



VOLUNTARY STANDARDS FOR MARINE RECREATION IN THE MESOAMERICAN REEF SYSTEM

SCUBA DIVING
SERVICES

SNORKELING
SERVICES

RECREATIONAL
BOAT OPERATIONS



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CONTENTS

ICRAN MAR 1

Standard Requirements for Recreational Scuba Diving Services in the Mesoamerican Reef System

Foreward	iii
1. Scope	1
2. Referenced documents	1
3. Definitions	1
4. Requirements	2
Annex A	8
Annex B	10
Annex C	12

ICRAN MAR 2

Standard Requirements for Recreational Snorkeling Services in the Mesoamerican Reef System

Foreward	iii
1. Scope	1
2. Referenced documents	1
3. Definitions	1
4. Requirements	2
Annex A	8
Annex B	10

ICRAN MAR 3

Standard Requirements for Recreational Boat Operations in the Mesoamerican Reef System

Foreward	iii
1. Scope	1
2. Referenced documents	1
3. Definitions	1
4. Requirements	2
Annex A	10




PREFACE

The standards described in this publication represent the culmination of a grassroots conservation process within the marine tourism sector in Mesoamerica. This three-year process—The ICRAN Mesoamerican Reef Alliance (ICRAN MAR)—is an ambitious initiative to improve environmental business practices that minimize impacts to the Mesoamerican Barrier Reef (MAR). Together with tourism, fisheries and watershed components, ICRAN MAR utilizes a holistic approach that will maximize private sector commitment to sustainable business practices, develop local and regional conservation alliances, and support effective marine protected area management. In this way, the project serves to address the most significant threats to the Mesoamerican Barrier Reef, while supporting the region's economic future.

With the support of project partners, CORAL has provided trainings in *Sustainable Marine Recreation* and financial support for *Conservation in Action* at multiple destinations along the MAR. These trainings have helped coral reef communities and materially invested stakeholders in marine tourism to better understand local coral reef threats and begin taking steps to mitigate damage that has been caused by uninformed or irresponsibly conducted tourism. Working together, CORAL is helping to forge pioneering conservation alliances, ensuring standards implementation, building greater understanding and support for marine protected areas, and providing opportunities for meaningful community involvement in coral reef conservation.

Standards have a long history of improving service quality and safety in a wide range of industries. Successful businesses benefit from standards both by actively participating in the standardization process and by using standards as strategic market instruments. As a result of the Mesoamerican Reef Alliance project, marine recreation providers in multiple destinations along the MAR are collaborating with CORAL to test and measure the effectiveness, attainability, and affordability of the marine recreation standards for scuba diving, snorkeling, and boat operations. This process will validate the requirements of these standards and strengthen acceptance of best environmental practices in the marine tourism sector along Mesoamerica's precious coral reefs.



Keywords: conservation; coral reefs; environment;
marine recreation; preferred practices for good
environmental behavior; safety; scuba diving

ICRAN MAR 1: 2007

Prepared by:

ICRAN Mesoamerican Reef Alliance
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Standard Requirements for Recreational Scuba Diving Services in the Mesoamerican Reef System

ABSTRACT

This voluntary standard specifies requirements for environmental performance and conservation practices, and operational safety that enhance the diving experience and minimize environmental impact of recreational scuba diving operations on fragile marine ecosystems in the Mesoamerican Reef system, particularly coral reefs, sea grass beds, mangrove forests, and related coastal environments.

This standard was developed by representative members of the ICRAN Mesoamerican Reef Alliance Standards and Code Taskforce (SCT) and the Coral Reef Alliance (CORAL). SCT and CORAL disclaim all liability for its use, application, or adaptation. This standard is subject to revision at any time and must be reviewed every five years and if not revised either reaffirmed or withdrawn.

CONTENTS

Foreward	iii
1. Scope	1
2. Referenced documents	1
3. Definitions	1
4. Requirements	2
Annex A	8
Annex B	10
Annex C	12

FOREWORD

(This Foreword is not an official part of this standard, and is included for information purposes only.)

This standard is being released in both Spanish and English to support ongoing sustainable coastal initiatives along the Mesoamerican Reef not only to conserve and protect the reef, but also to improve economic sustainability of marine recreation in the region. This voluntary consensus standard is the product of a taskforce representing four interest groups:

Suppliers – dive operators and managers of marine protected areas;

Purchasers – individual divers and bulk purchasers represented by associations of tour operators, hotels and cruise ships;

Local Communities; and

General Interests – government agencies, non-government organizations, certifiers, academics and others.

All members of the taskforce are from the four nations bordering the Mesoamerican Reef—Mexico, Belize, Guatemala and Honduras—except for the bulk purchasers, a few individual divers, and the managers of some long-established marine protected areas in other parts of the world.

The widely recognized due process practices defined in the Standards Engineering Society's standard SES-2, Model Standards Development Procedure, were followed in developing this standard. All drafts, comments, discussions and balloting were accomplished online simultaneously in Spanish and English.

Initially the taskforce considered adopting the European Committee for Standardization's EN 14467:2004, Requirements for Recreational Diving Service Providers, which has been submitted to ISO for adoption as an international standard. After thorough review it was determined that too many additions and exceptions would have to be incorporated to address sustainable tourism issues, particularly regarding the environment, that are critical to application on the Mesoamerican Reef.

An annex of this standard is a succinct list of preferred practices for scuba divers and dive operators. A number of organizations have prepared guidelines and codes of conduct for diving and these too were considered for adoption, but were found to be insufficiently prescriptive and specific. Those guidelines focus primarily on the conduct of divers and overlook the conduct and responsibilities of dive operators and their staff.

This standard, together with related standards on snorkeling and boat operations, will be pilot tested at representative sites in Mesoamerica during 2007. These tests will validate requirements in the standards, improve their quality and facilitate their implementation. In the meantime, any other country or region developing a standard for scuba diving should consider this regional standard for adoption or adaptation.

Suggestions for improvements to this standard are welcome. They should be sent to the Chairman of the ICRAN MAR Standards and Code Taskforce, c/o CORAL, 417 Montgomery St., Suite 205, San Francisco, CA, 94104, USA, or standards@coral.org.

STANDARD REQUIREMENTS FOR RECREATIONAL SCUBA DIVING SERVICES IN THE MESOAMERICAN REEF SYSTEM

1. Scope

This voluntary ICRAN MAR standard specifies requirements for marine recreation providers in the field of guided recreational scuba diving operations in vulnerable ecosystems such as coral reefs, sea grass beds and related coastal environments. The standard addresses four critical areas:

- » Minimizing impact to the marine environment, particularly coral reefs, sea grass beds and related coastal environments;
- » Competence of staff and clients;
- » Minimum requirements for conducting guided dives for certified divers; and
- » Operational safety and emergency equipment.

The standard does not specify curricula or practices for initial or advanced diver training, the qualifications of instructors, or related subjects, nor does it address business relationships with clients or the rental of equipment.

2. Referenced documents

ICRAN MAR 3 – *Standard Requirements for Recreational Boat Operations in the Mesoamerican Reef System*.

3. Definitions

For the purposes of this standard, the following definitions apply:

3.1. Coral reef conservation

The act of conserving coral reefs and related near-shore ecosystems such as sea grass beds, mangroves and related coastal environments.

3.2. Coral reef ecology

The study of organisms in coral reefs and related environments, and the physical and biological interactions with their environment.

3.3. Dive leader

A person who has sufficient knowledge, skill and experience to plan, organize, supervise and lead dives to known sites within the region; possesses personal rescue and rescue management skills; and holds proper credentials to engage in such activity.

3.4. Environmental briefing

Oral information sharing by dive leaders that instructs and guides divers on ways and reasons to minimize impact on coral reefs, sea grass beds and related coastal environments while scuba diving.

3.5. Guided scuba diving

Organized scuba diving where clients are accompanied by a dive leader appointed by the marine recreation provider.

3.6. Marine Protected Area (MPA)

An area of the marine environment that has been reserved by a federal, state, territorial, or tribal entity, or by local laws or regulations to provide protection and conservation to part or all of the marine, terrestrial and cultural resources within its boundaries.

3.7. Marine recreation provider

Entity (business, individual or organization), including any individual acting on behalf of such entity, which offers one or more of the following services:

- a) Training, education or information sharing on scuba diving services;
- b) Guided diving excursions;
- c) Environmental education prior to or during guided dive excursions.

3.8. Recreational scuba diving

Underwater recreational activity which utilizes a self-contained underwater breathing apparatus (SCUBA). Recreational scuba diving is limited to diving no deeper than 40 meters (130 feet) within the no stop limits of recognized dive tables or dive computers.

3.9 Technical diving

Any activity that is considered to be beyond the scope of “recreational scuba diving.” These include such activities as diving beyond 40 meters (130 feet); diving where there is an overhead environment blocking direct and immediate access to the surface, and staged decompression diving. It also includes modes of diving considered unusual, such as the use of any gas that is not compressed air, including nitrox, multiple cylinders on a single dive, and semi-closed or fully closed circuit rebreathers.

4. Requirements

4.1. General requirements

The following requirements apply to all marine recreation scuba diving providers and their staff.

4.1.1. Marine recreation providers shall demonstrate leadership and role modeling both above and underwater by enforcing all provisions of the preferred practices for environmental behavior specified in Annex A. Oral pre-dive briefings shall review these preferred practices and alert divers to the impact of poor diving practices on coral reefs, sea grass beds, related coastal ecosystems and wildlife. Briefings may be facilitated by use of a whiteboard, video, handouts, or other educational materials, but these aids are not substitutes for oral briefings.

4.1.2. During guided scuba diving trips marine recreation providers and their staff are responsible for pointing out poor behavior, in a positive and supportive manner, to divers while underwater and after a dive, and providing information on why and how to adjust this behavior.

4.1.3. Staff shall be trained in management of clients who disregard rules or are ignorant of environmental impacts associated with inappropriate diver behavior. After training, dive leaders shall be able to identify potential environmental impact caused by client's inappropriate diving behavior, and have practical tools and methods at their disposal for taking corrective action, including the following: verbally communicating with the client in a positive, reassuring manner, carried out in a private place; warning second time offenders they may be banned from diving activities; banning third time offenders from diving activities.

4.1.4. Marine recreation providers shall verify that dive leaders and other staff have received appropriate training in coral reef ecology and conservation, as well as training in how to properly instruct divers in safe and environmentally sensitive diving techniques. Where available, the training shall be provided by local or national tour guide certifying agencies or local marine protected area staff, and provide dive leaders and staff with tools and practical methods for ensuring good environmental practices. Where such training is unavailable, marine recreation providers shall accomplish the training with particular focus on threatened, endangered and rare species that are unique to the local environment. The marine recreation provider shall review coral reef ecology and conservation practices with staff at six-month intervals maximum. A checklist of topics to be covered during these periodic reviews shall be used to assure that critical issues are not overlooked.

4.1.5. All staff with responsibilities on board boats or in the water shall be trained in the marine recreation provider's procedures for diving, and safety practices including diving procedures, boat handling and navigation, communications, first aid, and cardiopulmonary resuscitation (CPR).

4.1.6. The marine recreation provider shall maintain the following documentation on all individuals delivering services:

- a) name, address and date of birth;
- b) marine related training and certifications;
- c) experience;
- d) medical and environmental training and certifications; and
- e) duties assigned to the individual staff member.

The marine recreation provider shall have documentary evidence that all staff members hold relevant and current qualifications for their duties. Proof of qualifications shall be made available to the clients upon request.

4.1.7. Marine recreation providers shall employ dive leaders who can communicate with at least 80 percent of the clients in their language and have facility in the local language. All staff training and education shall be in the local language used by dive leaders.

4.1.8. Clients shall be provided the opportunity to submit confidential evaluations of staff performance and satisfaction with the overall dive experience through an exit survey. An example of an exit survey is provided in Annex B. A record shall be maintained of client feedback and any corrective action that resulted.

4.1.9. Recreational scuba diving trips shall not be made to sites prohibited by national or local authorities, or designated off limits by the community or the local association of marine recreation providers. Marine recreation providers shall voluntarily rotate dive sites to avoid their degradation and allow their recovery, and cooperate with other suppliers; managers of marine protected areas and other responsible agencies to

- a) foster sustainability by collaborating with researchers and managers of marine protected areas to establish limitations on the number of boats and divers that visit popular sites at a given time and in monitoring reefs to evaluate their condition;
- b) promote installation of permanent buoyed moorings at dive sites;
- c) establish a regular schedule for maintaining mooring buoys; and
- d) communicate with other vessel operators to locate and share moorings.

4.1.10. Water entry points from boats in waters less than 3 meters (9 feet) deep shall be over sand or rubble, not coral.

4.1.11. When scuba diving from shore, entry and exit routes shall be used that avoid walking on corals or sea grass beds.

4.1.12. Bad practices and violations by marine recreation providers or divers shall be reported to local authorities and managers of marine protected areas.

4.2. Diving activities

4.2.1. A dive leader shall oversee all guided scuba diving activities. The dive leader shall utilize additional diving leader assistants with large groups (see 4.2.4). Dive leaders and assistants shall serve as role models, share information and provide leadership to clients both above and underwater by enforcing all provisions of the preferred practices for environmental behavior specified in Annex A.

4.2.2. As a minimum, dive leaders and dive leader assistants shall be certified to the requisite level of competence by a recognized dive certification agency. Technical dives shall be led by dive leaders with appropriate qualifications (specialty certification) or equivalent logged experience.

4.2.3. Dive leaders shall verify that each diver is certified. Technical dives may only be carried out if each diver has appropriate qualifications (specialty certification) or equivalent logged experience. Divers that have not dived within the past two years shall demonstrate to the dive leader that they possess the requisite skills and proficiency for the planned activity.

4.2.4. A guided scuba diving group shall not exceed 8 divers. When there are more than 8 divers additional groups of no more than 8 divers shall be organized. All groups shall be under the overall control of the dive leader who will assign a dive leader assistant to each group. The dive leader shall accompany one of the groups. Dive leader assistants shall be responsible to the dive leader for direction and enforcement of safety and environmental practices. It is desirable, but not mandatory, that experienced and inexperienced clients be separated into different groups.

4.2.5. Water entry points from boats shall lie over sand or rubble, not coral, or in water of sufficient depth that divers can make adjustments and become acclimated with minimal impact on corals or sea grass beds.

4.2.6. When diving from shore, entry and exit routes shall be used that avoid walking on corals or sea grass beds.

4.2.7. Operation of dive boats shall be in accordance with ICRAN MAR 3 – *Standard Requirements for Recreational Boat Operations in the Mesoamerican Reef System*.

4.3. Operational safety and emergency equipment

4.3.1. The marine recreation provider shall develop a written emergency management procedure for each distinctively different type of dive site and for each type of service offered at those sites. The procedures shall identify and define actions to mitigate existing and potential hazards and risks to clients and staff, and how to respond to emergencies including:

- a) Rescue procedures for underwater, in-water, and surface emergencies;
- b) Diver recall procedures; and
- c) Evacuation procedures.

The procedures shall take into account any unique local hazards, the capabilities of local emergency services and training required by the provider's staff.

4.3.2. All staff shall be trained in all aspects of these emergency management procedures including first aid, cardiopulmonary resuscitation (CPR), and administration of oxygen. The marine recreation provider shall review the procedures with staff at six-month intervals maximum. A checklist of topics to be covered during these periodic reviews shall be used to assure that critical issues are not overlooked.

4.3.3. The marine recreation provider shall ensure that dive leaders have knowledge and understanding of the features and hazards of the intended diving locality. Dive leaders shall make every reasonable effort to ensure that the dive site is suitable for the abilities and skills of the divers and the planned activity.

4.3.4. In addition to environmental behavior, the pre-dive briefing shall review safety and emergency procedures, buddy or group assignments, the identity and role of staff, and conduct required of the divers.

4.3.5. Prior to each dive, each dive leader and dive leader assistant shall perform a risk assessment that takes into account the abilities and skills of the divers in his/her dive group. As a minimum, the following shall be considered:

- | | | |
|---------------|-------------------------|----------------------|
| » weather | » underwater visibility | » divers' fitness |
| » current | » surface visibility | » planned activities |
| » wave action | » entry and exit | » local restrictions |
| » depth | » boat traffic | » emergency response |

4.3.6. Dive leaders have the responsibility of preventing any diver from participating in the dive if, following a risk assessment, this is determined to be in the best interest of the diver, other divers, or both. A risk assessment can indicate the need to reduce the planned number of divers in each group (see 4.2.4) due to sea conditions or other factors.

4.3.7. Marine recreation providers shall ensure that, in addition to meeting all specified requirements of ICRAN MAR 3 – *Standard Requirements for Recreational Boat Operations in the Mesoamerican Reef System*, dive boats are equipped with the following:

- a) communications equipment, including contact numbers to directly reach evacuation services, medical services and the nearest hyperbaric chamber;
- b) navigation equipment appropriate for the locality;
- c) an oxygen first aid unit including sufficient medical-grade oxygen to deliver a
- d) minimum of 15 liters per minute for the time required to reach a professional medical facility or properly equipped rescue/evacuation personnel

4.3.8. The dive leader and captain of each dive boat shall ensure that no persons are left behind on leaving a dive site. Counts of all persons on board before and after each dive shall be recorded, verified and signed by the dive leader and captain. If the record is made electronically the dive leader and captain shall personally enter their names and unique identifier.

4.3.8.1. An active (hard) count system shall be used to carry out the count. Active count systems require the persons being counted to actively participate in the counting process. Roll calls, tagging or signing systems are examples of such systems. Passive counts by the crew may be used for verification of the active count.

4.3.9. A dive safety log shall be kept for each dive containing the following information:

- a) each diver's name;
- b) the name of any buddy with whom the dive is conducted;
- c) the names of the dive leader and boat captain;
- d) the date and location of the dive;
- e) time in and time out;
- f) maximum depth of the dive;
- g) any incident, problem, discomfort or injury experienced or suffered by the diver;
- h) if the dive was done using a dive computer - the dive time;
- i) if the dive was done using dive tables – the repetitive dive group and either bottom time or dive time;
- j) if the repetitive dive group and surface interval result in a repetitive factor – the surface interval and repetitive factor

After each dive, the dive leader should assist divers in reviewing decompression calculations and computers so that a safe profile can be planned for the next dive. Dive safety logs shall be retained for at least one year. An example of a dive safety log is presented in Annex C.

4.3.10. Whenever divers are in the water a lookout shall be positioned out of the water or in a tender vessel where the lookout can see the whole area where diving is taking place. The lookout shall be able to recognize relevant hazards and divers in difficulty, and be able to either rescue a diver or direct a person who is immediately available and capable of rescuing a diver to do so.

4.3.11. Marine recreation providers shall ensure that the risks of divers being injured or killed by moving vessels is minimized or eliminated. In determining control measures, the following systems should be considered:

- a) ensuring lookouts maintain a watch for approaching vessels and are part of a communications system to allow contact to be made with the approaching vessel in a timely manner.
- b) using unpowered watercraft as tenders;
- c) installing propeller guards on powered tender vessels;
- d) using buoys or markers to separate diving activity from vessel activity;
- e) using appropriately sized and displayed flags to indicate diving activity; (Note: this control measure is only effective when the flag is displayed where diving is taking place, not just in the vicinity);
- f) ensuring that dive staff is familiar with dive sites and able to navigate competently.

The preferred practices for good environmental behavior specified here are mandatory parts of ICRAN MAR 1 – *Standard Requirements for Recreational Scuba Diving Services in the Mesoamerican Reef System*

A1.0 Divers and dive leaders shall:

A1.1 Obey all applicable local and national laws and regulations including interactions with whales, whale sharks and other wildlife;

A1.2 Maintain an awareness of fins, equipment and cameras; adjust buoyancy, and secure equipment to avoid contacting corals or stirring up sediment;

A1.3 Unless otherwise specified, remain at least 10 feet away from whale sharks at all times and 80 feet away from reef fish spawning aggregations, and not block a whale shark's path.

A2.0 Divers and dive leaders shall not:

A2.1 Touch or contact corals or other reef dwelling organisms;

A2.2 Use dive gloves unless required by a medical condition, or when maintaining contact with fixed or permanent ascent lines that have growths of barnacles;

A2.3 Spear, hook or capture any marine life, or chase, harass or try to ride marine life such as turtles, manatees, and whale sharks;

A2.4 Feed fish or any other marine life.

A3.0 Dive leaders shall:

A3.1 Describe the rules, local regulations or laws that apply to the area; provide examples of bad practices and violations; and provide contact information of local authorities;

A3.2 Provide a description of environmental, biological, and physical features of the dive site;

A3.3 Advise on proper navigation and diving techniques specific to the characteristics of the marine environment in which the diving activity is to be carried out, such as sandy bottoms, reef walls, and fragile local wildlife;

A3.4 Review with divers the preferred practices for good environmental behavior specified in this standard and this annex;

A3.5 Encourage divers to provide feedback on compliance with the code of good environmental behavior by the marine recreation provider and its staff through use of an exit survey at the end of the dive excursion;

A3.6 Include fundamentals of buoyancy control in each pre-dive briefing; check if divers are over-weighted; observe divers both above and underwater in order to identify buoyancy control problems, and help adjust their diving weights if necessary;

A3.7 Ensure that photographers understand that the health of coral reefs, sea grass beds, and related coastal environments shall not be compromised by any photography activity, and provide specific advice on proper diving techniques for safe and environmentally sensitive navigation while using photography equipment;

A3.8 Perform a buoyancy check with each photographer prior to diving activities and ensure that photographers and other divers are aware of each others' position at all times;

A3.9 Take appropriate action in the event divers cannot or do not comply with the rules, local regulations or laws that apply in the area and the code of good environmental behavior specified in this standard and this annex.

A4.0 Marine recreation providers shall:

A4.1 Employ only dive leaders who are trained to the requisite level of competence by a recognized dive certification agency;

A4.2 Provide training to dive leaders on rules, local regulations or laws that apply to the area, particularly marine protected areas; provide examples of bad practices and violations; and provide contact information of local authorities;

A4.3 Ensure that their employees and contractors comply with the rules, local regulations or laws that apply in the area and the preferred practices for good environmental behavior specified in this standard and this annex;

A4.4 Take appropriate corrective actions when divers cannot or do not comply with the rules, local regulations or laws that apply in the area and the preferred practices for good environmental behavior specified in this standard and this annex;

A4.5 Support local marine protected areas and non-profit organizations working on coral reef conservation issues and, if at a marine protected area, inform clients of the ecological, economic and cultural value the MPA provides and the importance of monetary support to sustain its mission.

A5.0 This annex shall be made available to clients orally and by posting it on all dive boats and in a prominent position at the provider's place of business.

This model Exit Survey exemplifies the type of information to be collected, but is not a mandatory part of ICRAN MAR 1 – Standard Requirements for Recreational Scuba Diving Services in the Mesoamerican Reef System

CONFIDENTIAL EXIT SURVEY QUESTIONNAIRE

Today’s date: _____

1. What was the primary reason for your visit?

Check one:

- ☐ Scuba diving
- ☐ Snorkeling
- ☐ Beaches and other water recreation
- ☐ Bird watching
- ☐ Hike in the mountains
- ☐ Visit cultural and/or historic sites
- Other: _____

2. How long were you in (country)? __ days

3. What is the name of the scuba diving service provider? _____
Number of dives:_____

4. How was this scuba diving service chosen?
My own research
Part of a tour package

Recommended by: friend, hotel, cruise ship, travel agent, guidebook,
Other:_____

5. How would you rate this dive operator? Circle Best Answer

	Below Expectations			Exceeded Expectations		
The level of service was high	1	2	3	4	5	
The dive boat was very seaworthy	1	2	3	4	5	
The dive boat was well equipped	1	2	3	4	5	
Staff and crew were sensitive to the fragility of coral reefs	1	2	3	4	5	
Good environmental practices were applied and enforced	1	2	3	4	5	
Good safety practices were applied and enforced	1	2	3	4	5	
I had good experiences on this operator’s dive trips	1	2	3	4	5	

Comments: _____

6. Were there any problems that were particularly bothersome? ☐ YES ☐ NO

Please describe _____

7. Were there any aspects that were particularly appreciated? ☐ YES ☐ NO
Please describe _____

8. How likely are you to recommend this operator to other divers?
Circle your rating

NOT LIKELY 1 2 3 4 5 VERY LIKELY

9. Were you aware that this dive operator makes a special effort to protect the environment and the reef? ☐ YES ☐ NO

10. Did the dive operator provide you with

☐ Instructional Materials or ☐ Briefings on:

» Appropriate behavior, safety and conservation practices prior to diving, boating, snorkeling and other excursions? ☐ YES ☐ NO

» How to support area marine parks and local conservation initiatives? ☐ YES ☐ NO

11. How would you rate the leaders of your scuba diving trips?

	Below Expectations		Exceeded Expectations		
The snorkeling leader was very knowledgeable	1	2	3	4	5
Briefings on safety were very good	1	2	3	4	5
Briefings on the ecosystem and how to protect it were very good	1	2	3	4	5
The guide was a role model in applying good practices	1	2	3	4	5
The guide enforced good practices when guidelines were violated	1	2	3	4	5

Comments: _____

12. Did you contribute to a local conservation initiative? ☐ YES ☐ NO
If so, what was the amount or value of your contribution? _____

13. Do you have any comments or recommendations for this dive operator, the community or the local tourism industry? _____

Please provide a few details about yourself.

Nationality _____

Home city or region _____

Age ____ Number in your party _____

Number of snorkeling excursions during the past 12 months _____

THANK YOU FOR YOUR VALUABLE COMMENTS!

This model Dive Safety Log exemplifies the type of information to be collected, but is not a mandatory part of ICRAN MAR 1 – Standard Requirements for Recreational Scuba Diving Services in the Mesoamerican Reef System

Dive 1 Location: Glover's Reef, Southwest Caye						Date: 11/01/2006	
Diver's name	Buddy	Time in	Time out	Max. depth (m)	Bottom time / dive time	Repetitive dive group	Signature
1. R. Wilson	R. Toth	09:00	09:23	18	23	M	<i>R. Wilson</i>
2. R. Toth	R. Wilson	09:04	09:27	18	23	M	<i>R. Toth</i>
3.							
4.							
Log entry completed and signed							
Dive leader M. Castillo				Captain V. Palacio			
Incidents etc	Dive 1: Incidents – None Problems – None Injury – None Discomfort – None Others – None						
Environmental Conditions	Surface conditions – Calm Currents – 0 Visibility – 10m Maximum depth – 20m Other – None						

Dive 2 Location: Glover's Reef, Usher's Caye						Date: 11/01/2006			
Diver's name	Surface interval	Repetitive factor	Buddy	Time in	Time out	Max. depth (m)	Bottom time / dive time	Repetitive dive group	Signature
1. R. Wilson	2:37	B	R. Toth	12:00	12:20	23	20	R	<i>R. Wilson</i>
2. R. Toth	2:35	B	R. Wilson	12:02	12:22	23	20	R	<i>R. Toth</i>
3.									
4.									
Log entry completed and signed									
Dive leader M. Castillo				Captain V. Palacio					
Incidents etc	Dive 1: Incidents – None Problems – None Injury – None Discomfort – None Others – None								
Environmental Conditions	Surface conditions – Calm Currents – 0.5 knot Visibility – 10m Maximum depth – 25m Other – None								

Keywords: conservation; coral reefs; environment;
marine recreation; preferred practices for good
environmental behavior; safety; snorkeling

ICRAN MAR 2: 2007

Prepared by:
ICRAN Mesoamerican Reef Alliance
Standards and Code Taskforce
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Standard Requirements for Recreational Snorkeling Services in the Mesoamerican Reef System

ABSTRACT

This voluntary standard specifies requirements for environmental performance, conservation practices, and operational safety that enhance the snorkeling experience and minimize environmental impact of recreational snorkeling operations on fragile marine ecosystems in the Mesoamerican Reef system, particularly coral reefs, sea grass beds, mangrove forests, and related coastal environments.

This standard was developed by representative members of the ICRAN Mesoamerican Reef Alliance Standards and Code Taskforce (SCT) and the Coral Reef Alliance (CORAL). SCT and CORAL disclaim all liability for its use, application, or adaptation. This standard is subject to revision at any time and must be reviewed every five years and if not revised either reaffirmed or withdrawn.

CONTENTS

Foreward	iii
1. Scope	1
2. Referenced documents	1
3. Definitions	1
4. Requirements	2
Annex A	8
Annex B	10

FOREWORD

(This Foreword is not an official part of this standard, and is included for information purposes only.)

This standard is being released in both Spanish and English to support ongoing sustainable coastal initiatives along the Mesoamerican Reef not only to conserve and protect the reef, but also to improve economic sustainability of marine recreation in the region. This voluntary consensus standard is the product of a taskforce representing four interest groups:

Suppliers – dive and snorkel operators and managers of marine protected areas;

Purchasers – individual snorkelers and bulk purchasers represented by associations of tour operators, hotels and cruise ships;

Local Communities; and

General Interests – government agencies, non-government organizations, certifiers, academics and others.

All members of the taskforce are from the four nations bordering the Mesoamerican Reef—Mexico, Belize, Guatemala and Honduras—except for the bulk purchasers, a few individual snorkelers and the managers of some long-established marine protected areas in other parts of the world.

The widely recognized due process practices defined in the Standards Engineering Society's standard SES-2, Model Standards Development Procedure, were followed in developing this standard. All drafts, comments, discussions and balloting were accomplished online simultaneously in Spanish and English.

An annex of this standard is a succinct list of preferred practices for snorkelers and snorkel operators. A number of organizations have prepared guidelines and codes of conduct for snorkeling. These were considered for adoption, but were found to be insufficiently prescriptive and specific. The guidelines focus primarily on the conduct of snorkelers and overlook the conduct and responsibilities of snorkel operators and their staff.

This standard, together with related standards on scuba diving and boat operations, will be pilot tested at representative sites in Mesoamerica during 2007. These tests will validate requirements in the standards, improve their quality and facilitate their implementation. In the meantime, any other country or region developing a standard for snorkeling should consider this regional standard for adoption or adaptation.

Suggestions for improvements to this standard are welcome. They should be sent to the Chairman of the ICRAN MAR Standards and Code Taskforce, c/o CORAL, 417 Montgomery St., Suite 205, San Francisco, CA, 94104, USA, or standards@coral.org.

STANDARD REQUIREMENTS FOR RECREATIONAL SNORKELING SERVICES IN THE MESOAMERICAN REEF SYSTEM

1. Scope

This voluntary ICRAN MAR standard specifies requirements for marine recreation providers in the field of recreational snorkeling operations in vulnerable ecosystems such as coral reefs, sea grass beds and related coastal environments. The standard addresses four critical areas:

- » Minimizing impact to the marine environment, particularly coral reefs, sea grass beds and related coastal environments;
- » Competence of staff and clients;
- » Minimum requirements for conducting guided snorkeling and providing equipment to independent snorkelers; and
- » Operational safety practices and emergency equipment.

The standard does not address business relationships with clients.

2. Referenced documents

ICRAN MAR 3 – *Standard Requirements for Recreational Boat Operations in the Mesoamerican Reef System*.

3. Definitions

For the purposes of this standard, the following definitions apply:

3.1. Coral reef conservation

The act of conserving coral reefs and related near-shore ecosystems such as sea grass beds, mangrove forests and related coastal environments.

3.2. Coral reef ecology

The study of organisms in coral reefs and related environments, and the physical and biological interactions with their environment.

3.3. Environmental briefing

Oral information sharing by snorkeling leaders that instructs and guides snorkelers on ways and reasons to minimize impact on coral reefs, sea grass beds and related coastal environments while snorkeling.

3.4. Guided snorkeling

Organized snorkeling where clients are accompanied by a snorkeling leader appointed by the marine recreation provider.

3.5. Independent snorkeling

Snorkeling activities not organized by a recreational service provider or led by an employee of the provider.

3.6. Marine Protected Area (MPA)

An area of the marine environment that has been reserved by a federal, state, territorial, or tribal entity, or by local laws or regulations to provide protection and conservation to part or all of the marine, terrestrial and cultural resources within its boundaries.

3.7. Marine recreation provider

Entity (business, individual or organization), including any individual acting on behalf of such entity, which offers one or more of the following services:

- a) Training, education or information sharing on snorkeling activities;
- b) Guided snorkeling excursions;
- c) Rental of snorkeling equipment;
- d) Environmental education prior to or during guided snorkeling excursions, or prior to the rental of equipment to persons participating in independent snorkeling activities.

3.8. Snorkeling leader

A person who has sufficient knowledge, skill and experience to plan, organize, supervise and lead snorkelers to known sites within the region; possesses personal rescue and rescue management skills; and holds requisite credentials to engage in such activity.

4. Requirements

4.1. General requirements

The following requirements apply to all marine recreation snorkeling providers and their staff.

4.1.1. Marine recreation providers shall demonstrate leadership and role modeling both in and out of the water by enforcing all provisions of the preferred practices for environmental behavior specified in Annex A. Oral briefings prior to organized snorkeling or rental of equipment to independent snorkelers shall review these preferred practices and alert snorkelers to the impact of poor snorkeling practices on coral reefs, sea grass beds, related coastal ecosystems and wildlife. If at a marine protected area, inform clients of the ecological, economic and cultural value the MPA provides. Briefings may be facilitated by use of a whiteboard, video, handouts, or other educational materials, but these aids are not substitutes for oral briefings.

4.1.2. During guided snorkeling excursions marine recreation providers and their staff are responsible for pointing out poor behavior, in a positive and supportive manner, to snorkelers while in the water and after snorkeling activities, and providing information on why and how to adjust this behavior.

4.1.3. Staff shall be trained in management of clients who disregard rules or are ignorant of environmental impacts associated with inappropriate snorkeling behavior. After training, snorkeling leaders shall be able to identify potential environmental impact caused by client's inappropriate snorkeling behavior, and have practical tools and methods at their disposal for taking corrective action, including the following: verbally communicating with the client in a positive, reassuring manner, carried out in a private place; warning second time offenders they may be banned from snorkeling activities; banning third time offenders from snorkeling activities.

4.1.4. Marine recreation providers shall verify that snorkeling leaders and other staff have received appropriate training in coral reef ecology and conservation, as well as training in how to properly instruct novice and non-swimmers in safe and environmentally sensitive snorkeling techniques. Where available, the training shall be provided by local or national tour guide certifying agencies or local marine protected area staff, and provide snorkeling leaders and staff with tools and practical methods for ensuring good environmental practices. Where such training is unavailable, marine recreation providers shall accomplish the training with particular focus on threatened, endangered and rare species that are unique to the local environment. The marine recreation provider shall review coral reef ecology and conservation practices with staff at six-month intervals maximum. A checklist of topics to be covered during these periodic reviews shall be used to assure that critical issues are not overlooked.

4.1.5. All staff with responsibilities on board boats or in the water shall be trained in the marine recreation provider's procedures for snorkeling, and safety practices including snorkeling procedures, boat handling and navigation, communications, first aid, cardiopulmonary resuscitation (CPR) and administration of oxygen.

4.1.6. The marine recreation provider shall maintain the following documentation on all individuals delivering services:

- a) name, address and date of birth;
- b) marine related training and certifications;
- c) experience;
- d) medical and environmental training and certifications; and
- e) duties assigned to the individual staff member.

The marine recreation provider shall have documentary evidence that all staff members hold relevant and current qualifications for their duties. Proof of qualifications shall be made available to the clients upon request.

4.1.7. Marine recreation providers shall employ snorkeling leaders who can communicate with at least 80 percent of the clients in their language and have facility in the local language. All staff training and education shall be in the local language used by snorkeling leaders.

4.1.8. Guided snorkeling clients shall be provided the opportunity to submit confidential evaluations of staff performance and satisfaction with the overall snorkeling experience through an exit survey. An example of an exit survey is provided in Annex B. A record shall be maintained of client feedback and any corrective action that resulted.

4.1.9. Snorkeling excursions shall not be made to sites prohibited by national or local authorities, or designated off limits by the community or the local association of marine recreation providers. Marine recreation providers shall voluntarily rotate snorkeling sites to avoid their degradation and allow their recovery, and cooperate with other suppliers, managers of marine protected areas and other responsible agencies to

- a) foster sustainability by collaborating with researchers and managers of marine protected areas to establish limitations on the number of boats and snorkelers that visit popular sites at a given time and in monitoring reefs to evaluate their condition;
- b) promote installation of permanent buoyed moorings at snorkel sites;
- c) establish a regular schedule for maintaining mooring buoys; and
- d) communicate with other vessel operators to locate and share moorings.

4.1.10. Bad practices and violations by marine recreation providers or snorkelers shall be reported to local authorities and managers of marine protected areas.

4.1.11. Persons renting snorkeling equipment, for example masks, fins, snorkels, snorkeling vests, for independent snorkeling activities shall be provided with the following:

- a) A copy of the preferred practices for environmental behavior specified in Annex A;
- b) an oral briefing (see 4.1.1) that reviews these preferred practices and alerts the renters to the impact of poor snorkeling practices on coral reefs, sea grass beds, related coastal ecosystems and wildlife;
- c) an oral briefing on recognized safety practices;
- d) recommended authorized snorkeling sites and how to access them;
- e) a description of the rules, local regulations or laws that apply to snorkeling in the area; and
- f) contact information of local authorities, evacuation services and medical services.

4.2. Snorkeling activities

4.2.1. A snorkeling leader shall oversee all guided snorkeling activities. The snorkeling leader shall utilize additional snorkeling assistants with large groups (see 4.2.2). Snorkeling leaders and assistants shall serve as role models, share information and provide leadership to clients both in and out of the water by enforcing all provisions of the preferred practices for environmental behavior specified in Annex A.

4.2.2. A guided snorkeling group shall not exceed 10 snorkelers, or the ratio specified by local regulations. When the total number of snorkelers exceeds these limits additional groups shall be organized that comply with the ratio of guides to snorkelers specified here or in local regulations. All groups shall be under the overall control of the dive leader who will assign an assistant to each group. The snorkeling leader shall be in charge of one of the groups. Assistants shall be responsible to the snorkeling leader for direction and enforcement of safety and environmental practices. It is desirable, but not mandatory, that experienced and inexperienced clients be separated into different groups.

4.2.3. After the pre-snorkeling briefing specified in 4.1.1 and prior to snorkeling in waters with vulnerable ecosystems, all clients shall participate in an in-water orientation at a benign site such as one with a clear sandy bottom and water that is a minimum of 3 meters (9 feet) deep to acquire at least a basic understanding of snorkeling practices, including buoyancy control and safe use of the snorkeling equipment. In addition to being an opportunity to provide basic instructions, this orientation enables snorkeling leaders to evaluate clients' physical abilities and aquatic skills, and determine activities that are appropriate.

4.2.4. Snorkeler's activities shall be controlled based upon capabilities demonstrated during the in-water orientation detailed in 4.2.3. Novice snorkelers shall not snorkel in coral areas where the distance from the surface to the coral is less than 3 meters (9 feet). Snorkeling leaders and experienced snorkelers shall not snorkel in areas where water depth is less than one meter (3 feet).

4.2.5. When snorkeling from shore, entry and exit routes shall be used that avoid walking on corals or sea grass beds.

4.2.6. Boat operations shall be in accordance with ICRAN MAR 3 – *Standard Requirements for Recreational Boat Operations in the Mesoamerican Reef System*.

4.3. Operational safety practices and emergency equipment

4.3.1. The marine recreation provider shall develop a written emergency management procedure for each service offered. The procedures shall identify and define actions to mitigate existing and potential hazards and risks to clients and staff, and how to respond to emergencies including:

- a) rescue procedures for underwater, in-water, and surface emergencies;
- b) snorkeler recall procedures; and
- c) evacuation procedures;

The procedures shall take into account any unique local hazards, the capabilities of local emergency services and training required by the provider's staff.

4.3.2. All staff shall be trained in all aspects of these emergency management procedures and the marine recreation provider shall review the procedures with staff at six-month intervals maximum. A checklist of topics to be covered during these periodic reviews shall be used to assure that critical issues are not overlooked.

4.3.3. In addition to environmental behavior, the pre-snorkeling briefing shall review safety and emergency procedures, buddy or group assignments, the identity and role of staff, and conduct required of the snorkelers.

4.3.4. The marine recreation provider shall ensure that the snorkeling leader has knowledge and understanding of the features and hazards of the intended snorkeling site or sites. The snorkeling leader shall make every reasonable effort to ensure that selected snorkeling sites are appropriate for the abilities and aquatic skills of the snorkelers and planned activities.

4.3.5. At each site prior to in-water activity, each snorkeling leader shall perform a risk assessment that takes into account the abilities and skills of the snorkelers in his/her group(s). As a minimum, the following shall be considered:

- | | | |
|---------------|-------------------------|----------------------|
| » Weather | » Underwater visibility | » Divers' fitness |
| » Current | » Surface visibility | » Planned activities |
| » Wave action | » Entry and exit | » Local restrictions |
| » Depth | » Boat traffic | » Emergency response |

4.3.6. Snorkel leaders have the responsibility of preventing any snorkeler from participating in the snorkeling activity if, following a risk assessment, this is determined to be in the best interest of the snorkeler, other snorkelers, or both. A risk assessment can indicate the need to reduce the planned number of snorkelers in each group (see 4.2.2) due to sea conditions or other factors. Special attention shall be given to unique risks when children are participating. Their aquatic skills and limitations, and those of accompanying adults need to be considered.

4.3.7. Marine recreation providers shall ensure that, in addition to meeting all specified requirements of ICRAN MAR 3 – *Standard Requirements for Recreational Boat Operations in the Mesoamerican Reef System*, boats engaged in snorkeling operations are equipped with the following:

- a) communications equipment, including contact numbers to directly reach evacuation services and medical services;
- b) navigation equipment appropriate for the locality;
- c) an oxygen first aid unit including sufficient medical-grade oxygen to deliver a minimum of 15 liters per minute for the time required to transport the person to a location where additional oxygen is available.

4.3.8. The snorkeling leader and boat captain of each boat shall ensure that on leaving a snorkeling site no persons are left behind. Counts of all persons on board before and after each in-water activity shall be recorded, verified and signed by the snorkeling leader and captain.

4.3.9. Whenever snorkelers are in the water a lookout shall be positioned out of the water or in a tender vessel accompanying the snorkelers where the lookout can see the whole area where snorkeling is taking place. The lookout shall be able to recognize relevant hazards and snorkelers in difficulty, and be able to either rescue a snorkeler or direct a person who is immediately available and capable of rescuing a snorkeler to do so.

4.3.10. Marine recreation providers shall ensure that the risks of snorkelers being injured or killed by moving vessels are minimized or eliminated. In determining control measures, the following systems should be considered:

- a) ensuring lookouts maintain a watch for approaching vessels and are part of a communications system to allow contact to be made with the approaching vessel in a timely manner;
- b) using unpowered watercraft such as kayaks as tenders;
- c) installing propeller guards on powered tender vessels;
- d) using buoys or markers to separate diving activity from vessel activity;
- e) using appropriately sized and displayed flags to indicate snorkeling activity; (Note: this control measure is only effective when the flag is displayed where snorkeling is taking place, not just in the vicinity);
- f) ensuring that staff is familiar with snorkeling sites and able to navigate competently.

The preferred safety practices for boat operation specified here are a mandatory part of ICRAN MAR 2 – *Standard Requirements for Recreational Snorkeling Services in the Mesoamerican Reef System*

A1.0 Snorkelers and snorkeling leaders shall:

A1.1 Obey all applicable local and national laws and regulations including those affecting interactions with whales, whale sharks and other wildlife;

A1.2 Maintain an awareness of fins and other equipment and adjust buoyancy to avoid contacting corals or stirring up sediment;

A1.3 Unless otherwise specified, remain at least 10 feet away from whale sharks at all times and 80 feet away from reef fish spawning aggregations, and not block a whale shark's path.

A2.0 Snorkelers and snorkeling leaders shall not:

A2.1 Touch, step on or contact corals or other reef-dwelling organisms;

A2.2 Use gloves unless required by a medical condition;

A2.3 Spear, hook or capture any marine life or chase, harass or try to ride marine life such as turtles, manatees, and whale sharks;

A2.4 Feed fish or any other marine life;

A2.5 Take anything living or dead out of the water except recent garbage that does not have living organisms on it.

A3.0 Snorkeling leaders shall:

A3.1 Describe to snorkelers the rules, local regulations or laws that apply to the area; provide examples of bad practices and violations; and provide contact information of local authorities;

A3.2 Provide a description of environmental, biological, and physical features of the snorkeling site;

A3.3 Advise on proper navigation and snorkeling techniques specific to the marine environment in which snorkeling will take place, such as sandy bottoms, reef walls, and fragile local wildlife;

A3.4 Review with snorkelers the preferred practices for good environmental behavior specified in this standard and this annex;

A3.5 Encourage snorkelers to provide feedback on compliance with the preferred environmental and safety practices by the marine recreation provider and its staff through use of an exit survey at the end of the snorkeling excursion;

A3.6 Take appropriate action in the event snorkelers cannot or do not comply with the rules, local regulations or laws that apply in the area and the preferred practices for good environmental behavior specified in this standard and this annex.

A4.0 Marine recreation providers shall:

A4.1 Employ only snorkeling leaders who have appropriate training in snorkeling safety, coral reef ecology and conservation;

A4.2 Provide training to snorkeling leaders on rules, local regulations or laws that apply to the area, particularly marine protected areas; provide examples of bad practices and violations; and provide contact information of local authorities;

A4.3 Ensure that their employees and contractors comply with the rules, local regulations or laws that apply in the area and the preferred practices for good environmental behavior specified in this standard and this annex;

A4.4 Take appropriate corrective actions when snorkelers cannot or do not comply with the rules, local regulations or laws that apply in the area and the preferred practices for good environmental behavior specified in this standard and this annex;

A4.5 Support local marine protected areas and non-profit organizations working on coral reef conservation issues and, if at a marine protected area, inform clients of the ecological, economic and cultural value the MPA provides and the importance of monetary support to sustain its mission.

A5.0 This annex shall be made available to clients orally and by posting it on all snorkel boats and in a prominent position at the provider's place of business.

This model Exit Survey exemplifies the type of information to be collected, but is not a mandatory part of ICRAN MAR 2 – *Standard Requirements for Recreational Snorkeling Services in the Mesoamerican Reef System*.

CONFIDENTIAL EXIT SURVEY QUESTIONNAIRE

Today’s date: _____

1. What is the name of the snorkeling service _____

2. How was this snorkeling service chosen?
☐ My own research ☐ Part of a tour package

Recommended by:
☐ friend,
☐ hotel,
☐ cruise ship,
☐ travel agent,
☐ guidebook,
☐ Other _____

3. How would you rate this snorkeling service? Circle Best Answer

	Below Expectations			Exceeded Expectations	
The level of service was high	1	2	3	4	5
The boat was very seaworthy	1	2	3	4	5
The boat was well equipped	1	2	3	4	5
Staff and crew were sensitive to the fragility of coral reefs	1	2	3	4	5
Good environmental practices were applied and enforced	1	2	3	4	5
Good safety practices were applied and enforced	1	2	3	4	5
I had good experiences on this operator’s dive trips	1	2	3	4	5

Comments: _____

4. Were there any problems that were particularly bothersome? ☐ YES ☐ NO
Please describe _____

5. Were there any aspects that were particularly appreciated? ☐ YES ☐ NO
Please describe _____

6. How likely are you to recommend this operator to others?
Circle your rating

NOT LIKELY 1 2 3 4 5 VERY LIKELY

7. Were you aware that this snorkel service makes a special effort to protect the environment and the reef? ☐YES ☐NO

8. Did the snorkel service provide you with
☐ Instructional materials or ☐ Briefings on

» Appropriate behavior, safety and conservation practices prior to snorkeling? ☐YES ☐NO

» How to support area marine parks and local conservation initiatives? ☐YES ☐NO

9. How would you rate the leaders of your snorkeling activities?

Circle Best Answer

	Below Expectations		Exceeded Expectations		
The snorkeling leader was very knowledgeable	1	2	3	4	5
Briefings on safety were very good	1	2	3	4	5
Briefings on the ecosystem and how to protect it were very good	1	2	3	4	5
The guide was a role model in applying good practices	1	2	3	4	5
The guide enforced good practices when guidelines were violated	1	2	3	4	5

Comments: _____

10. Did you contribute to a local conservation initiative? ☐YES ☐NO

If so, what was the amount or value of your contribution? _____

11. Do you have any comments or recommendations for this snorkel service, the community or the local tourism industry?

Please provide a few details about yourself.

Nationality _____

Home city or region _____

Age ____ Number in your party .

Number of snorkeling excursions during the past 12 months _____

THANK YOU FOR YOUR VALUABLE COMMENTS!

Keywords: conservation; coral reefs;
environment; marine recreation; preferred
practices for good environmental behavior;
recreational boat operations; safety

ICRAN MAR 3: 2007

Prepared by:
ICRAN Mesoamerican Reef Alliance
Standards and Code Taskforce
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Standard Requirements for Recreational Boat Operations in the Mesoamerican Reef System

ABSTRACT

This voluntary standard specifies requirements for environmental performance and conservation practices, and operational safety that enhance marine recreational activities and minimize environmental impact of boating operations on fragile marine ecosystems in the Mesoamerican Reef system, particularly coral reefs, sea grass beds, mangrove forests, and related coastal environments.

This standard was developed by representative members of the ICRAN Mesoamerican Reef Alliance Standards and Code Taskforce (SCT) and the Coral Reef Alliance (CORAL). SCT and CORAL disclaim all liability for its use, application, or adaptation. This standard is subject to revision at any time and must be reviewed every five years and if not revised either reaffirmed or withdrawn.

CONTENTS

Foreward	iii
1. Scope	1
2. Referenced documents	1
3. Definitions	1
4. Requirements	2
Annex A	10

FOREWORD

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This standard is being released in both Spanish and English to support ongoing sustainable coastal initiatives along the Mesoamerican Reef not only to conserve and protect the reef, but also to improve economic sustainability of marine recreation in the region. This voluntary consensus standard is the product of a taskforce representing four interest groups:

Suppliers – dive operators and managers of marine protected areas;

Purchasers – individual divers and bulk purchasers of tourism services represented by associations of tour operators, hotels and cruise ships;

Local Communities; and

General Interests – government agencies, non-government organizations, certifiers, academics and others.

All members of the taskforce are from the four nations bordering the Mesoamerican Reef—Mexico, Belize, Guatemala and Honduras—except for the bulk purchasers, a few individuals, and the managers of some long-established marine protected areas in other parts of the world.

The widely recognized due process practices defined in the Standards Engineering Society's standard SES-2, Model Standards Development Procedure, were followed in developing this standard. All drafts, comments, discussions and balloting were accomplished online simultaneously in Spanish and English.

This standard fills a major void in the documentation of coastal recreation practices. It compiles in one place proven practices that promote conservation and protection of fragile ecosystems, and safety of participants and bystanders for many of the most popular recreation activities involving boats. The standard also takes into consideration that in many parts of the world effective regulations for boating activities do not exist, or when they do, they are not enforced. Safety and environmental performance requirements are specified that are to be applied in these circumstances.

This standard, together with related standards on scuba diving and snorkeling, will be pilot tested at representative sites in Mesoamerica during 2007. These tests will validate requirements in the standards, improve their quality and facilitate their implementation. In the meantime, any other country or region developing a standard for recreational boat operations should consider this regional standard for adoption or adaptation.

Suggestions for improvements to this standard are welcome. They should be sent to the Chairman of the ICRAN MAR Standards and Code Taskforce, c/o CORAL, 417 Montgomery St., Suite 205, San Francisco, CA, 94104, USA, or standards@coral.org.

STANDARD REQUIREMENTS FOR RECREATIONAL BOAT OPERATIONS IN THE MESOAMERICAN REEF SYSTEM

1. Scope

This voluntary ICRAN MAR standard specifies requirements for recreational service providers engaged in boat operations -- including motorized and non-motorized boats, glass-bottom boats, sailing boats, multi-hull boats, submerged and semi-submerged vessels, and boats used in parasailing, water skiing, and wakeboarding -- near fragile ecosystems such as coral reefs, sea grass beds and mangrove forests. It specifies general requirements for operational, safety and environmental responsibilities, and good practices that service providers shall adopt for most types of recreational boating as well as specialized requirements for scuba diving, snorkeling, recreational fishing, bareboat rentals, and water skiing and other towed recreation. This standard does not specify requirements for the operation of small watercraft such as kayaks, sailboards or jet skis. Nor does this standard address business relationships with clients.

2. Referenced documents

The following documents are referenced in this standard:

- » ABYC H-5 – Safe loading and power compliance guide¹
- » ICRAN MAR 1 – *Standard Requirements for Recreational Scuba Diving Operations in the Mesoamerican Reef System*
- » ICRAN MAR 2 – *Standard Requirements for Recreational Snorkeling Operations in the Mesoamerican Reef System*²
- » ISO 12217 – Small craft - Stability and buoyancy assessment: Parts 1, 2 or 3
- » ISO 14946 – Small craft - Maximum load capacity³

3. Terms and Definitions

For the purposes of this ICRAN MAR standard, the following terms and definitions apply:

3.1. Bareboat

A boat either motorized or with sails, that is rented (chartered) without a crew engaged by the marine recreation provider

3.2. Boat

Any vessel which is used or is capable of being used as a means of transportation on water. For purposes of this standard the term “boat” applies to vessels at least 6 meters (18 feet) in overall length.

3.3. Coral reef conservation

The act of conserving coral reefs and related near-shore ecosystems such as sea grass beds, mangroves and related coastal environments.

¹ Available from the American Boat and Yacht Council, 3069 Solomons Island Rd, Edgewater, Maryland, 21037, USA or at <http://store.abycinc.org>

² Available online at www.coral.org, or from CORAL, 417 Montgomery St., Suite 205, San Francisco, CA, 94104, USA.

³ Available through any national member body of the International Organization for Standardization, Geneva, Switzerland or at www.iso.org

3.4. Coral reef ecology

The study of organisms in coral reefs and related environments, and the physical and biological interactions with their environment.

3.5. Environmental briefing

Oral information sharing by marine recreation providers that instructs and guides those participating in boating activities on ways and reasons to minimize impact on coral reefs, sea grass beds and related coastal environments.

3.6. Marine Protected Area (MPA)

An area of the marine environment that has been reserved by a federal, state, territorial, or tribal entity, or by local laws or regulations to provide protection and conservation to part or all of the marine, terrestrial and cultural resources within its boundaries.

3.7. Marine recreation provider

Entity (business, individual or organization), including any individual acting on behalf of such entity, which offers one or more of the following services:

- a) Training, education or information sharing on recreational boating or related services;
- b) Transportation of persons engaged in scuba diving, snorkeling, recreational (sports) fishing, marine wildlife viewing, sightseeing, jungle tours and similar activities; and rental of powered or unpowered boats, with or without crew (bareboat charters), for short or extended periods of time;
- c) Environmental education prior to or during recreational boating activities.

3.8. Maximum capacity

The maximum load that a boat has been designed and tested to carry when underway. This includes persons, engine and equipment.

3.9. No wake speed

“Wake” is the path of disturbed water left behind a moving boat; “no wake speed” means there is no “white” water in the track or path of the boat or created in waves immediate to the boat, and in no case greater than 10 kilometers per hour.

3.10. Operator

The person who has ultimate responsibility for operation of a vessel whether he or she is physically manning the helm.

3.11. Sewage

Human body wastes.

4. General requirements

The following requirements apply to all boats used by marine recreation providers (see 3.7) and their staff.

4.1. Statutory compliance

4.1.1. Marine recreation providers shall

- a) comply with all applicable local, national and international laws, regulations, and possess requisite licenses and permits;
- b) verify that boat operators and crew members comply with these statutes; and
- c) verify that boats meet applicable safety and performance standards through specified periodic inspections.

4.1.2. The operator of a boat is ultimately responsible for his/her own safety and the safety of passengers, the vessel and its crew. Boat operators shall understand and comply with all regulations concerning safety, rules of the road, environmental practices and required equipment. An unsafe condition is grounds to cancel an operation or discontinue an operation in progress.

4.1.3. Where comprehensive statutory requirements for safety and performance do not exist or are not enforced, marine recreation providers shall implement the practices specified in Annex A.

Note: The ICRAN Mesoamerican Reef Alliance project primarily addresses marine ecosystem protection and conservation. Safety is a related, but separate, subject. There are national and international institutions responsible for safety-related issues pertaining to boat operations. The basic set of safety guidelines in Annex A reflects requirements and best practices in these international and national safety standards. In the absence of appropriate domestic safety requirements or their enforcement, boats engaged in the marine recreational activities specified in this standard should at least comply with the minimum safety guidelines of Annex A when they do not conflict with existing recognized statutes.

4.1.4. Marine recreation providers shall demonstrate compliance with statutory and contractual liability insurance requirements for their boating operations. If insurance coverage is not specified in existing laws, regulations or contracts, at a minimum marine recreation providers shall maintain comprehensive public liability insurance protection in U. S. dollar equivalents of

- a) \$50,000/\$100,000 bodily injury/death;
- b) \$25,000 property damage; and
- c) \$100,000 per accident.

4.1.5. It is the boat operator's responsibility to assure as best as possible, that there are no illegal drugs on board and that all passengers and crew are free of the effects of alcohol or any drugs that may cause impairment of judgment critical to the safe operation of the vessel.

4.2. Good seamanship

The following requirements apply to all boat operators, whether employees or contractors of marine recreation providers or the operators of bareboat rentals for short or extended periods of time.

4.2.1. Marine recreation operators shall ensure that boat operators possess the requisite level of knowledge and experience for the service in which they are engaged. The depth and detail of the knowledge and skill required depend on the size and characteristics of the boat, the service the boat performs, the conditions of the waters in which the boat is operated and the weather conditions affecting operations. For example, the required level of boat handling skill is much greater to maneuver a 20-meter (60-foot) deep-draft single screw boat with a high superstructure through a winding and shallow channel with strong winds or currents to a safe landing alongside a dock than it is to maneuver a 6-meter (20-foot) inboard/outboard boat up the same channel. The mass and momentum of the larger boat and the increased effects of wind and current require greater knowledge and skill.

4.2.2. Prior to departure the operator shall

- a) perform a functional inspection of the boat and equipment, including communications, and confirm that they are working properly;
- b) confirm that the passengers and their equipment will not exceed the maximum capacity of the boat;
- c) assess all conditions that could affect planned activities – weather, ocean conditions, etc. – and if necessary reduce the number of passengers; and
- d) orally brief all on board on emergency procedures, location of personal flotation devices, fire extinguishers, man overboard procedures, and methods of seeking assistance.

4.2.3. Operators shall know how to properly use navigational charts and other tools on board such as global positioning system units, VHF radios and depth finders.

4.2.4. Operators shall be capable of “reading” the characteristics of the seabed for important marine ecosystems, such as coral reefs or sea grass beds. Operators shall stay within designated channel markers and outside the furthest visible reef patch in unknown or unmarked reef areas.

4.2.5. Boats shall be operated at a safe speed to avoid collision, property damage and passenger injury. In determining safe speed, these factors should be considered: weather, vessel maneuverability, visibility, traffic, sea state, current, navigation hazards, draft, depth of water, the possibility of divers or snorkelers, marine animals, floating objects and other factors relative to safety.

4.2.6. Boats shall not exceed a no-wake speed within 50 meters of dive, snorkel or swimming zones. In the vicinity of such zones a lookout shall be posted to check for signal flags and buoys, or the bubbles that indicate divers down in the zone. Boats shall approach no closer than 50 meters to a dive or snorkel site that is in use, and stay a minimum of 150 meters from dive and snorkel sites if the vessel is not involved in these operations.

4.3 Proper mooring and anchoring

4.3.1. Marine recreation providers shall cooperate with other suppliers, managers of marine protected areas and other responsible agencies to install mooring systems in heavily visited areas. Moorings may be installed at sites deemed fragile and ecologically important if the number of visitors is limited to a level that will not degrade those sites. The selection of mooring sites and mooring systems should take into account prevailing sea conditions and currents, and studies carried out or provided by marine environment experts or government environmental personnel.

4.3.2. Boat operators shall use mooring systems whenever available. If mooring systems are not installed, anchors shall be placed in sand or rubble channels away from coral reefs and sea grass beds; or shall allow the boat to drift with divers or snorkelers.

4.3.3. In addition to the primary anchor line, boats shall carry a secondary line in case of emergencies.

4.3.4. Boat operators shall be aware of no-anchoring zones and obey markers or signs that designate such zones.

4.3.5. Boats shall not anchor near fragile or sensitive areas including

- a) turtle nesting beaches during the nesting and hatching seasons;
- b) bird nesting areas; and
- c) indigenous heritage sites.

4.4 Minimizing environmental impact

4.4.1. The marine recreation provider shall prevent and mitigate any environmental damage to the reef and coast along the Mesoamerican Reef and adjacent waters. An action plan shall be prepared and maintained for reducing negative impacts caused by boat operations and a contingency plan for acting in case of an environmental emergency. The marine recreation provider shall review these plans with staff at six-month intervals maximum.

4.4.2. Prior to embarking and during the trip clients shall receive oral environmental briefings on

- a) coral reef ecology and conservation including the ecosystems and wildlife that will be encountered and preferred practices to minimize clients' impact;
- b) how to prevent marine pollution, for example, procedures for disposing of waste, proper use of toilets, etc.; and;
- c) if at a marine protected area, information on the ecological, economic and cultural value the MPA provides and the importance of monetary support to sustain its mission.

Briefings may be facilitated by use of a whiteboard, video, handouts, or other educational materials, but these aids are not substitutes for oral briefings. Standards ICRAN MAR 1 and 2 detail the briefing topics to be covered for boats transporting scuba divers and snorkelers.

4.4.3. Boat operators shall

- a) be on the alert for marine animals and travel slowly in areas where they are known to be present;
- b) stay alert for manatees and sea turtles over sea grass beds;
- c) comply with all rules applicable to observing whales, whale sharks and dolphin; and
- d) where required, engage a licensed aquatic guide to brief clients and monitor their behavior.

If regulations do not exist that specify requirements for observation of sea animals, then boats shall

- a) not approach closer than 100 meters;
- b) not cause an animal to change its direction, speed or general behavior;
- c) if moving, operate at a no-wake speed; and
- d) if stopped, keep the engine in operation so the animal is able to determine from its noise the location of the boat.

4.5. Waste management and emission control

4.5.1. Marine recreation providers shall implement an integrated solid and liquid waste management and emissions control plan for boat operations and maintenance that not only complies with minimum requirements specified by laws or regulations, but also addresses issues not covered by statutes. For example, if the local community has not yet established a system for disposing of hazardous waste or setting up pumpout stations for sewage, marine recreation providers can encourage local authorities to do so.

4.5.2. The marine recreation provider and responsible staff shall know the locations of all authorized sewage, garbage, hazardous waste and oil reception facilities in their area. The marine recreation provider shall ensure that staff or contractors use only authorized waste facilities.

4.5.3. All members of boat crews and marine recreation staff shall be vigilant that clients do not throw anything overboard; that all loose items are secured; and that anything that falls overboard accidentally is retrieved. Receptacles shall be provided for the collection and transportation of waste for disposal onshore. If the community has implemented a recycling program, these receptacles shall be properly labeled.

4.5.4. Floating debris at the boat's dock or anchorage and litter accumulated at sites visited by the boat's passengers shall be collected periodically and properly disposed of at onshore facilities.

4.5.6. Sewage holding tanks shall be emptied at sea only when onshore pumpout stations do not exist or are inoperative. The boat operator shall authorize emptying at sea only in compliance with applicable laws and regulations for sewage discharge. If no laws or regulations are in force, untreated sewage shall be by the boat only when all the following requirements are met:

- a) outside of no-discharge zones, boat harbors or marinas, and areas where diving or snorkeling activities are underway;
- b) moving in open water more than 20 meters deep; and

- c) at least 2 kilometers (1 nautical mile) seawards from the edge of the nearest reef, island, mainland or aquaculture facility.

If there are no holding tanks, toilets shall not be flushed except under the conditions specified above. If sewage is macerated and treated with enzymes or biodegradable chemicals, the above conditions apply, but holding tanks may be discharged 1 kilometer seaward of reefs, etc.

4.5.7. Hazardous waste (oil, paint, batteries, cleaning agents, etc.) shall not be released into the water. Oily bilge water shall not be pumped overboard. Petroleum products shall be separated from bilge water with reusable oil-only absorbers. The most environmentally friendly products among paints, anti-fouling bottom coatings, paint remover, detergents, etc., that are available and work efficiently shall be used. Used batteries, old anodes, transmission fluid, and oil-only absorbers shall be treated as hazardous waste. Hazardous waste and all other refuse shall be properly disposed of at an onshore facility.

4.5.8. Marine recreation providers shall establish a schedule for periodic maintenance that includes:

- a) servicing engines to minimize discharge of pollutants into the environment and maximize performance and fuel efficiency;
- b) inspecting engines, fuel tanks, holding tanks and other components susceptible to leaks of toxic substances;
- c) keeping all sanitation devices in good operating condition and regularly inspecting hoses, fittings and mechanisms associated with waste storage, and
- d) assuring that safety equipment is serviceable, first aid kit is fully stocked and oxygen bottles are full.

4.5.9. Marine recreation providers shall not use boats that produce excessive or unusual noise. All engines shall be equipped with efficient mufflers, underwater exhausts or other devices that suppress engine exhaust noise so as not to harm or disturb persons or ecosystems.

4.5.10. Marine recreation providers shall include the following practices in their waste management and emissions control plan (see 4.5.1):

- a) When replacing older two-stroke outboard engines, consider installing less polluting and more fuel-efficient four-stroke engines, or modern direct-fuel-injection two-stroke engines.
- b) Where possible, refuel in port instead of at sea; use proper equipment to minimize the risk of spills and have absorbent sponges available in the event of spills.
- c) Use dipstick probe pumps to change oil and transmission fluids; put a plastic bag over oil filters before removal and transfer used oil and fluids in closed containers. Treat transmission fluid as hazardous waste and dispose of used oil and filters at recycling stations, if available; otherwise use designated receptacles or oil reception facilities.
- d) Use appropriate boatyards or marine railways rather than beaches when boats need to be hauled for major maintenance operations. Capture paint scrapings and residues by the use of vacuum sanders, drop clothes and tarpaulins. Antifouling paints and their residues contain heavy metals that are particularly toxic to

marine ecosystems. Solid residues generated during washing, pressure washing, scraping, and sanding of antifouling paints from boat hulls are hazardous waste. These wastes must be captured and not allowed to enter the water.

5. Specialized requirements

In addition to the general requirements specified in Section 4, the following apply to boats used in specific recreational boating activities.

5.1. Scuba diving and snorkeling boats

All recreational boat operations involving scuba diving or snorkeling shall fully comply with

- a) ICRAN MAR 1 – *Standard Requirements for Recreational Scuba Diving Operations in the Mesoamerican Reef System.*
- b) ICRAN MAR 2 – *Standard Requirements for Recreational Snorkeling Operations in the Mesoamerican Reef System.*

5.2. Bareboat rentals

5.2.1. Inexperienced or poorly informed operators of bareboats can be the cause of significant damage to reefs, and can expose themselves and their guests to dangerous situations. Marine recreation providers shall verify that the responsible person who will be the operator (see 3.10) has, and can demonstrate, requisite skills and proficiency in seamanship, navigation and the handling of emergencies.

5.2.2. Marine recreation providers shall brief the bareboat operator and others in the party on all applicable requirements, practices and topics specified in sections 4.2 through 4.5 above, with special attention to the fragility of coral reefs and associated ecosystems. If the clients intend to scuba dive or snorkel they shall receive the environmental briefings specified in ICRAN MAR 1 and ICRAN MAR 2 as well as a detailed review of the good environmental practices specified in Annex A of each standard.

5.2.3. Oral briefings shall be supplemented with written instructions on proper mooring and anchoring practices;

- a) managing solid waste, sewage and other refuse;
- b) potential carbon monoxide hazards;
- c) proper scuba diving, snorkeling, and marine wildlife viewing practices; and
- d) how to contact the marine recreation provider and emergency services.

5.2.4. In addition to requisite safety equipment (see Annex A), bareboats shall be equipped with

- a) appropriate communications equipment;
- b) navigation charts and appropriate navigation equipment such as global positioning systems and depth finders;
- c) information about the boundaries of marine protected areas and restricted fishing zones; and
- d) information about the location of mooring buoys at popular snorkel and dive sites.

5.3. Water skiing and other towed recreation

Marine recreation providers shall ensure that boat operations involving water skiing and other towed recreation such as wakeboarding and parasailing comply with the following:

- a) These activities are allowed only after sunrise and before sunset.
- b) There shall be at least two people in the towing boat: an operator and a person to observe the person being towed.
- c) Anyone towed by a boat shall wear a personal flotation device.
- d) Anyone being towed shall not approach within 20 meters of swimmers or enter a designated swimming area.

5.4 Recreational fishing

5.4.1. In addition to compliance with applicable boating laws and regulations (see 4.1.1), marine recreation providers engaged in sports and recreational fishing shall have requisite fishing licenses and permits and verify that clients are properly licensed. Marine recreation providers shall recognize the fishing rights of communities and consult with communities to promote conservation of local resources.

5.4.2. Marine recreation providers shall orally brief clients on the following subjects:

- a) coral reef ecology and conservation (see 4.4.2);
- b) local fishing regulations, no-take zones and protected fish species;
- c) species identification, measurement, bag limits and closed seasons; and
- d) sustainable fishing practices.

Marine recreation providers shall advise clients how they can make significant contributions to conservation of fish species with partial or total catch-and-release practices using barbless hooks.

5.4.3. Boat operators shall

- a) see that crew and clients use common sense and restraint by returning endangered or threatened species to the water;
- b) return unused live bait to the waters they were taken from; and
- c) teach crew members correct practices for releasing fish to enhance their chances of survival.

5.4.4. Boat operators shall not fish

- a) directly over reefs or designated recreational dive and snorkel sites;
- b) among spawning aggregations and schools of juveniles; and
- c) close to marine animals (see 4.4.3) and bird roosting areas.

5.4.5. Lines, weights and other fishing gear are especially harmful to marine ecosystems and their inhabitants and shall never be tossed overboard, but shall be properly disposed of onshore.

5.4.6. Marine recreation providers are encouraged to report any illegal fishing activities to the relevant authorities; promote conservation of local marine resources; and cooperate with managers of marine protected areas and fishing associations in tagging and other research programs.

The preferred safety practices for boat operation specified here are a mandatory part of ICRAN MAR 3 - *Standard Requirements for Recreational Boat Operations in the Mesoamerican Reef System* when comprehensive statutes for safety and performance:

- » do not exist, or
- » are not enforced, or
- » do not address any one of the topics included here.

These safety practices apply, regardless of ownership of the boats, to marine recreational activities operating within the scope of this standard (see paragraph 1, Scope) and no farther than 33 kilometers (20 miles) offshore.

A1.0 Marine recreation operator's responsibilities

A1.1 The marine recreation provider shall develop a written emergency management procedure for each type of service offered. The procedures shall identify and define actions to mitigate existing and potential hazards and risks to clients and staff, and how to respond to emergencies, including rescue procedures for underwater, in-water, and surface emergencies, and evacuation procedures. The procedures shall take into account any unique local hazards, the capabilities of local emergency services and training required by the provider's staff or contractors. All staff and contractors shall be trained in all aspects of these emergency management procedures and the marine recreation provider shall review the procedures with staff and contractors at six-month intervals maximum.

A2.0 Boat operator's responsibilities

A2.1 Boat operators shall not engage in careless, reckless, or negligent operations on the water and shall be thoroughly familiar with safe practices, emergency procedures, and conditions that could endanger life or property. Boat operators shall be aware of their boat's capabilities and not exceed those operating limits.

A2.2 It is the boat operator's responsibility to take charge of and to ensure the safety of crew and passengers.

A2.3 Prior to departure boat operators shall orally inform everyone on board on the location of safety equipment, wearing of personal flotation devices, safety concerns while underway, and emergency procedures.

A2.4 The boat operator shall explain that passengers shall:

- a) always have one hand for the boat and the other for themselves;
- b) never walk around without holding on;
- c) sit in the seats provided and not ride or sit on the bow, stern or sides of the boat while underway; and
- d) hand equipment into the boat rather than trying to carry it on board.

A3.0 Seaworthiness and manning

A3.1 Marine recreation providers shall ensure that each of the boats it uses has sufficient maximum capacity -- volume, freeboard and stability -- to safely carry the maximum passengers and load under various weather and water conditions. Many jurisdictions require boat builders to attach a “maximum carrying capacity plate.” If such a plate is not installed, the boat shall be

- a) evaluated by a competent marine architect or surveyor, or
- b) maximum capacity shall be calculated in accordance with procedures specified in one of the following:
 - » ABYC H_5 – Safe loading and power compliance guide
 - » ISO 14946 – Small craft - Maximum load capacity
 - » ISO 12217 – Small craft - Stability and buoyancy assessment and categorisation: Parts 1, 2 or 3

A3.2 The structural strength and watertight integrity of hulls and watertight bulkheads shall be maintained in the condition for which they were originally intended. Any modifications, penetration, or repairs shall preserve the boat’s watertight integrity. After major modifications boats shall be inspected by a competent marine architect or surveyor to verify their seaworthiness.

A3.3 Marine recreation providers shall ensure that, in addition to the boat operator, at least one other person aboard is capable of operating the vessel in the event of an emergency.

A3.4 In determining the minimum number of crew members to assist in safely operating a boat, the following guidelines should be considered:

Sailing Boats under 8 meters length overall	Sailing Boats 8 meters length overall and longer	Power Boats under 8 meters length overall	Power Boats 8 meters length overall and longer
1 Operator	1 Operator	1 Operator	1 Operator
1 Experienced person	1 Experienced person	1 Experienced person	1 Experienced person
1 Other crewmember	1 Other crewmember		1 Other crewmember

A3.5 At a minimum, the boat operator or a crew member shall remain on board at all times, including when anchored or moored for recreational activities except when tied up at dock or immediately offshore from a recreational beach or similar site.

A3.6 The boat operator and at least one other crew member shall be trained in first aid, cardiopulmonary resuscitation (CPR) and administration of oxygen when operations include in-water recreational activities.

A4.0 Safety equipment

A4.1 Unless otherwise specified by applicable laws or regulations, at a minimum the following safety equipment shall be carried on all boats up to 8 meters length overall:

- a) Anchor and anchor line of a size and design appropriate for the boat, the waters, and the service;
- b) Personal Flotation Devices (PFDs) for each person on board and child-size PFDs if children are on board;
- c) A throwable PFD with a minimum of 20 meters of line;
- d) A hand-operated bilge pump;
- e) A powered bilge pump;
- f) Three hand-held orange (day) smoke signals and three red (night) flares;
- g) A whistle or horn audible at 1 kilometer;
- h) A VHF radio;
- i) A cellular phone;
- j) An emergency repairs kit and tools;
- k) A first aid kit with contents suitable for the type of operation, and skills and training of personnel expected to administer aid;
- l) An oxygen first aid unit including sufficient medical-grade oxygen to deliver a minimum of 15 liters per minute for the time required to reach a professional medical facility or properly equipped rescue/evacuation personnel;
- m) A hand-held pressurized fire extinguisher with minimum extinguishing agent weight of at least 1.2 kilograms; and
- n) A fixed fire extinguishing system installed in totally enclosed engine compartments with sufficient quantity to completely blanket the space. The release device shall be outside of the engine compartment. For carbon dioxide (CO₂) fixed fire extinguishing systems, the amount of CO₂ shall be 40% of the gross volume of the engine compartment, but not less than 2.25 kg (5 lbs.). A minimum of 85% of the total volume shall be released in a maximum of two (2) minutes.

A4.2 Boats from 8 meters up to 12 meters (26-40 feet) in length shall carry all of the equipment specified in section 4.1 of this annex and a total of (2) hand-held pressurized fire extinguishers with minimum agent weight of at least 1.2 kilograms, unless a fixed engine compartment extinguishing system is installed, in which case only one (1) hand-held extinguisher is required;

A4.3 Boats 12 meters up to 20 meters in length shall carry all of the equipment specified in A4.1.1 and a total of three hand-held pressurized fire extinguishers with minimum agent weight of at least 1.2 kilograms, unless a fixed engine compartment extinguishing system is installed, in which case only two hand-held extinguishers are required.

A4.4 Boats longer than 20 meters shall be equipped with fire extinguishers and other safety equipment in accordance with provisions specified in recognized codes and standards such as those of Transport Canada, the UK Maritime and Coastguard Agency, US Coast Guard, and the International Organization for Standardization.

A4.5 Safety equipment shall be serviceable and stored so as to allow rapid access in emergencies. Where safety equipment such as smoke signals, flares and fire extinguishers carry a manufacturer's expiration date, the equipment shall not exceed the prescribed date.

