

## EXECUTIVE SUMMARY

**T**ourism in Antarctica, particularly ship-based tourism in the Antarctic Peninsula area, has increased steadily in the last decade. Currently available information is insufficient to accurately predict how or to what extent the physical features and biota at particular sites may be affected by repeat visits or to accurately predict the frequency and duration of visits likely to produce particular effects or how those effects might best be avoided.

A number of studies have been and are being done that provide the kinds of data needed. It is not clear, however, whether these studies are providing all of the needed information and, if not, what additional research and monitoring are necessary to resolve the uncertainties.

To help address these issues, a workshop was held in La Jolla, California, June 7–9, 2000, jointly sponsored by the U.S. National Science Foundation (NSF), the U.S. Environmental Protection Agency (EPA), and the International Association of Antarctica Tour Operators (IAATO). The principal objectives of this workshop were to: identify the types of cumulative environmental impacts that possibly could result from commercial, ship-based tourist operations in the Antarctic Peninsula area; review on-going research and monitoring programs in the Peninsula area to determine whether they likely will be able to detect the possible cumulative adverse effects of ship-based tourism before they reach significant levels, and; describe changes in existing research and monitoring programs or additional programs that would be required to detect cumulative adverse effects before they reach significant levels.

Participants included scientists from several countries with many years of research experience in Antarctica, representatives of companies engaged in Antarctic tour operations, and representatives of U.S. government agencies with responsibilities for implementing the provisions of the Environmental Protocol.

The first set of presentations focused on overview of commercial ship-based tour operations in the Peninsula area. Topics included an historical overview of tourism, how expeditions are planned, and how activities ashore are managed. Additional presentations and discussions considered examples of possible cumulative environmental impacts and the site variables and activity variables possibly affecting cumulative impacts. Presentations were also made by researchers involved in long-term research and monitoring programs being conducted in the Peninsula area and near McMurdo Station. Among other things, these study results indicated that long-term studies are likely to be necessary to detect any possible cumulative impacts of ship-based tourism.

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In the discussions, the participants noted that a range of measures could be taken to avoid, minimize, or mitigate the possible cumulative impacts of ship-based tour operations. These measures included limiting the number of visits and visitors to particular sites; maximizing, minimizing, or alternating the number of sites visited; developing site-specific visit guidelines for different types of sites; establishing qualification standards for ship operations and expedition staff; conducting comparative studies and perturbation experiments; instituting site modifications such as marking walking paths; encouraging self-regulation and self-policing; and establishing and periodically reviewing guidelines or codes of conduct for activities not already covered by existing protocols.

The presentations and discussions led the workshop participants to identify specific needs and opportunities for detecting, avoiding, or mitigating cumulative adverse impacts from ship-based tourism in the Antarctic Peninsula area. These needs and opportunities fall into four general categories:

- 1) Site Monitoring
- 2) Coordination with Related Research and Monitoring Programs
- 3) Tour Planning
- 4) Expediting Long-Term Program Planning and Evaluation.

#### **Site Monitoring**

1. For reasons of cost effectiveness and practicality, it would be desirable to identify and focus monitoring efforts on a series of sites believed to be representative of the types of sites of interest to, and being visited by, tourists in the Peninsula area.
2. The Antarctic Site Inventory project is providing the types of information needed to detect possible long-term cumulative impacts at typical sites. At present, however, the project lacks a stable, long-term funding base. It is not clear whether the sampling regime being used is adequate to detect any but major changes in the variables being monitored; whether all potentially relevant variables are being monitored; or whether variables being monitored will yield useful results.
3. Observations at a series of comparable sites along a gradient with different types and levels of tourist activities and/or observations at a series of comparable sites subjected intentionally to different types and levels of tourist activities likely will be necessary to distinguish any cumulative environmental impacts resulting from tourist activities from those caused by other factors.
4. Reliable information on both tourist and non-tourist activities at particular sites will be needed to do the kinds of analyses required

to determine the likely cause or causes of any observed changes in the variables being monitored. Procedures should be established to periodically review the data currently being collected to assure that it will enable meaningful retrospective analyses.

### **Coordination with Related Research and Monitoring Programs**

5. Long-term observation will be necessary to detect possible cumulative environmental impacts of ship-based tourism in the Peninsula area.
6. If continued for the foreseeable future, the AMLR, LTER, and other research programs being carried out in the Peninsula area should detect region-wide changes in potentially affected penguin, sea bird, and seal populations and provide the kinds of information needed to determine whether any changes detected at tourist visitor sites are due to natural processes, fisheries, scientific research, or tourist activities.
7. Mechanisms should be established by the various organizations conducting or supporting related research in the Peninsula area to coordinate research planning, share data and logistic support, and cooperatively analyze and report data of mutual interest. Standard methods for collecting and formats for recording data of common interest should be established. Consideration should be given to establishing common base maps and geographic information systems for archiving and analyzing data with geographic attributes.
8. Efforts should be made to promote development of innovative research proposals and to seek funding from both government and private sources for short-term studies to document how disturbance affects the behavior and reproductive success of various species and for long-term monitoring to detect population level effects. Procedures should be developed to take advantage of the research opportunities afforded by accidents or by natural catastrophes.
9. Consideration should be given to long-term international programs to monitor the presence, level and effects of biological and chemical contaminants and disease organisms in indicator areas and species and to encouraging research coupling marine and terrestrial systems.

### **Tour Planning**

10. It would be desirable to develop site-specific visit guidelines to manage tourist activities at sites which are visited frequently and which contain flora, fauna, geological features, or historic artifacts that may be particularly vulnerable to damage or destruction.
11. Codes of conduct or guidelines should be established for tourist-related activities for which appropriate guidelines do not currently exist (e.g., whale watching, scuba diving, camping).

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12. Basic qualification standards should be established for deck officers, expedition leaders, naturalists, zodiac drivers, and observers responsible for safe and environmentally benign tour operations in the Peninsula area.

#### **Expediting Long-Term Program Planning and Evaluation**

13. Recognizing the broad scope and complexity of these tasks, the most effective way to proceed might be to establish an independent steering group, made up of appropriate experts, to assist in scoping, implementing, and overviewing needed actions. Among other things, such a group might:
  - Develop or oversee development of a handbook of standard methods for characterizing tourist visitor sites and detecting the possible cumulative impacts of ship-based tourism;
  - Assist in the identification of representative “type” areas in which monitoring efforts should be focused;
  - Help identify and determine how best to access historic data and data from ongoing research and monitoring programs that could contribute to detecting and determining how best to avoid, minimize, or mitigate the possible adverse cumulative effects of ship-based tourist activities in the Peninsula area; and
  - Assist in the development of site-specific codes of conduct, visit guidelines, and monitoring plans for the most frequently visited areas.