vicinity of vessel	Follow Zodiac or small boat guidelines and instructions to captain, maintain parallel course and speed
Humpback Whale	Disturbance of individuals in vicinity of vessel or Zodiac or small boat	Follow Zodiac or small boat guidelines and instructions to captain. Depending on activity, humpbacks will approach stopped Zodiac small boat or vessel. Do not surround
Hourglass Dolphin	Disturbance of small groups, associated with Antarctic Convergence, will follow ships	Maintain vessel course and speed
Other Whales	Disturbance of individuals encountered in vicinity of vessel or Zodiac or small boat	Follow Zodiac or small boat guidelines and instructions to captain. Rarely encountered

Terrestrial Flora and Fauna and Potential Impacts

The primary method of ensuring that any impacts are no more than minor or transitory is through avoidance and management of visits. ATCM Recommendation XVIII-1 will be observed at all times. Lakes, meltwater pools, stream banks and extensive areas of moss will not be visited.

Species	Potential Impact	Action Taken
Grass (<i>Deschampsia Antarctica</i>)	Physical disturbance of low mats	Avoid areas of grass, keep to tracks where established
Pink (<i>Colobanthus quitensis</i>)	Physical disturbance of compact cushions	Avoid stepping on cushions, keep to tracks
Crustaceous lichens including species of <i>Verrucaria</i> , <i>Caloplaca</i> , and <i>Xanthoria</i>)	Physical disturbance of low-growing brown, black, yellow or orange colonies, characteristic of coastal cliffs	Avoid stepping on or holding onto lichen-covered rocks, avoid climbing on cliffs
Fruticose and foliose Lichens including <i>Usnea</i> and <i>Umbilicaria</i>	Physical disturbance of delicate hairy or upright lichens, characteristic of dry, exposed, rocky terrain	Avoid stepping on or holding onto lichen-covered rocks, avoid climbing on cliffs
Moss hummocks, including <i>Bryum</i> , <i>Brachythecium</i> and <i>Tortula</i>	Physical disturbance of carpets and tall hummocks associated with meltwater	Avoid stream banks and edges of meltwater pools
Moss cushions and turf, including stands of <i>Chorisodontium</i> and <i>Polytrichum</i>	Physical disturbance of patches, often on sandy or peaty soil	Avoid extensive areas of moss, walk carefully so as not to disturb
Bryophyte carpet and mat, including <i>Brachythecium</i> and <i>Drepanocladus</i>	Physical disturbance of carpets, usually found in wet habitats at visitor sites	Avoid wet ground with extensive moss carpets
Algal mats (<i>Prasiola crista</i>)	Nil, thrives on disturbed ground in areas of mechanical disturbance	None. Widespread, conspicuous species in coastal regions
Terrestrial invertebrates, including springtails, mites, midges and tardigrades	Habitat disruption in areas of soil, rock, gravel and moss	Avoid disturbing habitats

Natural

- Annual variations in climate and marine productivity
- Microclimatic effects
- Predation at the colony and at sea

Human-induced

- Global warming and ozone depletion
- Fisheries
- Tourism
- Scientific studies
- Research stations and permanent bases