

P1436

LOAN COPY ONLY



# HAZARD MITIGATION



# for RECREATIONAL HARBOR COMMUNITIES



# **Hazard Mitigation for Rhode Island Recreational Harbor Communities**

**Submitted to:**

Joseph Almeida  
Rhode Island Emergency Management Agency  
Room 27  
State House  
Providence, RI 02903- 1197

**Submitted by:**

Virginia Lee  
Mark Amaral  
Coastal Resources Center  
University of Rhode Island  
Graduate School of Oceanography  
Narragansett, RI 02882

June 12, 1996

---

## Table of Contents

---

Project Description Overview.....	1
Product I - Hazard Mitigation Guidance	
Overview.....	6
Guidelines.....	7
Product II - Hazard Mitigation Overlay - Example	
Overview.....	18
Model Hazard Mitigation Plan for Municipal Harbors.....	19
Model Hazard Mitigation Plan for Marinas.....	30
Model Hazard Mitigation Plan for Boaters.....	46
Appendix	
Sample Fact Sheets	

---

# Hazard Mitigation for Rhode Island Recreational Harbor Communities

The Coastal Resources Center in cooperation with the  
Rhode Island Emergency Management Agency

## Project Description Overview

This document addresses the issues of local harbor storm preparedness. It was completed by the Coastal Resources Center at the University of Rhode Island with cooperation from several Rhode Island waterfront municipalities and the state's coastal management agency, Rhode Island Emergency Management Agency. The effort of the organization has produced a mitigation guidance for recreational harbors. This will be adapted into local municipal harbor management plans and into the state of Rhode Island coastal management framework. By creating and adopting local hurricane mitigation plans, waterfront municipalities will have taken a significant step towards protecting public assets and minimizing public hazards and costs.

The projects three main objectives are outlined below.

1. **Document preparation** - Prepare a document that can be provided to the R.I. Coastal Resources Management Council for adoption into regulatory framework and networked into local harbor management plans. This document will reflect the experience gained from the demonstration component of the project and will incorporate information collected from the regional committee.
2. **Demonstration** - Conduct a case study in a recreational harbor that has a diversity of uses and a past storm history and is vulnerable to severe weather. The case study will focus on the development of a draft model plan with the following components: prehurricane season preparation; recommended actions during various warning stages of storm approach; necessary action when a storm is imminent; activities during a storm; steps immediately after the storm; and **long-term** action and evaluation.
3. **Regional Harbor Safety Committee** - Establish a regional network of harbormasters, state and local emergency management agencies, marine trade associations, and other waterfront stakeholders through which project information can be channeled.

The Coastal Resources Center is dedicated to developing strategies for the effective management of the coastal environment and working with agencies such as the Federal Emergency Management Agency and other stakeholders to achieve these goals. This project will help significantly to mitigate the effects of hurricanes on the Rhode Island coastal community and foster cooperation among all the New England states to minimize the impacts of a major storm event on recreational harbors.

Hazard mitigation reduces or eliminates the risk to human life and property from natural hazards by breaking the cycle of repetitive damage by making postdisaster changes that are less vulnerable to natural hazards. Hazard mitigation also uses experience gained to improve preparedness and response planning and execution. By developing a mitigation plan, local communities can integrate preparedness, response and recovery strategies into a comprehensive approach for reducing potential losses from natural disasters.

The impetus for developing a model harbor hazard mitigation guidance came from the interagency hazard mitigation report issued in 1992 by **FEMA**. This report was written by the interagency hazard mitigation team that was activated in response to Hurricane Bob. One of the five functional areas reviewed by the team was reducing damage to boats and harbors. In addressing this issue, the team made several important recommendations. One of those recommendations states that a harbor management plan that includes severe storm planning should be developed as a pilot program for the New England region and the results should be integrated into existing harbor plans as appropriate. This document takes a significant step toward satisfying that recommendation.

Severe coastal storms, especially hurricanes, have significant effects on coastal harbor areas. This was most recently proven in 1991 when Hurricane Bob came ashore in Rhode Island. "*Boat/US*" estimates a boating loss of over \$60 million, which does not include damage to coastal buildings, waterway structures, or the environment. Losses could have easily tripled if Hurricane Bob had been a category four or five storm.

Total damage from coastal storms, such as Hurricane Bob, has increased over time due to increases in the number and density of structures and vessels in the coastal zone. Public and private marinas and mooring fields have swelled to capacity, with even small recreational harbors, like Barrington or East Providence, holding more than 350 boats within their boundaries. During storm activity these areas are extremely susceptible to forces of wind, rain, flooding, surge, and wave action. These powerful forces combine to push boats from their berthing areas onto bridges, roadways, public lands, and environmentally sensitive areas and wetlands. Damage caused by these grounded vessels is sometimes acute: leaking fuel and septic tanks; damage to roadways and bridges; hazardous debris and flotsam from boats littering the waterways, marshes, beaches, and wetlands. The burden of removing these vessels, in terms of cost and nuisance, directly affects the whole community. This very real coastal problem exists not only in terms of boat hazards, but also hazards from docks breaking free, waterfront buildings and storage areas being flooded; and human life at risk.

The threat of storm-created hazards to small harbors can be minimized through proper planning and management. Much of the damage occurs because there is a lack of planning and storm preparedness on the part of the boaters, facility operators, harbor masters, and emergency management personnel. This lack of activity can be attributed to the fact that there exist no structured guidelines or policies to assist in the development of comprehensive hurricane preparation plans for small harbors. Without a coordinated effort, strong public participation, and well designed plans, recreational harbors will continue to suffer unnecessary losses during storms.

By creating and adopting local hurricane preparedness plans, waterfront municipalities will have taken a significant step towards protecting public assets and minimizing public hazards and costs.

incorporate this additional section. Once preparedness plans are implemented in local harbors, the state will see substantially less damage to both private and public property in coastal areas from future storms because:

- damage control activities within the harbor area will be preplanned and coordinated, resulting in less confusion and greater efficiency in protecting that area
- responsibilities of emergency management personnel, harbormasters, and waterfront stakeholders will have been previously established, allowing for a quick recovery process

Municipalities can utilize the existing harbor management planning process for adopting and implementing model hurricane preparedness plans.

# Hazard Mitigation GUIDANCE

**This part contains:**

Guidance for municipalities to develop local harbor **hazard** mitigation plans

---

## **OVERVIEW**

The guidance is written to augment the existing document titled “Guidelines for the Development of Municipal Harbor Management Plans,” produced by the Coastal Resources Management Council (CRMC). **CRMC's** document provides instructions to direct municipalities in completing local harbor management plans. It provides explicit requirements that need to be met before a harbor plan will receive state approval.

Traditionally, harbor management plans have not addressed natural hazards. The current generation of harbor plans focused primarily on mooring-related issues, with some attention paid to concerns such as public access, water quality, and boating safety. Now municipalities are ready to begin to address issues that were not included in the first phase of harbor planning. This can be easily achieved as municipalities begin to update their plans as required by CRMC. Therefore, this guidance has been developed to assist municipalities in developing local storm preparedness plans for their harbor and shoreline areas as part of their harbor plans.

This guidance is divided into three main sections. The first is the policy that the municipality must comply with. The policy specifies four steps the municipality must complete in order to receive CRMC approval. The second section outlines recommended methods for achieving the policy. The final section answers some frequently asked questions pertaining to hazard mitigation. When used together, these three sections should provide the municipality with clear directions for completing a local hazard mitigation plan.



**The State of Rhode Island  
Coastal Resources Management Council**

**Guidelines for the Development of Municipal  
Harbor Management Plans**

**Amendment**

**Natural Hazards Mitigation**

**Policy** (Proposed amendment to Section 120.3.A.a)

Coastal municipalities shall develop harbor management plans that include guidance and strategies for mitigating the impacts from multiple natural hazards. The hazard mitigation element of the harbor plan will complete the following:

1. Assess the type and degree of risk that harbor and shoreline users face from natural hazards
2. Develop strategies that prepare for, respond to, and recover from natural disasters
3. Identify longer-term mitigation projects that will reduce damage from natural disasters
4. **Describe** specific steps for coordinated implementation

**Natural Hazards Mitigation** (Proposed new Section 360.0)

- a. Hazard mitigation is defined by the Federal Emergency Management Agency (FEMA) as any action taken to eliminate or reduce the long-term risk to human life and property from natural hazards. Natural hazards include flood, fire, hurricane, and earthquake. FEMA has identified several ways in which hazard mitigation actions are usually achieved:
  - acting on the hazard (seeding hurricanes)
  - redirecting the hazard (seawalls)
  - interacting with the hazard (building codes)
  - avoiding the hazard (relocating structures)
- b. Increased numbers of shoreline uses and vessels in harbors are putting municipalities at risk. During severe storms, harbors and shoreline uses are extremely susceptible to forces of wind, rain, flooding, surge, and wave action. These powerful forces combine to push boats from their berths onto bridges, roadways, public lands, and environmentally sensitive areas and wetlands. Damage caused by these grounded vessels is sometimes acute: leaking fuel and septic tanks; damage to roadways and bridges; hazardous debris and flotsam from boats littering the waterways, marshes, beaches, and wetlands. The burden of removing these vessels, in terms of cost and nuisance, directly affects the whole community. Other problems include hazards from docks breaking free, waterfront buildings and storage areas being flooded; and loss of power at sewage treatment facilities, causing direct discharge of untreated waste into local waters.

- c. This part of the harbor plan should be written in cooperation with appropriate municipal agencies such as: the harbormaster, police and fire departments, planning and zoning boards, and the planning department. Responsibility for implementation should be clearly stated in the harbor hazard mitigation plan. Many of the implementation activities require that the harbormaster play the lead role.

**Risk Assessment** (Proposed new Section 360.1)

- a. A risk assessment identifies the types and degree of risk posed by natural disasters facing harbor and shoreline users. This identification process will provide insights into the level of vulnerability of local harbor and shoreline users, the best allocation of financial and human resources, and segments of the harbor community needing special attention. For instance, a risk assessment will identify that mooring field A is highly vulnerable because it faces a large fetch and has a sandy bottom, which does not provide adequate holding for moorings.
- b. Risk assessment can be completed by re-evaluating much of the information collected for the resource inventory through the filter of hazard mitigation. Important pieces of information include, but are not limited to: a description of harbor areas that include bottom type, openness (fetch), and number of moored and docked boats; a listing of docking facilities and services provided at each; a description of the surrounding land use activities; mooring and dock standards; man-made or natural characteristics; floodplain information; and historic **vulnerabilities**.
- c. Once the information for **the** risk assessment is collected, it should be evaluated by:
  - 1) identifying a specific threat associated with a natural disaster
  - 2) comparing this threat to each harbor and shoreline use to identify what effect the threat will have on the specific marine interest. It is common to combine similar harbor and shoreline users, such as marinas, boaters, and homeowners, instead of looking at each facility individually
  - 3) the comparison between type of threat and harbor and shoreline users will yield a list of potential effects (i.e., when surge occurs at a marina, docks top their pilings). Effects generally result in damage (i.e., when docks top their pilings, boat and dock damage result). Results can be carried out to several levels, depending on the particular situation (i.e., when docks top their pilings, they are freed to damage the automobile bridge).
- d. In selecting strategies, it may be helpful to rank the results in order of significance to identify what effects need to be addressed immediately.

**Local preparedness, response, and recovery strategies** (Proposed new Section 360.2)

- a. The hazard mitigation strategy begins with **the** findings of the risk assessment. Strategies should be selected to minimize the effects from identified threats. Action should be directed at the threat.

Table 1 demonstrates a risk assessment model that looks specifically at a hurricane.

Table 1.

<b>Threat (cause)</b>	<b>Marine interest by location</b>	<b>Effect</b>	<b>Result -level 1</b>	<b>Result -level 2</b>
Flood/surge	Main Harbor- wide fetch, poor holding			
	Boats on moorings	Decreased scope	Dragging	Threat to auto bridge
	Marina facility	Flooded facility	Floating debris	
			Spills of hazardous material	Threat to surrounding wetland
		Docks topping piles	Freed docks and boats	
	Private residences	Flooded property		
		Docks topping piles	Freed docks and boats	
Wind	Boats on moorings	Windage	Dragging or pennant breakage	
	Marina facility	Windborne debris	Structural damage	

- b. Strategies should be divided by preparedness, response, and recovery sections. Each of these sections should define:
  - who is responsible for implementing the section, and specific actions
  - when the activity should be completed
  - how specific actions are to be completed
  
- c. It is unlikely that the municipality has the resources or the authority to do all that is needed to fully prepare for, respond to, and recover from a natural disaster. Therefore, the municipality must work closely with those harbor and shoreline users who can take action to mitigate damage. To facilitate coordination, the municipality may consider requiring some harbor and shoreline users to submit individual facility or boat plans to the municipality. This compilation of individual plans should be maintained in one document, perhaps a three-ring binder, along with the town's preparedness, response, and recovery strategies outlined in the harbor management plan.
  
- d. Individual plans from some harbor and shoreline users, if required, should address preparedness, response, and recovery activities. The municipality should provide specific guidance to those having to write individual plans about how the plans should be written, submitted, and updated.
  
- e. The municipality should seek to resolve conflicts among individual plans before the storm event. Opportunities to share resources, such as cranes and salvage equipment, should also be identified.
  
- f. Contracts with service providers, such as salvage firms, should be arranged before the disaster occurs. This allows the harbormasters to easily activate pre-arranged agreements immediately after the storm, without having to negotiate a contract.
  
- g. The municipality preparedness sections of mitigation plans should consider:
  - how and when harbor and shorefront users will be advised to begin preparedness activities and how they will be kept informed throughout the process

- safeguarding municipality-owned facilities (i.e., beaches, docks) and equipment (i.e., boats)
  - special issues such as boat owner resistance to leaving their vessels, increased boat traffic, and transit vessels
  - special hazards (i.e., absentee land/boat owners, commercial docking facilities) that need attention
  - allocation of secure mooring areas (i.e., hurricane holes)
- h. The response section should **define** what action the municipality will take during a storm event to protect people and property. The town manager, emergency response personnel, and the legal departments should determine what the appropriate conditions for emergency operations are. The following emergency response considerations should be addressed:
- who is qualified and authorized to dispatch personnel
  - what the parameters are for dispatching personnel
  - what equipment and precautions will be used

### **Emergency Response**

**There is the likelihood that a harbormaster will** have to respond to a distress call from a vessel owner who **initially** decided to stay on his/her vessel and subsequently changed his/her mind. This scenario is common and dangerous. Whenever possible, the primary response should be by the Coast Guard, if the **delay will** not threaten the life of the boat owner. When immediate action is **necessary**, a response crew should be sent. The composition and responsibilities **of this crew should** be established well before the storm event.

- i. After a storm, the primary objective is to secure the harbor so that harbor and shoreline users can safely begin the recovery phase. The first steps might be to institute security measures to prevent looting, and crowd control to protect curiosity-seekers and prevent them from getting in the way. Although the municipality may not be responsible for protecting each and every vessel that has washed up on the beach from being looted, the municipality does have a responsibility for maintaining civil order.

The second stage of the recovery phase includes documenting damage to public property along the waterfront and maintaining a file of what has been damaged, who the owners are, and what action is being taken. Standard activities to be considered may include:

- Immediate (24 hours)
  1. Assessing readiness of the harbormaster department; correcting deficiencies
  2. Completing rapid appraisal of damage
  3. Assisting in emergency situations as appropriate
  4. Initiating pre-established contract services (towing, salvage), if required
  5. Instituting security watches as necessary
- Mid-term (1 to 14 days)
  1. Completing inventory of damage
  2. Notifying appropriate parties regarding damage
  3. Providing list of unidentified boats to appropriate authorities
  4. Contacting local harbor and shoreline users to assess their situation

5. Contacting appropriate authorities, such as the Coast Guard, to provide a harbor status
  6. Beginning to remove large pieces of floating debris
- Long-term (14 to 90 days)
    1. Analyzing effects of storm and results--do they match risk assessment?
    2. Reviewing mitigation list and selecting actions that could be implemented during the recovery phase
    3. Conducting an evaluation meeting for harbor and shoreline users to identify problems
    4. Updating hazard mitigation plan and identifying new mitigation opportunities
    5. Identifying and applying for funding to implement hazard mitigation activities
    6. Completing any disaster assistance forms required by the state for reimbursement

### **Salvage**

Property that is not claimed and has subsequently been taken into the town's custody is subject to the provisions of Rhode Island state law, Title 46, Chapter 10, which calls for the appointment of a commissioner of wrecks and shipwreck goods. It is the responsibility of the commissioner to inventory and store any found property in the town's custody. If a vessel is in a stable position and in no danger of sustaining additional damage, then the salvager cannot intervene without permission of the owner. The same is true for equipment or other goods that wash up on shore. A person who finds the property of another has no legal right of ownership even if he/she 'salvages' it. Legally, in Rhode Island, found goods and equipment are placed in the custody of the local commissioner of wrecks.

- j. Educational materials and programs to guide boaters, harbormasters, marine operators, and local disaster officials in the preparation for, response to, and recovery from major storms have proven to be a successful tool for raising awareness about threats from natural disasters. These materials should be distributed widely throughout the community and be designed to stimulate study and encourage implementation of plans.

#### **Inventory longer-term mitigation projects** (Proposed new Section 360.3)

- a. Medium- and long-term hazard mitigation projects may be large capital improvements or open space acquisition. An inventory of these proposed projects will be a valuable resource when hazard-mitigation funding is made available after a storm event. An accurate inventory can easily be consulted for selecting appropriate projects that meet funding criteria. In the development of this inventory, some projects -- such as new zoning ordinances or roadway improvements -- might be implemented in routine management and improvements.
- b. Identify existing funding sources that can be used to implement hazard mitigation actions. This information is generally available from the state Emergency Management Agency.

c. When developing this section, consider several key points:

1. What projects may not be currently feasible but, if implemented, would mitigate damage?
  - Land acquisition or strengthening local building codes may be projects for future consideration.
2. What activities not directly associated with preparedness, response, and recovery actions would make the harbor safer?
  - Activities like educational programs informing boaters of new methods and technology may be important. These low-cost efforts can have significant impact on the way boaters behave.
3. How does insurance play a role in harbor hazard mitigation?
  - Check on the town's insurance policy to identify any restrictions or limitations that may be in conflict with the hazard mitigation plan.
  - Meet with boaters and marina operators to discuss methods for speeding the claim recovery process; perhaps hold an insurance workshop.
4. What level of protection do existing mooring standards provide?
  - Perhaps a study to examine the type of moorings that are most appropriate to the harbor could improve existing mooring standards.
  - If the scope of the mooring is dependent on the harbor density, not the level of protection it offers, perhaps the harbor could be reorganized to better serve both purposes.

**Methods for coordinated implementation** (Proposed new Section 360.4)

- a. To successfully survive a storm, all marine interests must play a role in preparedness, and the municipality must play the important role of coordinator. Experience from previous storm events shows that one boat breaking loose initiates a domino effect, causing significant damage. This happens even if all the boats are fully prepared except one. Therefore, this element of the harbor plan should specify how coordination will occur.
- b. The harbormaster should be required to interface closely with other storm planning in the municipality. Each municipality usually has a storm preparedness plan that is maintained by the emergency management officer. This plan should be reviewed, and relevant parts should be used in the harbor plan. Overlap and potential conflicts between the two should be evaluated and changed.
- c. Memorandums of Agreement with appropriate municipal departments should be established and maintained as part of harbor hazard mitigation planning. Municipal departments will likely include fire/police, public works, transportation, sewer, planning, and building inspections.
- d. Harbor hazard mitigation plans should be linked with comprehensive land use plans. All municipalities should have a state-approved comprehensive land use plan that provides a blueprint for future development within the municipality. If during the writing of the harbor plan, important land use changes are identified, those suggestions should be incorporated into the comprehensive plan. The comprehensive land use plan, in conjunction with local building codes, should specify adequate building requirements for structures in high-risk zones. These codes specify building standards and required

equipment. During the harbor planning process, evaluate local codes in terms of their resistance to storms.

- e. Harbor hazard mitigation plans should be linked with the National Flood Insurance Program (NFIP). This is a program administered through the FEMA, providing primary insurance coverage for private structures in high-risk areas. NFIP operates on a revenue-based system and collects premium fees from the owners of structures in high-risk areas. This program also evaluates and maps high risk flood hazard areas. The information available through this program should be used for completing the risk assessment phase of hazard mitigation planning. If, during the risk assessment and subsequent planning activities, floodplain management issues are identified, they should be brought to the attention of the local or state floodplain manager. An example may be significant changes to shoreline evaluation because of construction that is not reflected on the flood map.
- f. Harbor hazard mitigation plans should be linked with waterfront zoning. Zoning provides the map for land development along the waterfront. During the planning process, identify any high-risk uses in high-risk areas. Depending upon the seriousness of the problem, the zoning requirements may require revisions. Water zoning could also be created by mapping the areas of the harbor that are higher risk because of the fetch, depth of water, or surrounding land use. Also map vulnerable areas such as wetlands and bridges. Once these areas are identified, plan boat-berthing areas and other threats accordingly. This approach will create water zoning for harbor areas according to threat or vulnerability, allowing only certain uses according to the parameters of the specific zone.

### **Frequently Asked Questions** (Proposed new Section 360.5)

#### *What are some preparedness actions that can be recommended for the recreational boater?*

One of the critical harbor and shoreline users is the individual boater. Because they are often the primary occupants of the harbor area, these users should be given special attention. As part of this element of the harbor plan and related ordinance, each boater should complete and submit to the harbor master a preparedness plan. There is a growing amount of technical and educational material being developed for individual boat owners about preparing for storm events. The town should review this information and provide to local boaters relevant parts. The following is a summary of key points contained in the current literature.

Boat owners **will** be faced with deciding what to do with their boats in advance of a storm event. If the decision is made to stay at a dock, all lines should be doubled and chaffing protection provided where dock lines pass through fairleads and chocks over the vessels side. Dock lines should be attached to the high end of the pilings, if on a floating dock, rather than to cleats or other fastenings on the dock. .

If mooring tackle has been recently inspected and serviced, leaving the boat on the mooring may be the best option. One of the drawbacks to staying on a mooring, as with staying at a dock, is the threat of storm surge. Check with expected storm-surge forecasts to determine if the scope of the mooring will provide sufficient holding power at maximum tidal flow.

Regardless of whether the boat remains at a dock or mooring, there are some basic steps that need to be taken before the storm strikes. The first is to minimize the amount of

surface area the wind can work against. The more surface area the wind has to push on, the greater the strain on all components of boat and securing devices. Remove sails entirely and stow them below deck, especially roller furling jibs. Secure or remove everything in the cabin that is not fastened down, with particular attention to the galley area and chemicals stored in lockers. Secure all ports and hatches, and remove and cap all funnels. Tightly secure the tiller or wheel with strong lines from either side of the cockpit, do not leave coils of line on deck, and take out all slack from running lines on the deck or mast. In order to minimize damage caused by the impact of loose boats in a crowded harbor, it is important to place fenders on both sides of the boat. Once all precautions have been taken, the boat owner should leave the boat and seek shelter.

*Can the municipality tow a disabled vessel?*

According to the U.S. Coast Guard, assistance cases fall into two broad categories: distress and nondistress. Distress is defined as imminent danger requiring immediate response and assistance (U.S. Coast Guard COMDTINST 16101.2B, p. 2). If the situation is life-threatening, the historic law of the sea obliges the harbormaster, or any boater, to render assistance.

In cases of distress the Coast Guard should be notified immediately of the situation and of the intent of the harbormaster. The harbormaster plays a key role in the hierarchy of emergency response as he/she is often the first to arrive on-scene. If the Coast Guard deems it necessary, it may direct other private/public resources, in addition to its own, to respond. If the Coast Guard arrives and finds a stable situation, with the first responders capable of assisting, it may withdraw its response equipment. However, if the Coast Guard finds the situation unstable, and if the first responders are unable to provide the necessary assistance, it will intervene immediately.

When a harbormaster responds to a distress situation, and provides some form of emergency aid, **he/she** is afforded protection from liability through Title 46, Section 2303 of the U.S. Code which states:

Any person...who gratuitously and in good faith renders assistance at the scene of a vessel collision, accident, or other casualty without objection of any person assisted, shall not be held liable for any civil damages as a result of the rendering of assistance for any act or omission in providing or arranging salvage, tonnage, medical treatment, or other assistance where the assisting person acts as an ordinary, reasonable, prudent man would have acted under the same or similar circumstances.

The key phrase here is “act as an ordinary, reasonable, prudent...” which dictates that the harbormaster must act in good faith and in a reasonable, seamanlike manner. Any variance from this standard may increase liability.

This potential liability, and the fact that alternatives exist, should dissuade the harbormaster from towing. Other resources that may be able to offer assistance can be contacted. The Coast Guard will issue a Marine Assistance Request Broadcast (MARB), which solicits voluntary response from anyone who can assist the disabled mariner (including Coast Guard Auxiliary units and good Samaritans) (U.S. Coast Guard COMDTINST 16101.2B, p. 2). A harbormaster may also contact a friend or family member of the boater for assistance.



Another viable form of assistance may be sought through professional towing companies that work in the area. The harbormaster can provide the disabled boater with information on how to contact these companies, and their current rates. In most instances, these firms will contact the boater directly in response to the MARB. Once the boater decides upon a service and a verbal agreement is made, the harbormaster cannot interfere with that contract.

It is clear that “good faith” actions of harbormasters are protected, to some degree, by the “Federal Boating Safety Act of 1971,” but to what extent remains uncertain. Unfortunately, there is no statutory framework from which to formulate guidelines. Issues such as this are decided by customary law, which means each case is reviewed individually by a judge and jury. Because there are so few cases involving harbormaster liability, judges and jurors lack prior judicial decisions, which set precedents. It is therefore difficult to predict the extent to which harbormasters will be protected by the state. In order to limit the potential of being found liable, harbormasters must realize the extent of their liability and must make rational, professional decisions that can be supported as reasonable actions before a court of law.

#### *What is the municipality’s mooring liability?*

The major concern focuses on the harbormaster’s involvement with setting mooring standards, placing ground tackle, and conducting inspections. In order for a harbormaster to avoid or minimize the amount of liability, he/she must exercise reasonable care. This includes:

- (1) Setting mooring standards that are appropriate for the area. The harbormaster must be able to justify the standards that have been set. The maximum load the mooring gear is expected to withstand must be identified and documented (Taylor, 1992).
- (2) Providing mooring occupants with information on the stress points of moorings and offering advice on dealing with extreme weather conditions.
- (3) Ensuring that all mooring gear under town control is routinely inspected, and that proper records of these inspections are kept. The question of liability continually arises if the town conducts the inspections itself. Liability results, not because the town inspects the mooring, but because it does so improperly or fails to correct a situation in which the mooring does not meet specifications.

Some towns have opted to place the burden of mooring inspection on the boaters. This is generally a financial decision. However, by doing so, the town relinquishes direct control of the inspection process, and may not be as effective in ensuring that all mooring tackle conforms to the regulations. The harbormaster can choose instead to conduct the inspection and assure that each mooring has in fact been inspected.

- (4) Identifying and correcting situations that may cause damage to a moored vessel. If a harbormaster learns that two boats are hitting one another while on town-managed moorings, the situation needs to be rectified quickly. The harbormaster must first stop the vessels from hitting. This can be achieved by removing one of the vessels from its mooring. The harbormaster then decides where to move the vessel. To another mooring? Is that mooring of adequate

size? Has it been inspected? Where is the owner and when will the owner return? Are the town guest moorings available and of adequate size?

If the town acts as a commercial mooring operator, owning and then renting the mooring gear, its liability is greatly increased. The town can be held responsible for the safety of vessels stored on its moorings. This may include providing security patrols, preventing chafing during storms, and assuring the general well-being of the vessel. Normally, a town acts as surface manager and the physical mooring gear is owned by the boater. This greatly reduces the potential for lawsuits against the town, which is not responsible for the gear itself, but for the proper allocation of space and general management of the harbor area.

# Hazard Mitigation Overlay

**This part contains model plans for:**

- municipalities
  - marinas
  - boaters
-

# Overview

This section presents a model overlay for a harbor hazard mitigation plan. Also included are models that can be used by marinas and boaters in preparing their own preparedness plans. The models are included for two purposes: first, to demonstrate one form that the plans may take; second, to provide specific strategies and actions that can be used to mitigate potential damage from natural hazards.

The model of the harbor hazard mitigation plan provides the harbor planner, harbormaster, and others with an example of what a local harbor hazard mitigation plan may look like. It was developed in conformance with the guidance presented in the previous part of this document. The information presented in the marina model is drawn from a series of regional workshops developed in New England in the months following Hurricane Bob. These workshops were conducted by organizations and agencies such as the International Marina Institute and the Federal Emergency Management Agency. Information also came from experience gained during hurricanes Hugo and Andrew.

Likewise, the marina model was written to conform with the model town's requirements.

# Model Hazard Mitigation Plan for Municipal Harbors

This model harbor storm preparedness plan has been written in conformance with the guidance detailed in the previous part of this document. The model harbor contains many of the physical attributes found in a typical harbor in Rhode Island. In the development of this model, features from **Wickford** Harbor, located in North Kingston, Rhode Island, were used as a framework for the model.

## **Model Harbor Summary**

- **RIDEM** Water Quality Designation: SB
- **CRMC** Use Type Designation: Type 3
- **FEMA** Flood Zone(s): 445404 0009 B - 445404 0013 B - V16 and A13 zones, subject to **100-year** storm flooding and wave action.
- **Land Use:** The land use along the shores of this harbor has been a mix of **high-density** residential and water-dependent commercial development, such as marinas and boatyards. The Army Corp of Engineers constructed two breakwaters along the eastern face of this harbor in 1962. These structures are at times submerged during storms and high tides.
- **Moorings:** The town regulates three mooring fields in the harbor for a total of 230 boats. The town sets and enforces standard mooring gear with the average scope of 2.5: 1 resulting in 50 percent overlap between moored vessels.

## **100. Authority**

The primary authority for carrying out the responsibilities detailed in this plan is vested in the harbormaster, who will work in cooperation with the harbor commission. However, to successfully complete the activities outlined in this plan, the harbormaster is required to work with other town departments, including the planning board, police and fire departments, town planners, building code official, department of public works, and the emergency management officer as appropriate.

## **200. Goals of the Harbor Hazard Mitigation Plan**

To prevent the loss of life and property by:

- properly preparing harbor and shoreline areas for storm events;
- having a completed and enforceable response and recovery plan;
- working in cooperation with harbor and shoreline users to ensure that a coordinated approach is applied to hazard mitigation;
- integrating harbor hazard mitigation activities with other, ongoing, local hazard mitigation programs; and
- identifying and completing long-term actions to redirect, interact with, or avoid the hazard.

Although this plan strives to eliminate all damage from natural disaster, providing that level of protection is clearly impossible. Therefore, the plan seeks to provide the greatest degree of protection from storm events.

### **300. Risk Assessment**

#### **310. General Harbor Characteristics:**

The bottom consistency is generally mud, with a minimum depth of 3 feet. This bottom type provides good holding for moorings. The harbor opens eastward with a man-made breakwater marking the entrance. The breakwater separates the harbor from a stretch of open water extending eastward approximately five miles. The breakwater provides limited protection from surge and swell, but will be topped with a surge exceeding 3.6 feet.

The town manages 330 moorings in the harbor. The mooring field is divided into three sections: the lower mooring area, which is contained by the breakwater and natural harbor entrance (120 deep water moorings); the middle mooring field, which is contained by the main harbor (140 large and medium size moorings); and the upper mooring field (70 moorings), which is a string of small boat moorings extending up into the shallowest part of the harbor.

The surrounding harbor uses can be divided into three general uses:

1. Open space - this use is limited to 3 acres around the harbor area and is predominantly located in the northeast section.
2. Residential - this use totals approximately 70 percent of the land use surrounding the harbor area. Generally, the single family dwellings are built upon lots that range from 10,000 square feet to 1 acre.
3. Commercial - commercial waterfront uses, such as marinas, dominate the southwest section of the harbor. There are five marinas located in the harbor. Their total in-water capacity exceeds 1,000 boats. Two facilities operate a fuel dock. All the marinas provide upland storage and limited repair facilities.

In addition to the marinas, there is a commercial strip that fronts main street and backs up to the west end of the harbor. This commercial area is generally retail sales. There are no high hazard uses (i.e., gas stations, chemical storage, etc.) bordering the harbor area.

All waterfront structures are built to local building code (ordinance 33-104). A full time building inspector ensures that the codes are adhered to during construction.

#### **320. High Hazard Areas:**

According to FEMA flood insurance maps, all of the land surrounding the harbor is within the **100-year** storm floodplain.

Historically, the land uses in the upper part of the harbor within 300 feet of the shoreline have received significant surge damage.

330. Risk Assessment Table

<b>Threat</b>	<b>Marine interest</b>	<b>Effect</b>	<b>Result -1</b>	<b>Result -2</b>
Flood/surge	Boats on moorings Lower Middle <b>Upper</b>	Decreased scope	Dragging	Threat to shoreline homes Threat to shoreline business Threat to auto bridge
	Marina facility	Flooded facility  Docks topping piles	Floating debris Spills of hazardous material  Freed docks and boats	Threat to surrounding wetland
	Private residences	Flooded property Docks topping piles	Freed docks and boats	
Wind	Boats on moorings	Windage	Dragging or pennant breakage	
	Marina facility	Windborne debris	Structural damage	

400. **Strategies for Preparedness, Response, and Recovery**

410. Town

The harbormaster will coordinate all harbor activities related to preparation, response, and recovery in cooperation with the emergency management officer and the police department.

410. I **Preparedness**

The town, through the harbormaster, will activate the following preparedness, response, and recovery plan 72 hours prior to a severe storm event or as requested by the town manager.

LEVEL 3

72 HOURS

1. If hurricane, begin tracking and monitoring hourly weather reports.
2. Contact any services under contract for after event to assess their readiness.
3. Manage harbor traffic as it increases during marina/boater preparation activities.
4. Ensure vessels' fuel tanks are full and reserve batteries are charged.
5. Inventory and update first aid equipment and other **onboard** emergency tools.
6. Maintain radio watch.

7. Alert local port community, encouraging boat owners to seek safe refuge, remove boats from water, or take action to minimize damaging effects.
8. Alert local marinas, marine interests, holders of mooring permits, and occupants of special anchorage areas to impending emergency.
9. Keep US Coast Guard Marine Safety Office (MSO) Providence apprised of hazardous conditions in harbor.

LEVEL 2

48 HOURS

1. Continue to perform activities in level 3 as required.
2. Contact those town mooring holders who are not complying with their preparedness plan.
3. Assist mar&t/waterfront business with special requests as identified in the facilities plan submitted to the harbormaster.
4. Finalize emergency work schedule with assistant harbormasters.
5. Confirm arrangements to have harbormaster vessel hauled and stored.
6. Prepare town properties, with Department of Public Works, including:
  - securing all items such as trash bins, benches, etc. that are located in shoreline areas
  - completing necessary precautions for harbormaster office
7. Establish liaison with police and public works departments.
8. Alert maritime community to unsafe conditions in the harbor as needed.
9. Curtail regular business activities.
10. Begin regular patrols of the harbor to ensure that necessary individual precautions are begin taken.
11. Advise **MSO** Providence of the status of emergency preparedness in progress.
12. Alert local harbor community to any impending closure of anchorages or waterways.
13. Encourage local marinas to suspend fueling operations and to secure fueling piers sufficiently to minimize pollution threat.

LEVEL 1

24 HOURS

1. Continue to perform pertinent level 2 activities.
2. Undertake final patrol of the harbor:
  - inventory number of vessels and precautions taken by harbor and shoreline users
  - clear public pier of vessels and equipment



3. Log information on transient boats (see section 425.2).
4. Fuel harbormaster vessel.
5. Haul and store harbormaster vessel with assistance of the Department of Public Works.
6. Complete shoreline survey and final harbor check from shore.
7. Alert harbor community and **MSO** to any unsafe conditions in harbor.

#### 410.2 *Response*

The town's policy is that no emergency watercraft will be dispatched for emergency response during a storm event. All requests for assistance will be forwarded to the nearest Coast Guard station. This policy will remain in force unless revoked by the police chief or the town manager.

The harbormaster will remain on-site in the harbor's station or police department to address any harbor-related issue. This will also allow the harbormaster vessel to begin operations immediately at the conclusion of the storm.

#### 410.3 *Recovery*

Immediately after the event has terminated, the town has three recovery priorities:

- Priority 1. Reestablish the harbormaster department as an operational unit in order to facilitate the second and third priorities.
- Priority 2. Take the necessary immediate action to minimize additional risk to life and property.
- Priority 3. Reopen the harbor for recovery activity.

To achieve these priorities, the harbormaster will take the following sequential actions:

##### IMMEDIATE

##### 24 HOURS

1. Assess readiness of the harbormaster department; correct deficiencies  
· reestablish radio communications.
2. Complete rapid appraisal of damage.
3. Provide damage assessment information to town's public information center and to **MSO** Providence.
4. Initiate pre-established contract services (towing, salvage) if required.
5. Institute security watches as necessary.
6. Alert maritime community to unsafe conditions in the harbor.

- Name of primary contact person and primary and secondary phone numbers
- VHF channel facility monitors
- List of facility staff who are expected to assist in preparation, response, and recovery phases
- List of hazardous materials stored on site (i.e. waste oil, fuel tanks, solvents). This information can be extracted from the facility's Environmental Operations and Maintenance Plan
- Inventory of potential recovery equipment (heavy equipment, generators), including services provided by outside contracts
- Debris disposal plan
- Special assistance requested from town
- List of preparation, response, and recovery activities and timing

#### 4 2 2 . Boaters

Boat owners who require a town mooring permit must submit an individual preparedness plan. This will be accomplished by attachment of a preparedness plan to the annual mooring renewal forms. For a mooring permit to be approved, an individual preparedness plan must be attached to the mooring application. Boaters will be expected to comply, to the best of their ability, with the plan they have prepared. The boat owner should advise the harbormaster of any significant changes to the plan made during the boating season.

The individual preparedness plan will include the following information:

1. Preparedness
  - A. Action completed before hurricane season
  - B. Where the vessel will be moored/stored during storm event
  - C. Actions completed with 48 hours of the predicted storm event
2. Poststorm event
  - A. Description of how vessel will be secured after storm event
3. First and second alternate captains' addresses and phone numbers

Both the first and second alternate captains should have the necessary information and experience to safeguard your vessel if the harbormaster is unable to reach you.

Mooring standards have been developed to maximize safety during normal weather conditions. To safeguard a moored boat during a severe storm event, additional precautions will be necessary. At a minimum, these actions will include:

- Improving the connection between the vessel and the mooring chain by using chafing gear and extra lines
- Reducing windage
- Whenever possible, increasing scope

Boater owners should also consider:

- Bypassing the mooring swivel and attaching the chain directly to the pennant
- Hauling the boat and storing it upland
- Leaving anchor lights and autobilge pumps on
- Ensuring that self-bailing cockpit drains are clear of debris

- Adding an emergency catenary weight at the vessel end of the chain to absorb shock

Boat owners are encouraged not to stay aboard during major storm events. The town's standard procedure is NOT to respond to on-the-water requests for assistance during a major storm event. Such requests for assistance will be forward to the nearest U.S. Coast Guard Station.

423. *Waterfront business (excluding marinas)*

All waterfront businesses are expected to take the necessary precautions to protect their property.

424. *Shorefront home owners*

All shorefront home owners are expected to take the necessary precautions to protect their property.

425. *Special Hazards*

**425.1 *Commercial Dock***

All vessels shall be cleared of the town dock 12 hours prior to expected storm event.

**425.2 *Transients***

Vessels not usually moored in the harbor but seeking safe refuge will be allowed to moor in the federal anchorage areas. Transient yachts will not be allowed to tie to a mooring unless authorized by both the mooring owner and the harbormaster. Transient vessels seeking shelter will provide the harbormaster with:

- name of owner and captain, if different
- home port
- registration/documentation numbers
- length, draft, and type (power/sail)
- number of persons aboard
- address and phone where owner can be contacted

**425.3 *Commercial vessels and ferries***

As deemed necessary by the harbormaster, local commercial vessels and ferries will submit individual plans to the harbormasters. These plans will include the same information as required for the individual boater plans.

## **500. Inventory of longer-term mitigation projects**

1. Maintain the existing seawall to its original specification. Although it does not provide complete protection, a properly maintained seawall offers a measure of safety.
2. Explore methods to increase scope within the harbor without losing surface area maximization. Actions may include a targeted approach to removing vessels from moorings and increasing the scope with storm pennants for those that remain. In the existing mooring configuration, increasing mooring scope is difficult. Therefore, the town should explore alternative methods for gridding the mooring field that will allow space maximization and increased scope for each vessel.
3. Implement an annual education and training program conducted by the harbormaster for the public. The program should focus on storm preparedness for the boater. Other workshops should be conducted with the help of the building inspector and planning board to discuss shoreline construction standards and storm-proofing homes and businesses.
4. Compile a list educational materials that can be shared with harbor and shorefront users.
5. Maintain an accurate inventory of principal harbor and shoreline users, including:
  - marinas
  - waterfront businesses
  - neighboring harbormasters
  - Coast Guard
  - towing and salvage companies
  - environmental response teams
  - commercial vessel operators (charter boats and ferries)
  - fishing cooperatives
6. At the beginning of each hurricane season (June 1):
  - review local harbor hazard mitigation plan and update as necessary
  - distribute and post revised plan
  - inspect all storage sheds, outbuildings, and portable office trailers for proper tie-down
  - inspect all emergency power sources and lighting systems in harbormaster offer to ensure that they are operational
  - distribute a storm checklist to boaters
7. Conduct a disaster mitigation workshop for business and industry in cooperation with R.I. Emergency Management Agency. Propose activities that can be implemented to mitigate damage. Suggested actions for local coastal businesses may include:
  1. Placing more essential equipment and functions on higher levels of the structure, above the anticipated flood level
  2. Constructing berms around the facility
  3. Installing or activating dewatering pumps
  4. Providing emergency generators and potable water storage
  5. Installing blowout plugs in floor slabs whose elevation is below anticipated flood elevation

6. Installing master shutoff valve controls for sewer, gas, and water above anticipated flood elevation
  7. Reinforcing walls to carry hydrostatic and hydrodynamic loads
  8. Installing floodproof electrical systems and utility cores in areas subject to flooding
  9. Installing safety glass in windows
8. Assess the feasibility of developing a volunteer **corp** that can assist the harbormaster to secure vessels during the preparation phase or maintain security patrols after an event.

#### 600. **Coordination**

Memorandum of Agreement shall be entered into with the Department of Public Works to establish its working relationship with the harbormaster for preparing public waterfront property for a storm event and hauling and storing the harbormaster vessel.

The harbor commission shall work with the planning board and planning department to establish redevelopment policies for shoreline areas. These policies will be consistent with CRMC and DEM regulations.

In order to discourage redevelopment of critical shoreline areas and to reduce vulnerability of life and property to coastal hazards the town **should**<sup>1</sup>:

1. Limit development and redevelopment in hazardous coastal areas to protect lives and property from coastal storms and hazards. Poststorm development shall avoid extensive rebuilding and intensification of land uses in critical areas and encourage reductions in the amount and intensity of development in order to reduce exposure of lives and property to coastal hazards.
2. Attempt to **minimize** public expenditures and reduce risk to public infrastructure and facilities through redevelopment.
3. Encourage relocation of structures **landward** of critical areas. This can be done by influencing state policies, expenditures, and programs to reduce the amount and intensity of development and redevelopment.
4. Require shorefront area replacement of nonconforming uses and eliminate unsafe conditions and inappropriate uses as opportunities arise.
5. Identify shorefront areas that will be subject to poststorm regulations and acquisition in order to reduce loss of life and damage to property.

In order to further coordinate local policies contained in the comprehensive land use plan for resource protection and coastal management, the town should consider the following policies.

1. Work with appropriate state agencies to ensure that poststorm shoreline management options for shoreline areas shall be consistent, to the extent possible,

---

<sup>1</sup> This has been adapted from Florida Department of Environmental Protection.

with use, density, and other land uses policies and standards contained in the comprehensive land use plan.

2. Create local priorities for acquiring coastal properties to promote hazard mitigation, public recreation, and resource management objectives contained in the comprehensive plan.
3. Consider impacts to evacuation routes, as determined by emergency management officials, in poststorm redevelopment options.
4. Maintain and/or adopt minimum parcel size and configuration requirements on the subdivision of critical shoreline features.
5. Discourage platting of shoreline properties and encourage replatting to accommodate **landward** poststorm relocation of structures.

# Model Hazard Mitigation Plan for Marinas

This model marina plan has been developed in accordance with the town's requirements detailed in the previous section. The marina typifies a small-to-medium size facility with an even mix of power - and sailboats ranging in size from 15 to 36 feet. The boats are stored in-water at four docks (A-D) with approximately 25 finger piers at each. The facility stores 103 boats and provides some general services such as fuel, **pumpout**, and engine repair. During the season, the facility's 1 **.2-acre** lot is used primarily for parking. The upland portion of the facility also has a business office and two work sites totaling 1,000 square feet of work space. Boats are hauled from the water with a **50-ton** travel lift and placed on cradles and jack stands. There are no permanent dry storage facilities.

# Hazard Mitigation Plan

Name of Marina

Last Undated: April 23, 1994

## 1. GENERAL INFORMATION

### Primary contact

John Baker, Manager  
401 555-1111 work 1  
401 555-2222 work 2  
508 555-3333 home

### VHF channel

VHF 16 and 68

### List of facility staff

#### *Preparation:*

John Baker, manager  
William Johnson, clerk  
Sue Webster, maintenance crew  
**Phillip** Ortiz, maintenance crew  
Steve Curtis, maintenance crew  
John McCurdy, maintenance crew  
Eric Whale, maintenance crew  
Nancy Hunter, volunteer  
John Hicks, volunteer  
Mark **DeBoo**, volunteer

#### *Response:*

The facility will be evacuated prior to the storm event, with only John Baker remaining unless requested by local officials to evacuate.

#### *Recovery:*

John Baker, manager  
William **Johnson**, clerk  
Sue Webster, **maintenance** crew  
Steve Curtis, maintenance crew  
John **McCurdy**, maintenance crew  
Eric Whale, maintenance crew

### List of hazardous material stored on site

Underground fuel storage tank, 2,000 gallons  
Underground sewage storage facility, 1,000 gallons, weighted  
**100-gallon** waste oil receptacle  
**50-gallon** mixed material receptacle  
No other known hazardous materials are stored on site, except small amounts of paint and solvents



Inventory of recovery equipment

*We have for facility use only:*

- a 50-ton travel lift
- two front loader tractors

Debris disposal plan

All debris will be stored in the southwest corner of the facility until it can be collected and removed by a waste hauling contractor. We do have a prearranged contract with JB waste haulers.

Special assistance requested from town

The town may request that the harbor master maintain contact with the facility clerk about special hazards in the harbor and assist in identifying damaged vessels after the storm event.

## 2. PREPARATION, RESPONSE, AND RECOVERY ACTIVITIES<sup>1</sup>

### Preparation

Phase Three (Alert)

72-48 Hours Prior to Hurricane's ETA  
(Earlier if a Weekend is Involved)

- Notify all personnel that the facility is on a hurricane alert. All personnel will commence preparations for putting the Severe Weather Preparedness Plan in action.
- Man the communications center and notify all volunteers and other parties of the hurricane alert.
- At 72 hours prior to ETA, initiate plans to evacuate personnel and equipment in the flood-prone locations.
- Begin facility protection preparations by policing all yard, marina, and dock areas to stow away or secure loose equipment and items. Store in covered or sheltered areas.
- Secure all flammable and hazardous materials, such as waste oil receptacle.
- Remove small boats and trailers and secure in upland area with ground screws.
- Commence plans for securing remaining in-water vessels. Ensure that all vessel removal operations are well underway.  
The facility has established a list of vessels to be hauled from the water and secured. Those vessels that remain in the water will be secured with extra lines and fenders. The facility carries those actions out with preapproval from the vessel owners. Preapprovals will be signed when the ship contract

---

<sup>1</sup> Guidance adapted from: Maryland Department of Natural Resources. Maryland Guidebook for Marina Owners and Operators on Hurricane and Severe Weather Preparedness.

is completed. After the storm event, all tenants are charged a fee per foot for the preparedness services provided by the facility.

- Top off vehicles with fuel as necessary, in preparation for the securing of all fueling operations and equipment. (We expect that loss of electrical power during a hurricane may disrupt fuel supplies after the storm.)
- Check and secure any loose siding or roofing on worksheds and business buildings.
- Request that other companies that have supplies or equipment in the facility remove their items.
- Remove computer equipment and key files to a secure upland location.
- Take down large signs, antennas, or other removable items subject to wind damage.
- Commence facility protection precautions. Install storm shutters or protect windows with masking tape to reduce the possibility of flying glass.
- Process and mail all paperwork that can be completed immediately. Set all new paperwork aside to be completed after the hurricane or storm.
- Remove expensive equipment or products to a secure upland location.
- Reduce inventories as much as possible and delay ordering materials, stocks, or supplies until after the storm. If materials or inventories are **enroute**, try to divert them to a temporary warehouse or area not subject to the storm.
- Monitor storm's progress and maintain contact with harbormaster.

### Phase Two (Watch)

#### 48-24 Hours Prior to ETA

- Notify all personnel that facility is on hurricane watch.
- Continue to monitor storm's progress and maintain contact with the harbormaster.
- Complete securing operations in lowland locations. All dock structures, field buildings, and offices will be secured.
- In areas subject to flooding, move vehicles and/or equipment to the highest point available. If outside storage is necessary, do not park under trees, towers, signs, or power lines. Vehicles are to be parked with the emergency brake on.
- Remove all employee personal belongings from evacuated locations.
- Secure all electrical power supplies to areas that may be flooded by turning off the power at the main breaker switch.

- Secure all fuel supply tanks and lines at the shoreside installation.
- Disconnect and protect all electric motors, pumps, and like equipment at or below ground level, or place in a safe location.
- Turn off fresh water supplied from municipal or other water lines at the meter.
- Complete securing all facility “shop” operations. Tape windows, secure and lock doors.
- Check that all emergency supplies are readily available, such as first aid kits, fire protection equipment, sufficient stores of provisions, including bottled fresh water, fuel for emergency generators, battery-powered lighting, flashlights or lanterns, battery-powered radios, VHF units.
- Notify harbormaster when evacuation is complete and the location secured.

### Phase One (Warning)

#### 24-0 Hours Prior to ETA

In these hours prior to the projected arrival of the hurricane, the “hurricane warning” advisory will have been issued and it is highly likely that the hurricane will make landfall or pass near the marina facility. Continue or complete the following activities:

- Notify all personnel that the facility is on hurricane warning.
- Continue to monitor storm’s progress.
- Complete vessel removal and securing operations no later than 14 hours prior to the storm.
- With all vessel protection and securing operations completed, make a final check of doubled mooring lines, tied off with sufficient slack, and fender boards and/or other protective equipment in place.
- Secure as necessary any remaining operational facility buildings.
- Release employees who are not manning facilities during the storm no later than 12 hours prior to the storm. Give instructions for reporting back to work after the storm at that time.
- Insure that all perimeter access points in the form of fences, gates, and building doors are locked and secured, except the main entrance gate.
- Complete all facility preparations 12 hours prior to the hurricane’s arrival. Depending on the track of the storm, the extent of preparation based on information received may or may not be adequate.

### **Response**

**The** following suggestions are issued in the interest of personal safety:

- Evacuate when your local emergency management advises.

- Exercise extreme caution in all outdoor activities.
- Do not attempt to move or resecure a loose vessel or equipment during the storm period.
- Anyone required to perform any activities on or near the docks or piers during severe storm phases will wear a life jacket.
- Do not operate vehicles or equipment during the storm period.

## **Recovery**

The following will be considered when returning to the area:

- We understand that extensive damage may have been caused by the hurricane. While **checking** the condition of the marina facility is a main concern, there may be limitations to access to the facility or at the facility itself. An inspection of the facility will be made as soon as practicable to determine conditions, damages, and security of premises.
- Poststorm security will be provided as a priority to protect against vandalism.

Personnel returning to the facility and beginning the preliminary damage assessment are to be aware of the following:

- Wear boots and use extreme caution.
- Be aware of possible downed electrical wires, which should be considered “hot” and avoided until the power company or facility electrical maintenance personnel services the wires.
- Check facility fueling docks and tanks for leaking gasoline or diesel fuel, where applicable. File a report with your local harbormaster if a leak is found.
- Do not start electrical equipment that has been submerged in water until it has been checked and repaired as necessary.
- Report immediately broken sewer or water mains to the harbormaster.
- Check building’s, shop’s and docks electrical wiring completely prior to turning on the main power switch.
- Inspect and repair or replace as necessary wet electrical appliances, such as hot plates, toasters, calculators, typewriters, etc., prior to operation.

As soon as the facility has been deemed safe for complete inspection, and where damage has occurred, a complete survey of the facilities, inventories, equipment, and stocks will be made and documented with photographs or video, where possible. Any losses or damages should be reported immediately to the facility’s insurance agent.

A written assessment of damage will be prepared as soon as possible. Estimated damage to rocks and piers and other harbor facilities, cranes, mast hoist, boat sheds, toilets, showers, lockers, fuel dock and office, electrical service, and telephones is to be included in the

assessment. After making damage assessments, plan repairs and implement a repair program as soon as possible.

While it is understandable that immediate repairs may need to be undertaken, all actions taken during the course of repairs prior to any insurance adjustment must be properly documented and filed. In the case of facility property damage, appraisers assigned by the insurance company will be involved in assisting with the claims.

If there has been any theft or vandalism loss or damage to the facility, other than **storm-**related, a report will be made to the harbormaster. The incident report number and, if possible, a copy of the incident report, are to be obtained from the harbormaster to substantiate any insurance claim or tax property loss reporting.

It is obvious that vessel owners, captains, caretakers, and others with vessel interests will inquire as to the status of their vessels. These inquiries will be fielded as well as possible, especially if there is no damage to their property. Notification of any vessel damage should be made as soon as possible. A dedicated phone line with a prerecorded message will be established. Vessel owners will be advised as soon as practical of the situation at the facility and of the availability of berthing facilities for their vessels. If damages preclude the facility from providing berthing spaces for vessels, the owners will be notified and advised as to when the facility may be able to provide a berth.

Facility personnel will be put in charge of security, with considerations given to the handling of:

- tenants and nontenants
- radio, television, and press representatives
- outside salvage contractors, repairers, estimators, surveyors, adjusters, and appraisers

### **3. FACILITY CHECKLIST BY STAFF RESPONSIBILITIES'**

#### **Administrative Staff**

##### Phase Four

Automatically Set 1 June Through 30 November

- \_\_\_\_\_ Review severe weather preparedness plan and update.
- \_\_\_\_\_ Address areas of responsibility and complete.
- \_\_\_\_\_ Distribute and post revised severe weather plan.
- \_\_\_\_\_ Brief marina personnel, tenants, and volunteers on severe weather preparedness plan.
- \_\_\_\_\_ Coordinate plan's requirements with local authorities.
- \_\_\_\_\_ Check first aid supplies and restock.
- \_\_\_\_\_ Check emergency supplies and restock.
- \_\_\_\_\_ Make vender list for rental and leased equipment.
- \_\_\_\_\_ Ensure hurricane preparedness sector of tenant contract is updated for each boat in facility.

##### Phase Three

72-48 Hours Prior to Hurricane's ETA

- \_\_\_\_\_ Set up communications center.
- \_\_\_\_\_ Initiate hurricane warning and activate communications plans.
- \_\_\_\_\_ After phase three is set, release unnecessary marina personnel so that they can gather their personal belongings and prepare their homes.
- \_\_\_\_\_ Notify tenants and volunteers of impending conditions.
- \_\_\_\_\_ Work closely with harbormaster and marina volunteers to update posted storm information and disseminate other information to employees, boat owners, and volunteers.
- \_\_\_\_\_ Process and mail all paperwork that can be completed immediately.
- \_\_\_\_\_ Close marina stores to general public.

---

<sup>1</sup> This checklist has been adapted from the Maryland Guidebook for Marina Owners and Operators on Hurricane and Severe Weather Preparations produced by the Maryland Department of Natural Resources.

\_\_\_\_\_ Earmark supplies for marina use at the first sign of a hurricane threat to avoid depletion of stock by customer demands.

\_\_\_\_\_ Begin preparation of marina grounds:

- Stock emergency food and water supplies
- Check emergency generators, lighting, and fuel supply. Obtain additional generators if required
- Check emergency equipment list and arrange security staff and volunteer schedules
- Secure outdoor furniture, large signs, flags, trash cans, carts, fire extinguisher, antennas and other loose items that can be affected by wind

\_\_\_\_\_ Back up computers and store archive tapes with records to be removed.

\_\_\_\_\_ Start plans to evacuate personnel and equipment in flood-prone locations.

\_\_\_\_\_ Request other companies or concerns with supplies and equipment at the marina to remove them.

\_\_\_\_\_ Notify any suppliers to hold shipment until after the storm.

\_\_\_\_\_ Ensure that first aid supplies are on hand.

\_\_\_\_\_ Arrange security staff and volunteers schedules.

### Phase Two

48-24 Hours Prior to ETA

\_\_\_\_\_ Track position of hurricane in communication center.

\_\_\_\_\_ Maintain contact with local harbormaster.

\_\_\_\_\_ Ensure that marina is secured from nonessential traffic.

\_\_\_\_\_ Issue emergency supplies and equipment to crews as required.

\_\_\_\_\_ Move files and expensive equipment to higher shelves and drape with plastic.

\_\_\_\_\_ Implement check-in, check-out, and duty list for personnel entering and leaving the marina.

### Phase One

24-0 Hours Prior to ETA

\_\_\_\_\_ Secure marina.

\_\_\_\_\_ Coordinate status reports on hurricane position and intensities to crews, tenants, and volunteers at marina.

\_\_\_\_\_ Evacuate marina, if directed.

## MAINTENANCE STAFF

### Phase Four

Automatically Set 1 June Through 30 November

\_\_\_\_\_ Review severe weather preparedness plan, update and submit to administration.

\_\_\_\_\_ Address areas of responsibility and complete tasks.

\_\_\_\_\_ Ensure that all essential vehicles and portable generators are operational and ready for use.

\_\_\_\_\_ Inspect buildings, piers, and wharfs.

\_\_\_\_\_ Inspect all storage sheds, outbuildings, and portable office trailers for proper tie-down.

\_\_\_\_\_ Inspect all emergency lighting systems and ensure that they are operational.

### Phase Three

72-48 Hours Prior to Hurricane's ETA

\_\_\_\_\_ Schedule marina's crew for storm duties. Include "shore leave" for crew to prepare homes and families at the first notice of storm.

\_\_\_\_\_ Secure all dumpsters with tie-downs.

\_\_\_\_\_ Remove trash, scrap, and excess materials.

\_\_\_\_\_ Fuel all vehicles to 100 percent.

\_\_\_\_\_ Fill all gas and diesel fuel storage tanks.

\_\_\_\_\_ Clear all loose gear from wharves and piers.

\_\_\_\_\_ Secure piers, docks, and dry storage areas:

- Remove unclaimed trailers, boats, and equipment from piers, docks, and dry storage areas
- Move drink, ice machines, etc. to higher grounds
- Remove trash cans from piers and secure



- Anchor portable buildings
- Check tractors and lifts
- Begin stripping removable boats and moving to hoisting area
- Coordinate securing of marina facilities, equipment and boats
- Monitor the need to disconnect floating and fixed piers' power cables and water and fuel lines if tidal surge is expected. Be prepared to disconnect floating dock ramps and secure docks to fixed pier pilings

\_\_\_\_\_ Police marina and dock areas to stow away or secure loose equipment and items that could become missile hazards in high winds.

\_\_\_\_\_ Secure all hazardous materials.

\_\_\_\_\_ Remove boats and trailers. Secure with tie-downs when moved.

### Phase Two

#### 48-24 Hours Prior to ETA

\_\_\_\_\_ Inspect all work done in phase three.

\_\_\_\_\_ Begin evacuation of boats and dinghies.

\_\_\_\_\_ Evacuate trailerable boats to predesignated area.

- Arrange to have boats tied down after move.

\_\_\_\_\_ Evacuate nontrailerable boats.

\_\_\_\_\_ Evacuate cruising boats.

\_\_\_\_\_ Board up all windows and glass doors.

\_\_\_\_\_ Remove or lock all dock boxes and check tie-downs.

\_\_\_\_\_ Secure waterside sewage pumpouts. Turn off sewage grinder pump breakers at last call to evacuate marina.

### Phase One

#### 24-0 Hours Prior to ETA

\_\_\_\_\_ Brief departing released personnel on recall procedures.

\_\_\_\_\_ Stage personnel who are scheduled to ride out storm.

\_\_\_\_\_ Respond to last-minute items.

- \_\_\_\_\_ Secure fuel and oil tanks.
- \_\_\_\_\_ Secure main switch gear to piers and low-lying areas.
- \_\_\_\_\_ Remove all excess gear from piers and dock area.
- \_\_\_\_\_ When appropriate (extra high tide or storm surge expected) loosen floating dock ramps from hinges and secure.
- \_\_\_\_\_ At last call, remove outside life rings and fire extinguishers from floats and other outside locations.
- \_\_\_\_\_ Secure power to marina, if evacuated.

## **TENANTS**

### **Phase Four**

Automatically Set 1 June Through 30 November

- \_\_\_\_\_ Review severe weather preparedness plan, update and submit to administration.
- \_\_\_\_\_ Address areas of responsibility and complete tasks.
- \_\_\_\_\_ Update marina Tenants Severe Weather Questionnaire and return to office.
- \_\_\_\_\_ Know your evacuation route and shelter plan.
- \_\_\_\_\_ Ensure that your emergency gear is serviceable and ready for use.

### **Phase Three**

72-48 Hours Prior to Hurricane's ETA

- \_\_\_\_\_ Secure your boat in accordance with your preapproved plan.

### **Phase Two**

48-24 Hours Prior to ETA

- \_\_\_\_\_ Evacuate area.

## **VOLUNTEERS**

### **Phase Four**

Automatically Set 1 June Through 30 November

- \_\_\_\_\_ Review severe weather preparedness plan, update and submit to administration.

\_\_\_\_\_ Address areas of responsibility and complete tasks.

\_\_\_\_\_ Participate in exercises of hurricane planning.

Phase Three

72-48 Hours Prior to Hurricane's ETA

\_\_\_\_\_ Staff communication center.

\_\_\_\_\_ Assist in securing marina and boats, as agreed.

Phase Two

48-24 Hours Prior to ETA

\_\_\_\_\_ Continue to staff communication center.

Phase One

24-0 Hours Prior to ETA

\_\_\_\_\_ Evacuate marina and return to family.

#### 4. ALL MARINA PERSONNEL - GENERAL NOTES

Prior to the hurricane season, take the following actions.

Each employee will have a written plan for **his/her** personal preparation and evacuation in order to effectively reduce his/her required leave time. This will also ensure that other crew members can have adequate time. This plan should be discussed with your family so that they will be prepared and know what is expected of them. When preparing your plan, you should consider the following:

Prepare your home and yard early in Phase Three to allow for an organized early evacuation. You should try to reduce wind and flood damage by boarding windows, raising furniture, covering books and appliances, etc.

Decide where to go. This will depend on the track and severity of the storm. Local emergency shelters may not be as comfortable as a stay with out-of-town relatives, but will allow you to return more quickly.

If your family decides to go to different locations during evacuation, decide on destinations, alternatives and communication options to reduce anxiety over the well-being of family members. Calling a designated out-of-state relative is one option to reestablish contact.

How will you evacuate? Plan your route and departure time to avoid low areas, which may be flooded due to torrential rains and high tides. Consult the evacuation maps for your area. Scout your route ahead of time for local hazards and alternatives. Plan to leave early.

Decide what to take. Important documents should be designated in advance for removal. Small valuables, heirlooms, photos, etc. can be boxed for evacuation.

Be prepared to evacuate early and leave as soon as possible after evacuation has been called for. You may want to send your family ahead if other responsibilities may delay your own evacuation until Phase One.

Returning after an evacuation may be a time of despair or rejoicing. Concentrate on the positive aspects of your survival, and meet the challenge with optimism and safety consciousness.

Because of the uncertainty of time crew members will be required to be on duty, at first notice of a storm, staggered relief shifts will be implemented to allow each person time to go home and prepare their homes and families.

In order to return to preparations as soon as possible, leave time will be scheduled with team leaders going first. Because the fatigue factor during and after storms can be expected to be high, staffing prior to the storm's arrival should be kept at a minimum.

# Marina Tenant's Severe Weather Questionnaire

Boat Owner \_\_\_\_\_ Phone # \_\_\_\_\_

Pier # \_\_\_\_\_ Slip # \_\_\_\_\_ Locker # \_\_\_\_\_

Alternate Captain \_\_\_\_\_

Insurance Carrier \_\_\_\_\_

Boat Type \_\_\_\_\_ Boat Name \_\_\_\_\_

PLEASE COMPLETE THE FOLLOWING QUESTIONNAIRE  
AS APPROPRIATE:

## Group A - Sunfish, Board Boat, Dinghy

\_\_\_\_\_ I intend to remove my boat(s) and equipment from the marina grounds.

\_\_\_\_\_ I intend to temporarily store my boat(s) and equipment in the following location: \_\_\_\_\_

## Group B - Trailerable Boats

\_\_\_\_\_ I intend to remove my trailer(s), boat(s), and equipment from the marina grounds, and relocate them to \_\_\_\_\_

\_\_\_\_\_ I intend to temporarily store my trailer(s), boat(s), and equipment in the following location: \_\_\_\_\_

\_\_\_\_\_ I have inspected my boat trailer(s) to insure that it is in operable condition and agree to maintain the trailer in operable condition while it remains on marina property.

## Group C - Nontrailerable Boats

\_\_\_\_\_ I intend to secure my boat in the following location: \_\_\_\_\_

\_\_\_\_\_ I intend to haul out my boat for temporary storage in the following location: \_\_\_\_\_

\_\_\_\_\_ I agree to report to the marina during the severe weather warning to prepare my boat.

GROUND TACKLE ON BOARD

Anchor(s) \_\_\_\_\_  
\_\_\_\_\_

Chain(s) \_\_\_\_\_  
\_\_\_\_\_

Anchor Line(s) \_\_\_\_\_  
\_\_\_\_\_

Mushroom Anchor \_\_\_\_\_  
Bridle(s) \_\_\_\_\_  
Chafing Gear \_\_\_\_\_

- \_\_\_\_\_ I have reviewed the marina's severe weather preparedness plan.
- \_\_\_\_\_ I have a severe weather preparedness checklist on board the boat, which is in conformance with the marina's plan.
- \_\_\_\_\_ I have reviewed and rehearsed my severe weather preparedness plan with my alternate captain.

Dock Box

- \_\_\_\_\_ I understand that the dock box belongs to the marina and is not insurable under the marina insurance policy.
- \_\_\_\_\_ I intend to remove my dock box and/or belongings during a hurricane warning.

# Model Hazard Mitigation Plan for Boaters

This section contains two parts. First is a form for hazard mitigation plans for boat owners. This form can be used by towns as an attachment to mooring applications. The second part contains an example of a completed form. This example is written for a medium sized (30-foot) cruising sailboat stored at a town mooring. It is written in conformance with the town's requirements, as outlined in the previous section.

# Boater Hazard Mitigation Plan

Name of boat  
Registration number

## 1. Preparedness

A. Before the hurricane season, the following activities will be completed:

B. The vessel will be secured:

C. Within 48 hours of a predicted storm event, the following activities will be completed:

## 2. Poststorm:

My vessel will be secured by completion of the following actions:

## 3. Alternate Captain's Address:

Phone:

Second Captain's Address:

Phone

4. I agree to report, or will ensure that one of the alternate captains will report, to my vessel during the severe weather warning to prepare my boat as detailed in this plan.

Signature: \_\_\_\_\_



# Boater Hazard Mitigation Plan

*S/V Minnow  
RI 0001A*

## 1. Preparedness

A. Before the hurricane season, the following activities will be completed:

- *All emergency equipment is checked and in good working order*
- *Cleats checked for security and backing*
- *Chafe gear and storm pennants are on board and labeled*
- *Status of insurance policy and reporting procedures checked*

B. This vessel will be secured: *at its current town mooring location.*

C. Within 48 hours of predicted storm event, the following activities will be completed:

- *Chafe gear and storm pennants installed and checked*
- *Fuel tanks shut off*
- *All spare rigging, sails, dodgers, cowlings, and deck gear removed*
- *Thru-hulls, except self-bailing drains, closed*
- *Self-bailing drains cleared of any blockages*
- *All portable fuel and oil storage containers removed*
- *All power turned off, except auto bilge and anchor light*

## 2. Poststorm:

My vessel will be secured by completion of the following actions:

- *Vessel located, if vessel cannot be located, harbormaster contacted*
- *Damage assessed, once vessel located.*
  - *Vessel secured*
  - *Any displaced portals reinforced*
- *Preselected salvage company contacted*
- *Previously established insurance company procedures followed*

3. Alternate Captain's Name and Address: *Joe McGinn, 12 Stewart Street, Small Town,  
RI 02111*

Phone: (401) 555-3721

Second Captain's Name and Address: *Andy Kinzie, 44 Waterway, Small Town,  
RI 02111*

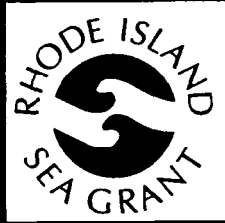
Phone: (401) 555-2187

4. I agree to report, or will ensure that one of the alternate captains will report, to my vessel during the severe weather warning to prepare my boat as detailed in this plan.

Signature: \_\_\_\_\_

References:

- Federal Emergency Management Agency. 1990. Disaster Mitigation Guide for Business and Industry. Washington DC.
- Federal Emergency Management Agency. 1990. Post-Disaster Hazard Mitigation Planning Guidance for State and Local Guidance. Washington, DC.
- Florida Department of Environmental Protection. 1994. Pre-Storm Planning for Post-Storm Redevelopment: Policies and Options for Florida's Beachfront Areas Phase I. Fort Lauderdale, FL.
- Maryland Department of Natural Resources. Maryland Guidebook for Marina Owners and Operators on Hurricane and Severe Weather Preparedness.
- Rhode Island Office of State Planning. 1984. The National Flood Insurance Program - A Handbook for Local Administrators in Rhode Island. Providence, RI.
- United States Coast Guard. 1991. Maritime Hurricane Response Plan. Port of Boston, Marine Safety Office. Boston, MA.
- Write, Jane McNally. 1993. Rethinking Moorings in Massachusetts: Lessons from 1991 Coastal Storms. Massachusetts Coastal Zone Management Program. Boston, MA.



Rhode Island Sea Grant

# FACT SHEET

## Hurricane Plan for Boaters

P 1266

by Mark **Amaral**  
Coastal Resources Center

If your boat is moored, docked, or stored in a recreational harbor on the East Coast, the threat of hurricanes is a very real concern. Even the least severe Category 1 hurricane can have devastating effects in today's crowded harbors. These high-density areas can be disasters waiting to happen because of the close proximity of vessels to one another, faulty mooring maintenance, and lack of hurricane preparedness.

Although the harbor manager, harbormaster, or port director tries to ensure that boats in their harbor are safe, the final responsibility falls upon the boat owner. Owners are ultimately responsible for their vessel. In order to protect personal property and the vessels around them, owners must: (1) know their boats and their own skills; (2) know the surrounding area; and (3) have a plan.

Creating a plan and being ready for a hurricane starts well in advance of the boating season. When vessel owners prepare their vessels for the boating season, they should also prepare a hurricane plan. This plan should review all the options available. Prior to the hurricane season, decisions should be made as to where the safest place for the vessel would be, the adequacy of the present mooring or dock, and what type of equipment is necessary to have on board.

The following are options for safeguarding recreational boats. Only the vessel owner can decide which is best.

### OPTION I: Get Out of the Water

If the vessel is small and trailers easily, it should be taken out of the water and moved to higher ground. This is the safest means of protecting a vessel. Getting a vessel out of the water, however, does not automatically mean that it is safe. It is only protected from the storm surge and wave action-rain and wind must still be considered. The best solution is to store these vessels in a covered area, such as a garage. If this is impossible, then all equipment, including oil and gas cans,

personal flotation devices, oars, paddles, and other loose gear, should be removed and stored indoors. The trailer frame should be placed on blocks so that the frame will carry the boat's weight instead of the axle and springs.

The drain plug should be installed, and the boat should be partially filled with water if the hull is strong enough to withstand flooding (as are most fiberglass hulls).

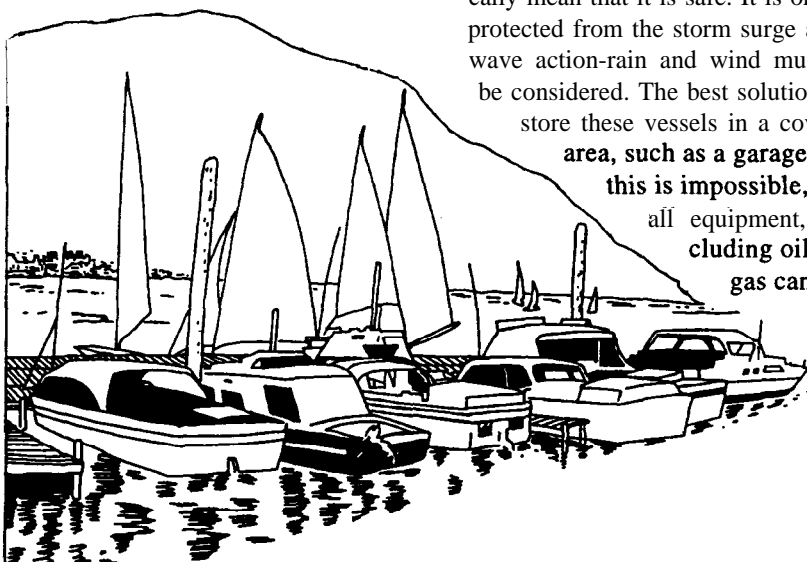
If the hull is not strong enough to hold water (plywood- or wooden-planked hulls), use multiple anchor tie-downs to hold the boat and trailer in position, and remove the plug. Consider large tent pegs (2 feet) or house trailer tie-downs for this anchoring system.

### OPTION II: Stay In the Water

Staying in the water assumes that the vessel will either: (1) stay on the mooring or dock; (2) go to a hurricane hole to anchor; or (3) head out to sea. Each of these options should be considered and accurate information collected well in advance of the hurricane season.

#### Dock

The decision to remain in port will probably depend on the intensity of the storm, the protection afforded by the harbor, and the condition of the dock or mooring. If the decision is made to stay at the dock, then precautions need to be taken. Ensure that all lines are doubled and that chafing protection is in place where dock lines pass through fairleads and chocks or over the side of



the vessel. The best chafing protection is to cover lines with a rubber hose of the same diameter as your line, then tightly wind it with heavy fabric and fasten with a heavy commercial tape. A vessel tied to a dock should have ample fenders to provide protection to the hull. Dock lines should be attached to the high end of the pilings, rather than to the cleats or other fastenings on the dock. As flooding and the storm surge raises the water level, dock lines will move up the pilings.

## Mooring

Staying at the mooring may be the best option if you've ensured that the mooring tackle meets safety standards and has been inspected for wear. Any mooring gear that has worn by one-third of its original diameter should be considered unsafe.

One of the drawbacks of staying at the mooring, like staying at the dock, is the threat of a storm surge. If the water level rises even moderately above present conditions, the mooring scope may not provide sufficient holding power. This can be combatted by checking with expected storm-surge reports prior to the hurricane.

Regardless of whether you choose to stay at the dock or mooring, there are some fundamental steps that need to be taken. The first is to minimize windage, or the amount of surface area that the wind can act against. The more surface area for the wind to act on, the greater the strain on your vessel and the dock or mooring. If possible, remove sails entirely and stow them below decks, especially roller furler jibs. If it is not possible to remove sails, then it is imperative to fasten them as securely as possible. Next, look around for other possible objects that could result in added windage, including flags and pennants, and store them properly. Make sure that all ports are closed securely and that all funnels are removed and capped. Using stiff lines from both sides, secure the tiller or wheels that operate the rudders; do not leave coils of line on the deck without proper stops or other means of render-

ing them immovable; and take out all the slack from any running lines on the deck or mast. Finally, you must face the possibility that your vessel, or a vessel nearby, may break loose. In order to minimize the impact of loose vessels in a crowded harbor, it is important to remove and stow all protruding objects and set fenders on both sides, if at a mooring, or outside of a docked boat.

## Hurricane Holes

If your boat is in a crowded anchorage zone, you may consider moving your vessel to a "hurricane hole" or area for safe anchorage. Small soft-bottom coves that are less crowded are traditional spots. Before making such a move, consider the fact that hurricane holes can become crowded with vessels seeking refuge from impending storms. This instantly eliminates one of the reasons for going to such places. If you do decide to utilize a hurricane hole, consider the following: Hurricane holes should be located before the storm season by consulting an inland chart. It is best to look for a location that has deep water (you may have to arrive at low tide) and is close. The best spots have a route that is free of highway and railroad bridges and has good protection, such as a high bluff, an outer reef, or tall trees on as many sides as possible. It is a good idea to visit potential hurricane holes prior to the hurricane season, test the bottom, and note the surroundings. Multiple hurricane holes should be tested and several options should be available in the event of a hurricane.

Arrive at a hurricane hole at least 12 hours prior to landfall, and set your anchor with at least a 7-to-1 scope (i.e., in 30 feet of water, 210 feet of anchor line is needed). Nylon is the best anchor line because of its elasticity. Chafing protection should be used where the anchor line passes through the anchor chute chocks. Experts recommend that you leave by means of a small boat once your vessel is securely anchored, and that all automatic switches have been double-checked.

If you elect to stay aboard, stay in touch with all weather advisories. It is important to have stocked up on fuel, water, food, ice, clothing, a portable radio and flashlight with extra batteries, and any prescription medicines. It might be necessary to put the engine in gear during the worst part of the storm to ease the strain on the anchor line, as well as to have someone stay awake on anchor watch at all times to prevent the boat from drifting. To help maintain your position, use a spot light and/or radar at night. To see if water or debris is accumulating, and to make sure the pumps are operating, check the bilge regularly. Finally, traditional markers or navigation aids may have been rearranged by the storm. It is important, therefore, not to rely solely on those aids to guide you.

## Do Not Go Offshore'

Unless you are the owner of a large recreational vessel, 100 feet or greater, experts do not recommend that you go offshore. Hurricane conditions at sea are extremely violent. Going offshore should not be considered as a viable option for most recreational boaters. Remember, the objective is to minimize property loss without jeopardizing safety.

---

For Further Reading:  
"Hurricanes," Rhode Island Sea Grant, April 1992.

"How to Deal With the Aftermath of a Hurricane," Rhode Island Sea Grant, April 1992.

---

Source: South Carolina Sea Grant.

Editing and layout by Rhode Island Sea Grant Communications Office.