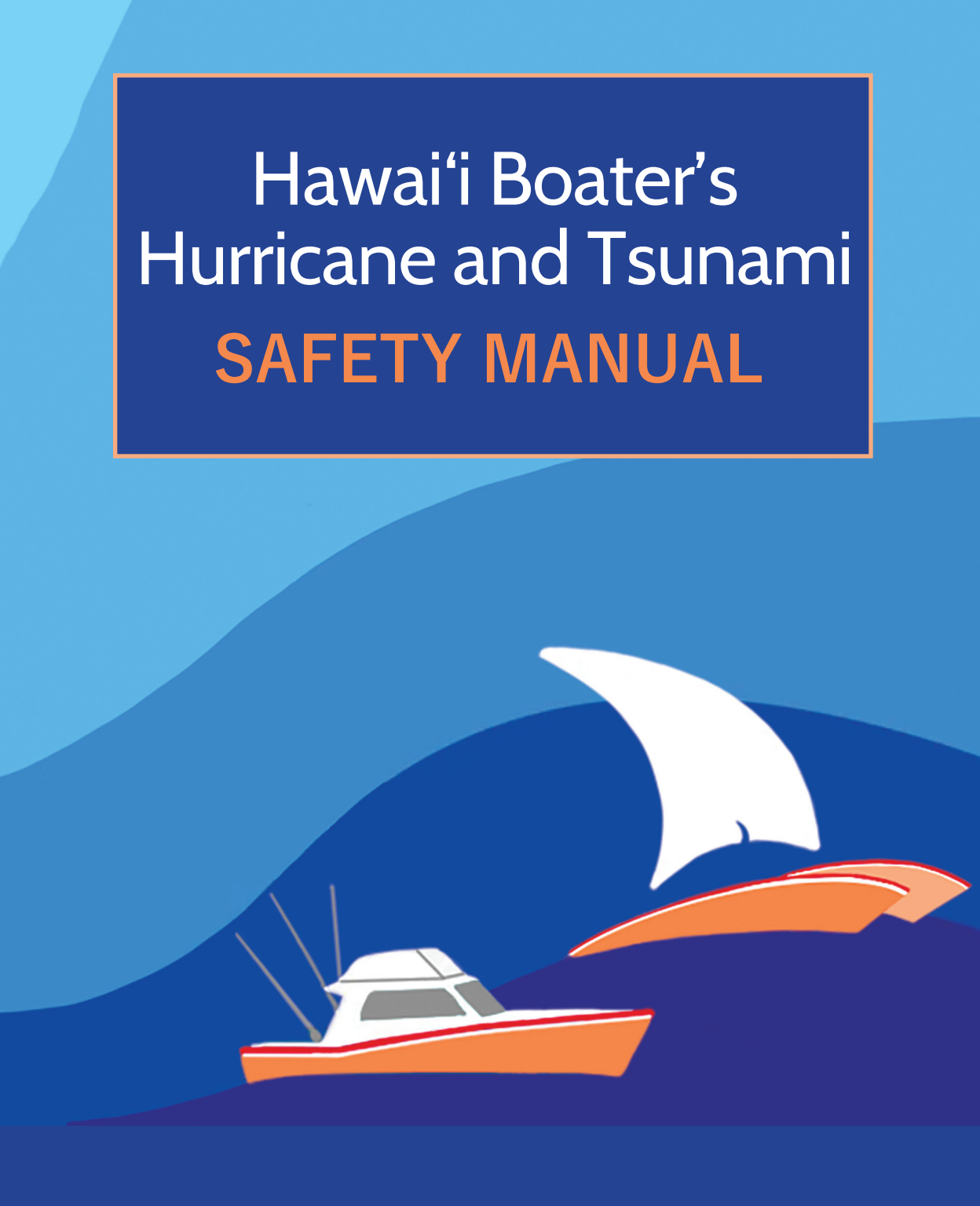
Hawai‘i Boater’s Hurricane and Tsunami SAFETY MANUAL



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July 2025

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INTRODUCTION

Hurricanes are the most severe of all tropical cyclones and have great potential for widespread destruction in Hawai'i. This was demonstrated in 1982 by Hurricane Iwa and in 1992 by Hurricane Iniki. Total damages in Hawai'i from Iwa were estimated at $250 million, and from Iniki at $2.4 billion. Hurricanes impact coastal areas, especially harbors and marinas, where they cause widespread damage to boats and marine facilities. The Hawai'i Emergency Management Agency and the University of Hawai'i Sea Grant College Program (Hawai'i Sea Grant), in cooperation with the State of Hawai'i Department of Land and Natural Resources (DLNR) Division of Boating and Ocean Recreation, have developed this manual to give Hawai'i's boaters the information they need to protect their lives and property when a hurricane or other severe storm threatens. The manual also includes a section on tsunamis, another serious threat to boaters and the marine community in Hawai'i.

Most hurricanes that impact Hawai'i originate off the coasts of Central America or southern Mexico and then move in a west-northwest direction toward the Hawaiian Islands. Some hurricanes have formed to the south and southwest of Hawai'i and have threatened the islands. Whatever their source, hurricanes often dissipate before they reach the islands or pass to the south, east, or west. Storms that do not strike the islands can still cause significant damage through high surf and heavy rain, which can cause flooding and landslides. On occasion, hurricanes strike Hawai'i, causing considerable damage. Hurricane Iwa in 1982 and Hurricane Iniki in 1992 were especially destructive, causing billions of dollars in damage, especially on Kaua'i. In addition to the considerable damage on land, boats in the harbors were hard hit, with many of them tossed onshore like toys and completely destroyed. In the aftermath of these great storms, many members of the boating community felt that they needed specific guidelines for action–especially since, with Hawai'i situated in the Central Pacific hurricane corridor, the probability of another hurricane striking the islands is great. Thus, the original version of this manual was published in 1998.

For boaters, tsunamis pose a threat similar to hurricanes, so it is appropriate to address the tsunami threat in this manual as well. The tsunamis of 1946 and 1960, from the Aleutian Islands and Chile respectively, were the most damaging of recent history.

The 1946 tsunami delivered damaging waves to all the Hawaiian Islands, while the damage from the tsunami of 1960 was concentrated along the shorefronts of Hilo, Hawai'i and Kahului, Maui.

The damage to Hawai‘i from the tsunami in Japan in 2011 was somewhat smaller, but caused damage in all small boat harbors in the state. Currents produced by the 2011 tsunami were especially severe at Ke‘ehi Lagoon on O‘ahu, where floating docks broke free and more than a hundred vessels were severely damaged or sunk.

This updated manual provides a summary of the actions boaters and other members of Hawai‘i’s marine community can take before, during, and after a hurricane or tsunami. It includes information on these events and their dangers, provides guidelines to develop a personal preparedness plan, and lists emergency assistance information (phone numbers, radio frequencies, and hurricane evacuation shelter locations). The statements and procedures contained in this manual should be modified or supplemented to meet the specific needs of individual boat owners. It is intended that this manual complement state statutes, Hawai‘i administrative rules, and county codes and ordinances whose provisions shall prevail in the event of a conflict.

KEY DEFINITIONS

Category
Classification of hurricane strength based on sustained wind speed in miles per hour. Category 1: 74 to 95 mph (64 to 82 knots); category 2: 96 to 110 mph (83 to 95 knots); category 3: 111 to 129 mph (96 to 112 knots); category 4: 130 to 156 mph (113 to 136 knots); and category 5: 157 mph (137 knots) or greater.

Gale Warning
A warning of sustained surface winds, or frequent gusts, in the range of 39 to 54 mph (34 to 47 knots) inclusive, either predicted or occurring, and not directly associated with a tropical cyclone. See also Storm Warning.

High Surf Advisory/Warning
The National Weather Service (NWS) now has a two-tiered system for high surf, with the criteria for advisory and warning varying by the coastal sector and island, as described in the following table:

Advisory and Warning Criteria

Location	Advisory	Warning
North-Facing Shores – All Islands	15 ft.	25 ft.
West-Facing Shores – Hawai'i Island	8 ft.	12 ft.
West-Facing Shores – Remaining Islands	12 ft.	20 ft.
South-Facing Shores	10 ft.	15 ft.
East-Facing Shores	10 ft.	15 ft.

All surf heights and forecasts are for the full-face surf height, from the trough to the crest of the wave.

Hurricane
A storm with distinct rotary circulation at the surface of the ocean with sustained winds of 74 mph (64 knots) or more.

Hurricane Warning
Hurricane conditions (sustained winds of 74 mph or higher) are expected in the specified area of the warning, but the warning is called 36 hours before the expected arrival of the tropical storm winds (sustained winds of 39 to 73 mph). Complete hurricane preparations and implement your hurricane plan if directed by officials. When a Hurricane Warning is called, the sirens will sound, and the warning will be broadcast by local media.

Hurricane Watch
Hurricane conditions (sustained winds of 74 mph or higher) are possible in the specified area of the watch, but the watch is called 48 hours before the possible arrival of the tropical storm winds (sustained winds of 39 to 73 mph). During a watch, prepare your boat and review your emergency plan in case a hurricane warning is issued. Preliminary preparations should begin even before a watch has been issued.

Small Craft Advisory
A statement issued by the National Weather Service when the winds are, or expected to be, between 29 and 38 mph (25 and 33 knots), and/or when combined seas are, or expected to be, 10 feet or greater, thereby producing conditions hazardous to small craft.

Squall
A strong wind of sudden onset and short duration.

Storm Surge
An abnormal rise of water above the predicted astronomical tide caused partly by the low pressure of the storm and mostly by winds driving water onshore. On top of the astronomical tide and storm surge, there are waves, which give a Total Water Level during a hurricane that can inundate coastal areas, erode beaches, and destroy shoreline roads, structures, boats, and marinas.

Storm Warning
A warning of sustained surface winds, or frequent gusts, in the range of 55 to 73 mph (48 to 63 knots) inclusive, either predicted or occurring, and not directly associated with a tropical cyclone. See also Gale Warning.

Tropical Storm Warning
Tropical storm conditions (sustained winds of 39 to 73 mph) are expected in the specified area of the warning, usually within 36 hours.

Tropical Storm Watch
Tropical storm conditions (sustained winds of 39 to 73 mph) are possible in the specified area of the watch, usually within 48 hours.

Tornado
A violently rotating column of air extending down from a cumulonimbus cloud or thunderstorm.

Tropical Cyclone
The general term for all cyclonic circulations (storms rotating counterclockwise in the northern hemisphere) originating over tropical waters and classified by form and intensity to include, in order of increasing strength, tropical depressions, tropical storms, and hurricanes.

Tropical Cyclone Public Advisory
Once a disturbance develops into a tropical cyclone (tropical depression, tropical storm, or hurricane), advisories are issued every six hours. The Tropical Cyclone Public Advisory contains a list of watches and warnings and provides information on the cyclone position in terms of latitude and longitude coordinates, the distance from a selected land point or island, as well as the current motion. The Public Advisory includes the maximum sustained winds and the estimated, or measured, minimum pressure. The Tropical Cyclone Forecast/Advisory contains similar information as the Public Advisory but also includes the cyclone's position, intensity, and estimated wind fields for 12, 24, 36, 48, 60, 72, 96 and 120 hours from the current time. Boaters should actively monitor advisories so that they can adequately prepare well in advance of a hurricane watch or warning.

Tropical Depression
A storm with distinct rotary circulation at the surface of the ocean with sustained winds of 38 mph (33 knots) or less.

Tropical Disturbance
A moving body of thunderstorms that maintains its identity for 24 hours or more.

Tropical Storm
A storm with distinct rotary circulation at the surface of the ocean with sustained winds of 39 to 73 mph (34 to 63 knots).

Tropical Weather Outlook
During hurricane season, the National Weather Service issues a Tropical Weather Outlook four times daily, with the outlook assessing the genesis potential of tropical disturbances over the next 48 hours.

Tsunami
A series of ocean waves that are set in motion by great disturbances in the earth's crust. These disturbances are normally earthquakes, or natural events associated with earthquakes, such as volcanic eruptions and explosions that vertically displace the water column in the ocean.

Tsunami Advisory
A tsunami is expected but will not be large enough to cause significant land flooding. Evacuation of the coast is not necessary, but the beach and coastal waters may be hazardous because of unusual waves and strong currents. Sirens will not sound, but beaches will be closed. The advisory will be continued until wave action falls below danger levels, which may take several hours.

Tsunami Warning
A damaging tsunami is expected, and people should evacuate from the tsunami zones. When a warning is issued, sirens will sound, and the warning will be broadcast by local media. Normally, a warning is issued at least three hours before the tsunami arrives; the time the tsunami is to arrive is part of the warning and will be repeated by the media. The warning continues until wave heights have dropped below hazard levels, which may be more than 12 hours. After a damaging tsunami, the warning will be downgraded to an advisory as the threat dimishes, but the advisory may remain in effect for six hours or more before being cancelled. See also, Urgent Local Tsunami Warning.

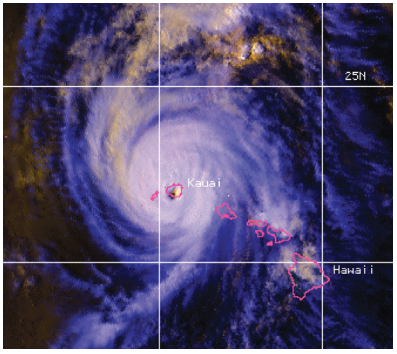
Tsunami Watch
The potential for a damaging tsunami is present, but the existence of a tsunami has not yet been confirmed. A Tsunami Watch will always be upgraded to a Tsunami Warning or a Tsunami Advisory, or will be cancelled. If it is upgraded to a warning or advisory, that upgrade will occur with a target of at least three hours before the tsunami arrives. If you learn that a Tsunami Watch has been issued, tune in to local television or radio for further information and prepare to evacuate in case the watch is upgraded to a warning.

Urgent Local Tsunami Warning
Issued when there has been a major earthquake in the Hawaiian Islands and a damaging tsunami is likely within minutes. If you feel the ground shaking so severely that you have difficulty standing, take the shaking as a natural tsunami warning and move inland immediately, do not wait for the sirens to sound. If you feel shaking, even if it is not very severe, and the sirens sound within a minute or two, immediately leave the coastal area, preferably on foot. Tune in to local television or radio once you are out of the evacuation zone. If you are on the water at a dock, the compressional shock waves in the water from an earthquake will feel as if the hull has been hit or the boat has run aground. Evacuate the marina immediately. If you are on the water at sea, and an earthquake is felt, head to deeper water (over 300 feet).

Waterspout
A tornado occurring over water.

Part 1

HURRICANE INFORMATION



NOAA satellite image of Hurricane Iniki over Kaua'i, September 11, 1992. The band of strong winds and rain surrounding the eye of the hurricane missed the more populated islands of O'ahu, Maui, and Hawai'i, as Iniki passed west of these areas.

General Hurricane Information

Origin

Most Central Pacific hurricanes originate in the warm, tropical waters near the coasts of Central America or southern Mexico and then move west-northwest. Many of them dissipate as they encounter unfavorable atmospheric and oceanic conditions such as cooler water, but those that survive follow a conventional path that brings them across the Central Pacific toward the Hawaiian Islands.

In Hawaiian waters, they usually pass below or south of the islands and tend to veer northwest below or beyond Kaua'i. Fortunately, most of them remain far enough away to spare the state severe effects. Hurricanes also originate outside of the conventional corridor described above. Some of them form closer to Hawai'i, while a few, like Iwa, even originate far to the southwest.

Season

The official hurricane season in Hawai'i is from June 1 through November 30. Most Central Pacific hurricanes occur in July, August, and September, but may occur as late

as December, and could occur any time of the year, although that is infrequent. During some years many hurricanes occur, whereas in others, there are few or none. The Central Pacific Hurricane Center in Honolulu issues a seasonal outlook typically in May that forecasts the number of tropical cyclones that are expected to occur within the basin in the upcoming season. Regardless, if the forecasts call for an active season or not, boaters should prepare every year before hurricane season because it only takes one hurricane to cause great devastation.

To show how Tropical Cyclone activity changes through the year, the frequency of Hurricanes (red), Tropical Storms (yellow) and Tropical Depressions (green) are plotted by month.

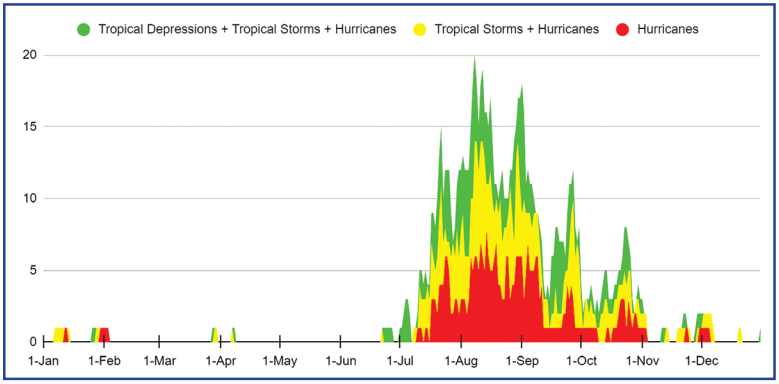


Figure courtesy of the National Weather Service

Characteristics

A hurricane is a type of tropical cyclone, an atmospheric disturbance that originates over warm tropical waters with winds that rotate in a counterclockwise direction. Tropical cyclones are classified by form and intensity and include tropical depressions, tropical storms, and hurricanes. When the sustained wind speed in a tropical cyclone reaches 74 miles per hour (64 knots), it is classified as a hurricane.

Stated simply, hurricanes are giant whirlwinds in which air moves in a large, tightening spiral around a calm center of extremely low pressure, the eye of the hurricane. In the Northern Hemisphere, the wind circulation is counterclockwise and reaches maximum velocity in a circular band extending outward 20 to 30 miles from the rim of the eye. Near the eye, winds may gust to more than 200 miles per hour (174 knots). Winds of 39 miles per hour (34 knots) and greater can extend 200 miles or more in all directions from the center of the hurricane. The entire storm dominates the ocean surface and lowers atmospheric pressure over thousands of square miles.

The eye, within the spiral structure of the storm, is unique to hurricanes. In the eye, winds are light and skies are clear or partly cloudy. However, this is a deceptive calm, bordered as it is by maximum force winds and torrential rains. Many people have been injured or killed when they ventured out from a safe shelter during the calm of the hurricane's eye, only to be caught in the maximum- force winds at the far side of the eye which blow in the opposite direction from the winds in the leading half of the storm. These winds are responsible for flying debris, one of the greatest dangers during a hurricane.

Hurricanes are extremely dangerous because they combine the multiple effects of violent winds, torrential rains, abnormally high surf, and storm surge. Each of these weather phenomena alone is hazardous, but in combination they pose a serious threat to life and property. In Hawai'i, hurricane winds, especially when accelerated by local terrain, are very damaging to all types of vegetation and structures. Hurricane rain can cause landslides and flash floods. High surf generated by hurricane winds reaches the islands while the storms are still several hundred miles away, causing dangerous conditions along the coast. When hurricanes approach or strike the islands, abnormally high, wind-driven surf inundates coastal areas, eroding beaches and destroying shoreline roads and structures. Storm surge from hurricanes presents a great danger to boaters and others in low-lying coastal areas. As a hurricane moves across a coastal area, it may create a storm surge that will make the ocean rise several feet or more above the normal high tide level, and if the storm surge is accompanied by high surf, coastal lowlands may be severely flooded and battered.

Movement

In their conventional corridor, hurricanes move to the west-northwest, pushed along by surface winds. In the Central Pacific they move slowly, usually 15 miles per hour or less, and are often stationary for short periods of time. Typical forward speed of a hurricane is from 11 to 14 miles per hour. As they move farther north from the equator, their forward speed tends to increase, and at middle latitudes may exceed 50 miles per hour in extreme cases. Although hurricanes normally follow an established path that carry them to the south of Hawai'i, their behavior can sometimes be erratic. It is this measure of unpredictability and the extended geographical effects of high surf, heavy rains, and landslides that necessitate taking precautionary measures when a tropical storm is in the Central Pacific.

During hurricane season, the NWS maintains a constant watch over any tropical disturbance that could develop. The NWS's Central Pacific Hurricane Center issues a

Tropical Weather Outlook four times daily during hurricane season, with the outlook assessing the genesis potential for tropical disturbances over the next 48 hours and over the next seven days. The probability of development will be stated to the nearest 10 percent for each area of interest. If a disturbance becomes a tropical depression, the NWS will issue advisories, which detail the tropical cyclone's (TC) location, intensity, speed and direction of travel. Advisories are issued on a more frequent basis if the TC threatens any portion of the island chain.

General Precautionary Measures for Boaters

The key to protecting boats from hurricanes or any severe threatening weather is planning, preparation, and timely action. The following precautionary measures are meant for use as guidelines only. Each boat owner needs a plan unique to the type of boat, the local boating environment, and the weather conditions likely to occur in that region. The following preparatory and precautionary measures are issued as guidelines for use by the boating community. While these precautionary measures may not be applicable to everyone in all instances, it is anticipated that common sense and good judgment will prevail in determining which measures should be used.

1. **Hurricane Plan.** Your hurricane plan should be written. Prior to hurricane season, develop a detailed plan of action that includes: (a) securing your boat in the marina or harbor (if permitted); removing your boat from the marina or harbor, or taking your boat to a previously identified hurricane refuge; and (b) identifying and assembling equipment and supplies. Specific details and worksheets are provided later in this manual. Keep your hurricane plan with your equipment and supplies. Practice it before every hurricane season to ensure that it works, as access or other circumstances may change over time. Determine how valuable equipment will be removed from the boat and how long it will take to do it. You will need to have an accurate estimate of the time and work involved.

2. **Plan Implementation When You Are Away.** Arrange for a knowledgeable friend (preferably a boater who is familiar with your vessel and its state of readiness) to conduct your hurricane plan if you are out of town during hurricane season. If your vessel is moored in a state recreational boating facility and you are out of state, off island, or otherwise unable to immediately respond to an emergency related to your vessel for any length of time, you are required to have a caretaker serve in this capacity.

3. **Responsibilities.** Check your lease or storage agreement with management personnel of the marina, harbor, or storage area. Know your responsibilities and liabilities as well as theirs. Make sure they have your most current contact information and the name and current telephone number of the person you have designated to care for your boat in your absence.

4. **Records**. Consolidate your records, including copies of insurance policies; recent photos of your boat; boat registration; equipment inventory; lease agreement with the marina, harbor, or storage area; and telephone numbers of appropriate authorities such as the harbormaster, Coast Guard, and your insurance agent. Take them with you after securing your boat, you may need them when you return to check on your boat.

5. **Inventory.** Keep a list of the items from your equipment inventory that you took off the boat. Items of value should be marked so they can be readily identified.

6. **Final Provisions.** When a hurricane is impending and you have made your final anchoring, mooring, or storage provisions, remove all portable equipment such as canvas, sails, dinghies, radios, cushions, biminis, and roller furling sails. Lash down everything you cannot remove, such as tillers, wheels, and booms. Make sure the electrical system is shut off, unless you plan to leave the boat in the water. Remove the battery to eliminate the risk of fire or other damage unless the battery is needed to run automatic bilge pumps.

Specific Precautionary Measures for Boat Owners

In addition to the general precautionary measures which should be taken no matter where you plan to leave your boat during a hurricane or other severe weather, the following specific precautionary measures should be taken depending on the situation.

Trailered Boats

1. If your boat can be trailered away from the shoreline and placed in a safe area, then as part of your hurricane plan you should identify the vehicle and the trailer to be used to move the boat. Be sure your tow vehicle is powerful enough to move your boat, and your trailer and vehicle are in good working condition. Too often, a flat tire or a broken axle will prevent the owner from moving their boat.

2. Once at a safe location, lash your boat to the trailer and place blocks between the frame members and the axle inside each wheel. Owners of lightweight boats, after consulting with the manufacturer, may consider letting half of the air out of the tires and then filling the boat one-third full of water to help hold it down. The blocks will prevent damage to the springs from the additional weight of the water.

3. Secure your boat with heavy lines to fixed objects. Because hurricane winds rotate and change direction, try to pick a location that allows you to secure it from four directions. Anchors screwed in the ground can serve as fixed objects for your lines.

Non-trailerable Recreational Boats

Non-trailerable recreational boats are usually large boats berthed in a marina, harbor, or moored offshore. Owners need to select one of the following three options, each of which requires a different strategy to protect their boat:

1. Secure the boat in its berth
2. Moor the boat in a previously identified safe area
3. Haul the boat out of the water

The option of running from a hurricane is not listed here for recreational boats because it may bear considerable risk for many recreational boats not designed for commercial use or not operated by individuals with professional mariner credentials or experience. Hurricanes can change forward speed, direction, and wind intensity quickly. High seas, waves, or swell will extend many hundreds of miles in advance of a hurricane, creating hazardous sea conditions. This makes the decision of when to leave and where to go very difficult to anticipate. Boaters who consider running from a hurricane must keep their vessel in a very high state of readiness. If a boater decides to launch when a warning is issued, the vessel should already be prepared for extended, open ocean travel and severe storm conditions. A vessel's insurance policy may not cover sea voyages beyond a certain distance from shore. The boat must have sufficient supplies to sail a considerable distance to wait out the storm, multiple methods for communication, global positioning capabilities, an experienced crew, and devices that provide real-time weather updates away from land (i.e., outside of cell phone range). **It is critically important for a boater to be realistic about his/her abilities and the vessel's state of preparedness to prevent loss of life and endangering rescue personnel and vessels.**

Boats Remaining in a Berth

1. Double all lines. Rig crossing spring lines fore and aft. Attach the lines high on the pilings to allow for the storm surge. Make sure the lines are secured and will not slip off the pilings. Inspect the pilings and choose those that seem the strongest, tallest, and are properly installed.

2. Cover all the lines at the contact points to prevent fraying because of chafing. Wrap the lines with tape, heavy plastic bottles, rubber hoses, or similar items. Install fenders to protect the boat from striking the pier, pilings, and other boats.

3. Assess the attachment of the primary cleats, winches, and chocks. They should have substantial back plates and be secured by adequate-sized bolts, preferably ones made of stainless steel.

4. Make sure batteries are fully charged and able to run automatic bilge pumps for the duration of the storm. Turn off or disconnect all electrical devices except the bilge pumps. When it is safe to return to your vessel, bring spare charged batteries to replace depleted ones to run the bilge pump, if necessary.

5. Do not stay aboard. After you have secured the boat, leave the area and seek shelter in a safe haven.

Boats Tied to an Offshore Mooring

1. Double your anchor lines and set port and starboard anchors both fore and aft.

2. Cover all the lines at the contact points to prevent fraying because of chafing. Wrap the lines with tape, heavy plastic bottles, rubber hoses, or something similar.

3. Assess the attachment of the primary cleats, winches, and chocks. They should have substantial back plates and be secured by adequate-sized bolts, preferably ones made of stainless steel.

4. Make sure batteries are fully charged and able to run automatic bilge pumps for the duration of the storm. Turn off or disconnect all electrical devices except the bilge pumps. When it is safe to return to your vessel, bring spare charged batteries to replace depleted ones to run the bilge pump, if necessary.

5. Do not stay aboard. After you have secured the boat, go ashore and seek shelter in a safe haven.

Boats Hauled Out of the Water

1. Determine the safest haven for your boat and make arrangements to move it there. When selecting a safe location, be sure to consider whether storm surge could rise into the area.

2. Wherever you choose to locate your boat for the duration of the hurricane, lash your boat to its cradle or trailer with heavy lines and consider, based on the weight of the boat, adding water to the bilge to help hold it down.

3. Never leave your boat in davits or on a hydro lift.

Hurricane Plan for Boat Owners

All boat owners should take the time and effort to develop a hurricane plan to protect themselves and their property. Marine-related facilities, service organizations, and insurance companies consider it reasonable to expect boat owners to take necessary precautions to secure and protect their boats. The following information should be considered when developing a hurricane plan:

Prior to Hurricane Season

1. Make sure your vessel is in sound condition. This includes the hull, deck hardware, rigging, ground tackle, machinery, and electronics. Absentee owners should arrange for a boatyard haul-out or a supervised inspection of the boat prior to hurricane season. The inspection should include making sure that the batteries are charged, the bilge pumps are operational, and all equipment is secured.

2. Enhance the watertight integrity of your boat, both above and below the waterline. Seal portlights, deadlights, companion ways, and hatches using duct tape if necessary. Shut seacocks and cap off or plug un-valved through-hull fittings such as sink drains.

3. Inspect the vessel's deck hardware considering planned mooring arrangements. Assess the size and structural attachment of the primary chocks, cleats, bitts, bollards, and winches. These high load/high-stress points should have substantial backing plates and should be secured with bolts of adequate size.

4. Give special attention to the mooring lines to prevent them from chafing. Consider using a double neoprene hose, a proven example of successful chafing gear, or a fire hose.

5. Use double lines for storm moorings, whether at dock or otherwise. The second set of lines should be a size larger than the normal lines, including spring lines at a dock.

6. Purchase necessary materials–such as additional lengths of mooring lines, screw anchors, fenders, fender boards, chafing gear, and anchors–ahead of time. These items may not be readily available during hurricane season or just prior to a hurricane.

7. If the boat is to be left unattended during the hurricane season, haul it into a storage yard or leave it on its trailer. If the boat is not trailerable, arrangements should be made for wet storage at a marina or harbor.

8. Make up an inventory of all vessel equipment as part of your hurricane plan. Note the items that are to be removed from the boat if you must implement the plan.

9. For wet berthing locations, ensure that seawalls and docks are sound, mooring bitts and cleats secure, and dock pilings and dolphins in good condition.

10. At private berthing and dock facilities in residential areas, coordinate safety and mooring plans with neighbors and other boat owners in the area.

11. Get copies of harbor or marina facilities' own hurricane plans and procedures for boats at their facilities and keep them with your personal hurricane plan. Check with the local civil defense or emergency management offices for copies of preparedness information.

12. If your hurricane plan calls for moving your boat from its current berthing location, rehearse your planned boat movement, including an actual visit to the alternate docking, mooring, or anchoring location.

13. If your plan calls for moving your boat from its current berthing location to an inland waterway, know your boat's navigation requirements, including bar and bridge restrictions at different tides.

14. Make a list of reputable salvage operators and repair facilities in your area. Include the list in your hurricane plan.

15. Be sure that your family and crew members are familiar with your hurricane plan in advance and how they can contact you or your designated representative or agent.

16. Make sure that your plan includes a quick response to protecting your boat if a hurricane watch is announced. Moving a boat, stripping sails, derigging, and anchoring in high winds and stormy seas may be extremely difficult, and at times impossible.

17. Make copies of your hurricane plan with inventory of equipment and keep one on the boat, one at home, and, if appropriate, a third copy at the office.

18. Make sure the insurance policy on your boat is current. Read the policy thoroughly. It should contain some helpful information regarding your actions if your boat does sustain hurricane-related loss or damage. Be sure you understand what is covered and what is not, and your duties as a boat owner.

19. Many boat owners are homeowners. Your hurricane plan should have enough preparation time to implement protection measures for your boat, family, and home. This will require preparation before hurricane season and prior to a Hurricane Watch. Monitor Tropical Cyclone Public and Tropical Cyclone Forecast Advisories (in Key Definitions section). See the *Homeowner's Handbook to Prepare for Natural Hazards* (https://bit.ly/NaturalHazardPreparedness).

Prior to the Hurricane

1. If your plan calls for moving your boat, do it before or as soon as a Hurricane Watch is issued by the National Weather Service. A Hurricane Watch is issued when hurricane conditions pose a possible but uncertain threat to a specific coastal area within 48 hours. If you do move your boat, make sure of the following:

   ✓Fuel tanks are empty
   ✓Fuel filters are clean
   ✓Batteries are charged
   ✓Bilges are clean

✓Cockpit drains are free and clear
✓Fire-fighting equipment is operational
✓Lifesaving equipment is accessible and in good condition
✓Marine band radio, if installed, is in proper working orde

2. If your plan does not call for moving your boat, remove or secure all deck gear, portable gear, portable radios, radio antennas, outriggers, fighting chairs, deck boxes, bimini tops and side canvas/curtains, sails, booms, dorades, extra halyards, canister rafts, and dinghies. Make sure you secure all hatches, ports, companionways, lazarettes, and sailboat rudders. Remember that you may need the dinghy to take line ashore. Consider minimizing the amount of fuel in your gas tanks and placing absorbent pads in the bilge and around the engine to reduce the release of hazardous materials (HAZMAT) should a breach occur.

3. When removing equipment from the vessel, remember to remove the Emergency Position Indicating Radio Beacon (EPIRB) (if equipped) to avoid making an unintended false distress call to the U.S. Coast Guard. Be sure to keep the EPIRB readily accessible to place back on board when you're ready to get the boat underway again.

4. Monitor VHF Radio Channel 16 or go to Port Status Navigation Center (https://www.navcen.uscg.gov/port-status?zone=HONOLULU) to remain aware of any commercial port restrictions established by the U.S. Coast Guard Captain of the Port. Those without internet or VHF access can also call the U.S. Coast Guard Command Center at 1-808-842-2600.

5. Wherever your boat is moored, assume that it will be subject to storm surge that is 5 to 10 feet greater than normal tidal movement, and adjust your lines accordingly. High surf and hurricane surge will precede the estimated time of arrival of the hurricane. For boats in rivers or canals, the best mooring location is in the center of the river or canal where double mooring lines can be secured to both shores, port and starboard, fore and aft.

6. Do not raft boats together at moorings or docks, especially if larger and smaller boats are involved. The probability of damage to the boats is greater than if they are moored separately.

7. If the boat must remain dockside at a harbor or marina, use or install heavy duty fender boards (2" X 6") on a bare center piling to prevent or at least reduce damage. Lines should be doubled or even tripled where necessary to hold a boat in the center of a berth or off a seawall or dock pilings.

8. Do not attempt to move your boat once a Hurricane Warning has been issued. Leave your boat and initiate protective actions for yourself and your family. A Hurricane Warning is issued when the NWS expects hurricane force winds, but is announced when tropical storm winds (39 to 73 mph) are expected within 36 hours or less to give the public more time to prepare.

During the Hurricane

1. Do not stay aboard the boat during a hurricane. If you have taken all the precautionary measures in your Hurricane Plan, you have done all that can be done in anticipation of the storm.

2. Stay in a protected place or designated shelter. Attend to the safety of your family, your home, and other personal property.

3. Stay tuned to news broadcasts and weather advisories concerning the hurricane so you will know when the danger has passed.

After the Hurricane

1. Check your boat as soon as possible after the all-clear announcement is made. Be aware that there may be extensive damage in the area and that you may not be able to reach your boat due to downed power lines, blocked roads, and flooding in low-lying areas. Consider taking a spare battery just in case the one powering your bilge pump is depleted.

2. If you moored your boat in a river where it blocks traffic, move it as soon as possible. If other boats cannot navigate past you their operators may cut your mooring lines and let your boat drift, possibly causing more damage than the hurricane.

3. If your boat was damaged, be sure to check for fuel leaks or the odor of fuel.

4. If your boat was damaged and its security breached, take action to re-secure it as soon as possible. Looters will take advantage of any damaged boat if given the opportunity.

5. Report any non-storm-related theft, vandalism, or damage to a boat to the police or the appropriate law enforcement agency. Record the incident number and obtain a copy of the report as soon as possible to substantiate insurance claims or Internal Revenue Service (IRS) property loss reports.

6. If your vessel, or any other vessel you observe spilled oil, fuel, or other chemicals into the water, make an immediate report to the National Response Center by calling 1-800-424-8802, or make your report to the NRC Watch at email: (NRC@uscg.mil).

7. If the boat was damaged, take immediate action to save the boat and its equipment and to prevent further loss or damage. This action on the part of the boat owner is a requirement of all insurance policies. Boat owners are expected to take actions that uninsured people would take to save their property. Take photographs of the damage once the boat is secured.

8. If the boat appears to be unrepairable and a total loss, arrange to remove the hull from any navigable waterway as required by government authorities. Your boat should be hauled to a storage yard or salvage facility. Take photographs of the damage before the boat is moved.

9. If salvage removal of your boat is required, emergency or otherwise, and you are unable to contact your insurance agent or the harbor or marina representative, screen the salvage contractor for competence and evaluate the estimated cost. Read the contract carefully and find out where your boat is going and how secure the site is. Before the boat is hauled away, remove as much equipment as you can, make an itemized list of the equipment that remains, and take photographs of the damage.

10. When damage to your boat is repairable, make immediate arrangements to have the boat moved to a reputable repair yard. Obtain estimates and agree on the work to be done before authorizing the repairs.

Hurricane Plan for Other Members of the Marine Community

Harbor and marina operators, boat builders, boat dealers, and boat repair yards should consider the following information in developing a hurricane plan for their facilities.

Prior to Hurricane Season

1. Develop a written hurricane plan and distribute it to all employees. Because facility personnel will have their own family and property concerns to attend to, they must be made aware of their work-related responsibilities so they can plan accordingly.

2. Know your physical plant facilities, operational services, equipment, and standard operating procedures. Make assignments of personnel to be responsible for areas and operations of the facility. Designate team units and key people to manage them.

3. Review your hurricane plan with co-tenants and subcontractors in multiple occupancy facilities.

4. Review your facility's operations during the hurricane season and consider ordering supplies, stocks, and boating inventory items accordingly to keep exposure damage to a minimum.

5. Consider the number of permanent, transient, new, or brokered boats that you may be responsible for at any time during the hurricane season. In the event of an approaching hurricane, you will need to determine how you and your staff can secure these boats in place or move them to a safer inland site.

6. Keep a current list of all the boats in your care and their owners, captains, or caretakers, including their home and business phone numbers and addresses. Consider requiring boat owners to file a hurricane plan with you.

7. Conduct a complete facility housekeeping field day sometime in the spring or just prior to the start of hurricane season to clean up all open areas and structures within your facility. The cleanup should include but not be limited to the following:

    a. Removing all debris, trash, and unnecessary items from open areas
    b. Storing or securing all materials and supplies

c. Servicing, as necessary, building walls, roofs, windows, doors, docks, piers, wharfing, slip fingers, pilings, electrical and lighting installations, fuel and natural gas supply and equipment, portable and fixed fire-fighting equipment, mobile lifts, hydro lifts, and railways.

8. Order and stock extra equipment and supplies for emergencies, including mooring lines, lumber for fender boards, chafing gear, screw anchors, nails, hoses and clamps, oil absorbent pads, flashlights, batteries, portable generators, electrical and manual bilge pumps, and hull-patching supplies.

9. Test all equipment that may be used during an emergency such as portable generators and pumps.

10. Consider having one event per year (workshop, fair, seminar, etc.), before the beginning of hurricane season on June 1, to educate boaters on best practices, preparation tips, and harbor/marina plans, policy, and practices. The information disseminated should be correct and up to date.

Prior to the Hurricane

Even the smallest marine facility has numerous tasks to perform in preparation for a hurricane. However, 72 hours is probably the minimal time needed in most instances for a facility owner or administrator to undertake the following.

48 to 72 Hours Prior

1. Notify facility employees that they should begin implementing their hurricane plan.

2. Consider terminating activities of all mobile or waterborne operations, if any, within 24 hours.

3. Initiate facility protection procedures by removing or securing all loose items and equipment in open areas.

4. Secure all flammable, explosive, and other hazardous materials such as compressed gas cylinders in a protected structure.

5. Consider relocating small boats on dry storage or outside racks or on trailers to safer locations under cover. Facilities with inside rack storage may provide

sufficient protection unless they are situated in a low-lying area that is subject to storm surge inundation.

6. Take down large signs, antennas, or other removable items that could be subject to wind damage.

7. Install storm shutters and other protective equipment.

8. Process and mail all paperwork that can be completed immediately. Set aside new paperwork to be completed after the hurricane.

9. Transport expensive equipment or products to inland storage sites.

10. Reduce inventories as much as possible and delay ordering materials, stocks, or supplies.

11. Begin contacting boat owners or their representatives to remove their boats, if required.

36 to 48 Hours Prior

1. Complete the following facility-protection measures:

   a. Lock all structures, including trailers
   b. Turn off electricity at the main power switch
   c. Turn off natural gas at the main valve
   d. Top off tanks of facility boats and vehicles, and then turn off fuel supply tanks at the main valve
   e. Disconnect electric motors, pumps, and similar equipment below ground level and remove them to a safe location
   f. Turn off the water supply at the meter

2. Complete boat removal operations and secure remaining boats.

3. Place forklifts, trucks, travel lifts, mobile cranes, and workboats in protected structures, if possible.

0 to 36 Hours Prior

During the 36-hour period prior to the projected arrival of the hurricane, a Hurricane Warning will be issued. The following activities should be in progress

or nearing completion so that personnel can be released within the final 12 hours, if not sooner:

1. Complete vessel protection and securing operations with a final check of doubled mooring lines, which should be tied off with sufficient slack and fender boards and other protective equipment in place.

2. Release employees who are not required to staff facilities during the hurricane no later than 12 hours prior to the projected time of arrival. Instructions for reporting to work after the hurricane should be given before they leave. Determine where in the facility all remaining employees will take shelter.

3. Complete facility preparations 12 hours prior to the arrival of the hurricane. Make sure that all perimeter access points in the form of fences, gates, and building doors are locked and secured.

4. Do not allow any personnel to stay on any vessel during the hurricane.

5. Evacuate all personnel from the facilities, if directed by Emergency Management or Civil Defense officials.

During the Hurricane

1. Stay in a safe and protected place, inland if possible. Moving to high ground outside an evacuation or flood zone is recommended and is safer than moving to a high area within these zones. For the rare instances where facilities must remain staffed, personnel should have engineered protection from the wind, rain, and storm surge, and should remain inside during the hurricane.

2. Do not attempt to move or re-secure a loose boat or piece of equipment.

3. Stay tuned to news and weather broadcasts concerning the hurricane's movement so you will know when the danger has passed.

4. Do not venture out during any lull or calm as the eye of the hurricane passes.

After the Hurricane

1. Be aware that the hurricane may have caused extensive damage, including widespread flooding, washed out roads and bridges, and downed power lines–all of which may prevent you from accessing your facility.

2. Alert personnel returning to the facility to begin the damage assessment process to be aware of the following:

   a. Poisonous insects that may have crawled into unexpected places. Wear boots and gloves while working outside the facility.
   b. Downed power lines that still may be live. Avoid all downed lines until the electric company troubleshooter disconnects them. Be aware that lines that appear de-energized may be live if they are connected to a generator.
   c. Natural gas leaks. Check for natural gas leaks by smell only, not with matches or candles.
   d. Fuel leaks. Check facility fueling docks and fuel tanks for leaking gasoline or diesel fuel.
   e. Electrical equipment. Do not start any electrical equipment that was submerged in water until it has been checked or repaired. This includes electrical appliances such as hot plates, toasters, and calculators.
   f. Broken sewer or water mains. Report the breaks to the appropriate utility company.
   g. Electrical wiring. Check all the facility's wiring completely before turning on the main power switch.

3. Prepare a written assessment of the damage and take photographs of them as soon as possible. Estimate damage to docks, piers, and other harbor facilities, including cranes, mast hoists, boat sheds, toilets, showers, lockers, offices, and fuel docks.

4. If any theft, vandalism, or damage other than that caused by the hurricane has occurred, report it to the police or other appropriate authorities. Record the incident report number and obtain a copy of the report as soon as possible to help substantiate any insurance claim or IRS property loss report.

5. Carefully document and photograph immediate repairs made prior to an insurance adjustment. In the case of facility property damages, appraisers assigned by the insurance companies will be involved with the adjustment and will establish temporary claim offices.

6. Be aware that the facility will receive calls from vessel owners, captains, caretakers, and others with boating interests.

This boat was destroyed and beached in front of the Sheraton at Black Rock at Ka'anapali Beach, Maui, by Hurricane Iniki in 1992. Photo courtesy of Ward Graessle.

General Procedures for Processing Vessel Claims

If your boat is insured and damages occurred during a hurricane, a report of loss and/or damage should be made to your insurance agent or to the insurance company as soon as possible. A telephone call should suffice to initiate the claim. Then follow up the call with a brief written report that includes the following:

- The exact location of the boat, including information on whether it is partially or totally submerged.
- The structural condition of the boat, including an estimate of the percentage of damage, a description of the damage, and photographs of the damage.
- Information on whether the boat must be removed immediately and, if so, to what location.

With all the confusion that follows in the aftermath of a hurricane, insurance companies will settle first those claims that have the appropriate paperwork completed and in hand. After you have made the initial notification to your insurance company, take the steps listed below to assist in processing your claim. Take these steps as quickly as possible to expedite getting your boat repaired as soon as possible.

1. If your boat is still in a precarious situation, stabilize it to prevent further damage.

2. Do not perform repairs other than those necessary to prevent further damage.

3. Photograph the damage to your boat.

4. Make a list of all damages and suspected problems.

5. Contact repair yards to get estimates. You do not have to wait for an adjuster/ survey or to get estimates.

To process claims, insurance companies will send surveyors and adjusters into the area to work with you and other policy holders. In locations designated as disaster areas, claim offices will be set up and staffed with teams of insurance personnel to expedite the processing of large numbers of claims. Locations of the claim offices should be available through the local media and emergency management and civil defense offices. In your dealings with the insurance companies, remember the following:

1. You will need to file a statement of loss explaining what, when, why, where, and how it all took place. Your statement should include copies of your list of damages, photographs, and sketches, if necessary.

2. An adjuster, insurance company surveyor, or independent surveyor acceptable to the insurance company will be instructed to survey the damage to your boat. Make sure you accompany the surveyor on the initial damage survey.

3. You should have your inventory list, receipts, pictures of damages, and repair estimates ready for inspection by the adjustor/surveyor.

4. After conducting the survey, the surveyor will file a damage report with the insurance company. Request that a copy also be sent to you.

5. If you are not satisfied with the damage report results and are not able to resolve the differences with the insurance company, you may elect to hire another surveyor at your own expense for a second opinion. Your surveyor will then represent you in any mediated discussions that follow.

6. If you agree with the insurance company's damage estimates and the company designated to do the repairs, the insurance company will proceed with the payment for repairs. It will issue a check with both the repair company's name and your name as payees.

7. When the work is completed to your satisfaction, you sign the check and the repair company gets paid.

8. If your boat is declared a total loss, the insurance company will issue a check to you, usually for the boat's fair market value as agreed upon by you and the company.

9. Be prepared to surrender the boat's documentation papers, original insurance policy, and remaining equipment, as well as the boat itself.

Storm surge from a hurricane is one of the greatest dangers to boats and marinas. It destroys structures and pushes boats inland. Hurricane Sandy in 2012 damaged or destroyed more than 65,000 boats on the east coast. Photo courtesy of Dennis Hwang.

Boat Owner's Hurricane Plan Worksheet

After reading the material in this manual, use this worksheet to develop a Hurricane Plan for your boat. Be sure to distribute copies to your alternates as well as your harbor manager.

Boat's name: _____

Vessel registration #: In Hawai'i (HA#) _____ or USCG document# _____

Length: _____ Make/Model: _____ Hull Color: _____

Boat's current location: _____ Harbor: _____ Row/Pier: _____ Slip#: _____

Boat's location during hurricane: _____

Your name: _____

Address: _____

City: _____ State: _____ Zip Code: _____

Phone Day: _____ Night: _____ Cellular: _____

Two Alternative Contacts (if you are not available)

Name: _____

Address: _____

City: _____ State: _____ Zip Code: _____

Phone Day: _____ Night: _____ Cellular: _____

Have boat keys? _____ Access to hurricane equipment? _____

Name: _____

Address : _____

City: _____ State: _____ Zip Code: _____

Phone Day: _____ Night: _____ Cellular: _____

Have boat keys? _____ Access to hurricane equipment? _____

Storage Options

Is boat already stored ashore? _____

If No, what arrangements have been made for hauling? _____

_____

Storage location: _____

If at dock: _____ Slip #: _____

Additional lines: _____ No.: _____ Length: _____ Size: _____

Additional chain: _____ No.: _____ Length: _____ Size: _____

Chafe gear: _____ Fenders: _____

If at a Mooring/Anchorage

Has mooring been inspected within the last six months? _____

How will the boater get ashore? _____

Type of bottom: _____ Depth: _____

Mooring line should be extended _____ to increase scope.

Additional anchors needed: No.: _____ Size: _____

Type(s): _____

Additional lines: _____ No.: _____ Length: _____ Size: _____

Additional chain: _____ No.: _____ Length: _____ Size: _____

Chafe gear: _____ Swivel: _____ Shackle(s): _____

List All Equipment Needed Aboard to Prepare Boat

Equipment	Current Location
1. Extra lines	
2. Chafe protectors	
3. Fenders	
4. Anchors	
5. Swivels	
6. Shackles	
7. Duct tape	
8. Plugs (exhaust ports)	

List All Equipment to be Removed from Boat

Equipment	Storage Location
1. Electronics	
2. Dinghy	
3. Outboard/fuel	
4. Sails	
5. Bimini	
6. Galley fuel	
7. Ship's papers	
8. Emergency Position Indicating Radio Beacon (EPIRB)	
9. Distress flares	
10. Other	

HURRICANE PLAN FINAL CHECKLIST

- Arrange dock/anchor lines
- Add chafe protection
- Use extra fenders/fender boards as needed
- Insert plugs in engine ports
- Strip bimini, sails, life rings, etc.
- Disconnect shore power
- Close all but the cockpit sections
- Lock boat
- Notify harbor manager
- Plug all through-hull ports

Remember These Important Points!

1. Develop your hurricane plan now. You alone are responsible for this.

2. Make all emergency plans for moving and securing your boat prior to hurricane season (June 1 to November 30).

3. Do not stay on your boat or attempt to move it after a Hurricane Warning has been issued. Rescue agencies will not risk the lives of their personnel to assist you or other careless boaters during a hurricane.

4. Do not become a hurricane statistic! Your life is more valuable than your boat.

5. Do not be fooled by the lull or calm as the eye of the hurricane passes. The second half of the storm will strike soon with full intensity from the opposite direction.

6. Sign up to receive emergency messages and notifications from your counties emergency management or civil defense website. (See page 46).

7. Stay tuned to all broadcasts and official announcements of the hurricane's status.

8. Do not return to your boat until the hurricane has passed and an official announcement indicates that it is safe to do so. DLNR will not be the agency issuing the announcement. The "All Clear" will be given by the Captain of the Port, USCG.

This was a common sight in the small boat harbors in Kaua'i after Hurricane Iniki struck in 1992. Picture taken at Nāwiliwili Small Boat Harbor. Photo courtesy of Ward Graessle.

Part 2

TSUNAMI INFORMATION

April 1, 1946 – Hilo, Hawai'i. A magnitude 8.6 earthquake near the Aleutian Islands of Alaska generated a large tsunami causing death and destruction on all the Hawaiian Islands. In this photo, the tsunami wave breaks over Pier No. 1 in Hilo Harbor. The arrow points to a man as one of the 159 identified fatalities in Hawai'i. The photo was shot from a ship that later managed to escape to open sea. Photo courtesy of NOAA/NGDC and the Pacific Tsunami Museum.

General Tsunami Information

A tsunami is a series of ocean waves set in motion by a rapid change in the shape of the ocean bottom over a large area. By far the most common reason for this change is an earthquake, although landslides, volcanic activity, and meteorite impacts can also cause tsunamis.

Tsunamis are sometimes incorrectly called "tidal waves," because the surge and withdrawal may resemble rapidly rising or falling tides.

Tsunami waves may come ashore as a "bore," a vertical wall of water, superficially resembling the tidal bores observed in regions with very large tides such as the Bay of Fundy, the Amazon River, and the Turnagain Arm (Cook Inlet, Alaska). Tsunamis have nothing to do with tides, however, and they differ from true tidal waves in three very important respects. First, unlike tidal waves which can be forecast months in advance, tsunamis occur at random, unpredictable times. Second, a tsunami is a succession of waves rather than a single wave. The false expectation that a tsunami is over after the first wave has resulted in considerable loss of life, even in Hawai'i. Third, tsunami waves

proceed as ordinary gravity waves with a typical period of five to 60 minutes, while the period of tides is 12 hours. Consequently, the time of the flooding is drastically different.

There is no tsunami season. A tsunami is an unpredictable event that can happen at any time. Most tsunamis that strike the Hawaiian Islands are generated by earthquakes in the oceanic trenches around the border of the Pacific Ocean. The unstable areas are the Pacific coast of Japan, the Kuril-Kamchatka Island chain, the Aleutian Arc, and the Pacific coasts of Central America and South America.

It is important to note that a tsunami can be dangerous for several hours, and the first wave is often not the largest of the series.

A tsunami has great destructive potential and is capable of quickly inundating (or flooding) areas thousands of feet inland past the normal high tide level. Their fast-moving waters can crush cars, homes, buildings, boats, and anything else in their path. They also have great erosional potential, stripping beaches of sand and undermining trees and other coastal vegetation.

In Hawai‘i, tsunamis have caused death and destruction on all the major islands. The town of Hilo has been hardest hit in historic times with destruction to major parts of the city in both 1946 and again in 1960. Both tsunamis were generated by earthquakes along the Pacific Rim: the 1946 tsunami from the Aleutian Trench that impacted mainly the northeast shores of our islands, and the 1960 tsunami from the Peru-Chile Trench that impacted mainly the southeast shores of our state. The 1946 event resulted in 158 deaths, with casualties on every major island.

Tsunami waves generated by the 2011 Tohoku magnitude 9.1 earthquake caused significant damage to Hawai‘i’s recreational boat harbors with the loss of dozens of vessels and damage to countless more. A tsunami in Hawai‘i can also be generated by a nearby earthquake as well as a distant one. This is especially true on Hawai‘i Island where earthquakes occur in association with the volcanic activity at Kīlauea and Mauna Loa. Any violent earthquake—one that causes you to fall to the ground or to hold onto something to keep from falling—should be considered a natural tsunami warning. Another warning sign is when earthquake shaking lasts for more than twenty seconds. If you are in a low-lying area you should immediately move to higher ground—at least 50 feet in elevation or higher. Due to the short response time for a local tsunami, you may need to vertically evacuate to the fourth floor or higher of a reinforced concrete building that is at least ten stories in height.

In 1975, two campers at Halapē campground, a coastal area in Hawai'i Volcanoes National Park, were killed by a tsunami generated by a magnitude 7.7 earthquake immediately offshore. The earthquake shook the campsite severely and gave the campers only a few minutes to evacuate before the tsunami came on shore, rising to 26 feet above sea level. Farther south, the tsunami damaged the coastal villages of Punalu'u and Honu'apo, though, fortunately, no lives were lost. The 1975 event was a repeat of a similar earthquake and tsunami which hit the same coast in 1868.

In general, all coastal areas of the Hawaiian Islands are vulnerable to inundation by a tsunami. Tsunami waves can be amplified where a bay, harbor, or lagoon funnels the wave as it moves inland.

> As tsunami waves approach islands, they encounter shallower depths which cause the waves to bend or refract. The bending (refraction) means that tsunami waves may wrap completely around an island causing inundation even on the side of the island farthest from the area of tsunami generation. Tsunami wave refraction may result in smaller waves in some areas and larger waves in other areas. Tsunami waves may also be reflected off coastal areas with steeply sloping shorelines. These reflected waves may combine with incoming, refracted, or other reflected waves to produce large wave run-up in unexpected places. No matter where a tsunami is generated, all sides of our islands are at risk.
>
> *– The Pacific Tsunami Museum*

The tsunami evacuation zones can be found in the Disaster Preparedness Guide in front of the local telephone book. Maps are also available online at: Hawai'i Emergency Management Agency | Tsunami Evacuation Zones (hawaii.gov) or (https://dod.hawaii.gov/hiema/public-resources/tsunami-evacuation-zone/).

https://bit.ly/TsunamiPreparedness

See also the following YouTube video on tsunami preparedness for the general public: 2025 Hawai'i Tsunami Preparedness (youtube.com). In this 16-minute video, learn about the science of tsunamis, distant vs. local tsunamis, tsunami evacuation maps, the extreme tsunami zone, the all-hazard outdoor warning siren, and receiving emergency messages from your county emergency managers. Determine whether you live, work, or go to school in a tsunami evacuation zone and develop a Tsunami Evacuation Plan for you, your entire family, and your boat.

Tsunami Warnings

Distant Earthquakes
In the event of a significant earthquake in a distant area of the Pacific Basin, the Pacific Tsunami Warning Center (PTWC) on O'ahu will issue a Tsunami Watch until a tsunami can be confirmed or discounted. PTWC will issue a Tsunami Warning when a tsunami is confirmed and evacuation is necessary. The warning will be announced over the radio and on television through the Emergency Alert System, in conjunction with the sounding of the All-Hazard Outdoor Siren Warning System. The warning will include the predicted time of arrival of the first wave. The Outdoor Siren Warning System will be sounded at 3, 2, 1, and 1/2 hour prior to the estimated arrival time of the first wave.

For land activities only, it may be safe to return to the evacuation zone after a Tsunami Warning is cancelled **and** your local Emergency Management or Civil Defense agency indicate it is safe to return by issuing an "All Clear." This may vary from area to area depending on whether there is damage. If there is no damage, the "All Clear" may take hours. If there is damage, the "All Clear" may take days. All Clear announcements will be made by your local Emergency Management or Civil Defense Agency through the Emergency Alert System over the radio and on television. The Outdoor Siren Warning System is not sounded during All Clear announcements nor used to indicate All Clear conditions. Remain in a safe area until you hear an official All Clear announcement over the Emergency Alert System.

For activities in the water (e.g., wading, swimming, or boating), it is not safe to go in the water or return to a harbor until the Tsunami Advisory is cancelled **and** the harbor has been cleared by local authorities. Boaters should monitor VHF Radio Channel 16 to receive an "All Clear" from the captain of the port.

Local Earthquakes
If a significant earthquake occurs in the vicinity of the Hawaiian Islands, PTWC will issue an **Urgent Local Tsunami Warning**. The warning will be announced over the radio and on television through the Emergency Alert System, in conjunction with the sounding of the All-Hazard Outdoor Siren Warning System. **If the Urgent Local Tsunami Warning identifies the island, and you are subject to impact, head to higher ground immediately**.

As stated previously, in the event of a local earthquake that causes you to fall to the ground or to hold onto something to keep from falling, **if you are in an evacuation zone** move immediately to higher ground at least 50 feet in elevation when the shaking stops.

There may be no time for an official warning from PTWC, the Emergency Alert System, or the Outdoor Siren Warning System. **You must act on your own and self-evacuate to high ground**. If you are at sea, and the earthquake is felt, head to deeper water (over 300 feet).

Tsunami Emergency Plan for Boat Owners

The need to evacuate may occur suddenly and at any time. Therefore, all boaters should prepare in advance, maintain a high state of readiness, and develop a Tsunami Emergency Plan that covers evacuation scenarios for distant and local earthquakes that generate tsunamis.

Boat and Owner Preparedness

1. Have your local U.S. Coast Guard Auxiliary conduct a free vessel safety check to ensure your boat is in full compliance with all federal and state boating laws for that year. To find a local examiner, visit the U.S. Coast Guard Auxiliary online at http://www.cgaux.org/vsc/. If these safety checks are offered at a harbor near you, take advantage of the opportunity. It may save a life.

2. Check your emergency gear each and every time you go out on the water. Perform maintenance, make repairs, and replace out-of-date or worn equipment as needed. Check and replace rubber parts and hoses that are brittle or cracked. Make sure you have spare fuel filters aboard.

3. The powder in dry chemical fire extinguishers can pack down into a solid mass over time. This greatly reduces its effectiveness during actual use. Before you launch, unpack and loosen the powder by inverting the extinguisher and giving it a few taps with a rubber mallet at the base.

4. Regular maintenance of your boat and support equipment are vital for any tsunami emergency. If your vessel is moored in a State of Hawai'i recreational boating facility, it is required to leave the confines of the harbor every 90 days to demonstrate its seaworthiness. It should be able to move offshore to the recommended minimum depth of 300 feet.

5. Any towing vehicle or trailer should be in good condition. This can be checked every year during registration, when an annual inspection is required.

6. Vessels should always have enough non-perishable food and drinking water on board so that a trip to the grocery store is not needed when a watch or warning is called. The supplies should be sufficient, so it is not necessary to rely on support from other vessels for aid.

7. Fuel supplies should be sufficient to keep a boat out of the harbor for 24 hours, if that is part of your Tsunami Emergency Plan.

8. All vessel owners should insure their vessels, and make sure their policies cover **salvage costs for grounded and sunken vessels, damage to docks, pollution containment, and wreck removal**.

9. If you do not know about the issuance of emergency notifications, you could lose precious preparation time. You should pay heed to the monthly testing of the All-Hazard Outdoor Siren Warning System near your workplace, near your home, and other locations that you frequent. Report outages so the system can be properly maintained.

10. Every resident in the state should know of the numerous ways to receive emergency information from your state and local emergency management offices. Note of the following:
    a. State Emergency Alert System - Consists of a system of sirens under the All-Hazard Statewide Outdoor Warning Siren System. When the siren sounds, residents should turn on their television and radio for more information.
    b. NOAA Weather Radio – Some radios with the NOAA weather radio band turn on automatically when an emergency broadcast through the Emergency Alert System is announced. The NOAA weather radio station broadcasts round-the-clock weather and surf conditions, and participates in the EAS system.
    c. Wireless Emergency Alert System – Also known as “WEA” the Federal Government has arranged with cell phone carriers to provide emergency alerts to your smartphone. Go to the settings on your phone to turn on the notifications and receive the relevant emergency information for your specific location.
    d. County Emergency Notification System—Also receive free emergency texts, emails or notifications from your county’s emergency management or civil defense office. You can receive warnings issued for tsunamis, earthquakes and severe weather events. This is an important source of emergency

information and requires participants to sign up and register at the applicable county emergency management sites:

Kaua'i—Use the Wireless Emergency Notification System WENS at: http://www.kauai.gov/KEMA
Honolulu—Emergency Notifications at: hnlalert.gov
Maui—Get Maui Emergency Management Agency "MEMA" alerts at: http://www.mauicounty.gov/mema
Hawai'i County—Use the Everbridge app. at: http://hawaiicounty.gov/departments/civil defense

These practices can keep you and your vessel in a high state of readiness and allow you to successfully implement your Tsunami Emergency Plan. See the Resources section of this book for more information to help you prepare.

Evacuation Planning for a Tsunami Emergency
If your vessel is in an evacuation zone you will have three options: move it inland, move it offshore, or leave it in place. The decision to leave a safe place to go to your boat should depend on your equipment, your state of readiness, and adequate warning. Whatever option you choose requires a realistic assessment of the situation. Moreover, have a plan when you are off island or traveling out of state.

If, in your assessment, you, your vessel, and your trailer are in a high state of readiness, and you have more than adequate time based on estimated wave arrival, then you can move the boat inland. However, traffic on the roads, weather conditions, and other unforeseen factors can change everything and take away precious time. Reassess your situation periodically. If you think that you will have just enough time to move inland or out to sea, you are probably not expecting the unexpected. Be realistic and know when it's time to evacuate, with or without your vessel.

A Tsunami Emergency Plan may include any of the following steps that are applicable to the vessel, the vessel owner, specific situations, and other considerations:

1. **If your boat is on a trailer in an evacuation zone, move it outside the evacuation zone as soon as a Tsunami Warning is issued.** Don't rush, but try to get off the roadways as soon as you can. Only implement this option if your towing vehicle and trailer are in good condition and there is no risk that there could be a breakdown on the road, worsening traffic.

2. **If your boat is in the water and cannot be trailered, prepare to put to sea as soon as a Tsunami Watch is issued.**
    a. Consider having someone drive you to the harbor. If you drive yourself and leave your vehicle in the harbor parking lot, it may sustain damage from the tsunami while you are offshore in your boat. Even worse, it may impede vehicle traffic or prevent emergency personnel from conducting their assigned duties.
    b. **Move your vessel offshore to waters greater than 300 feet in depth. Stay away from the channel entrance except for transiting as soon as a distant Tsunami Warning or Tsunami Advisory is declared (See Appendix A—Regulated Navigation Area for South Oahu)**. Tsunamis can cause rapid changes in water level and unpredictable and dangerous currents in harbors and entrance channels, in addition to destruction from waves. Stay in designated areas and maintain the minimum water depth of 300+ feet just prior to and during the expected arrival time of the tsunami.
    c. It is important to note that even if the event is not elevated to a Tsunami Warning, a Tsunami Advisory is still associated with strong currents or waves that are dangerous to those in or very near the water, and the threat may continue for several hours. The decision to move your vessel out of the harbor during a Tsunami Warning or Advisory should be part of your Tsunami Emergency Plan.
    d. You should plan to have enough fuel, food, water, and anything else you consider essential for at least 24 hours. Be sure to turn on your navigation lights at night and in times of limited visibility.
    e. If your vessel is unable to navigate to a safe depth in advance of the arrival time, do not attempt to move your boat offshore or you may be caught in the tsunami or the dangerous currents associated with it. Do not move your boat offshore if your vessel is not seaworthy (e.g., risk that the engine may quit in the entrance channel, preventing other vessels from transiting the waterway).

3. If your boat is in an evacuation zone and cannot be moved inland or offshore, determine ahead of time what you want to remove and how you will secure the boat. As soon as a Tsunami Advisory or Tsunami Warning is declared, remove predesignated items, secure the boat, and leave the evacuation zone. Don’t rush, but get off the roadways as soon as you can.

4. The shores of all Hawaiian Islands are subject to seasonal high surf, some of which directly impact boat channels and harbor entrances. **If a Tsunami Warning occurs during a period of seasonal high surf, especially at night, and your Tsunami Emergency Plan calls for moving your boat offshore, you should give serious consideration to leaving it where it is** and just removing whatever you can, securing your boat, and leaving the evacuation zone.

5. Upon initiation of an evacuation, public safety officials will establish roadblocks to control traffic coming into the coastal evacuation zone. When wave arrival is imminent, no one will be allowed back into the evacuation zone for their own safety. Therefore, if you intend to take some kind of emergency action for your boat, you should complete it and be out at sea or out of the evacuation zone at least one hour prior to the expected arrival of the first wave.

6. Anticipate heavy traffic island-wide when a Tsunami Warning is issued. Again, allow ample travel time to reach your boat before the evacuation zones are closed to non-emergency traffic.

7. If for any reason you are unable to tend to your boat during a tsunami event, designate someone else to carry out your Tsunami Emergency Plan.
    a. **If your vessel is moored in a state recreational boating facility and you are out of the state, off island, or otherwise unable to immediately respond to an emergency related to your vessel for any length of time, you are required to have a caretaker serve in this capacity.**
    b. Harbor managing agents must have your contact information and/or your caretaker's most current contact information so one of you can be reached at all times. Many times, vessels have been saved from sinking in their slips with just a phone call.
    c. Your designated caretaker should be very familiar with your boat and its seaworthiness. If your caretaker is expected to take your vessel to sea, he/she should be very capable of piloting your vessel. If not, your designated caretaker should be prepared to identify the items on your predesignated list of equipment, remove it, and evacuate. **Do not** put your caretaker in harm's way to move your vessel if the condition of your vessel, trailer, etc., is questionable. **Do not** put your caretaker at risk if there isn't adequate time to travel to the harbor to remove items or secure your mooring. Equipment can be replaced. Lives cannot.

In 1964 in Kodiak, Alaska, a warning was received prior to the arrival of the first tsunami waves. People who rushed down to the harbor to secure or take their boats out to sea constituted two thirds of all the fatalities caused by the tsunami at Kodiak City.

Boats at Sea During a Tsunami

1. Tsunami wave activity is imperceptible in the open ocean, so normally that would be the safest place for most boats. Remember, however, that out on the water you are at the mercy of the weather, seasonal ocean conditions, and possible rough seas. You could run out of fuel and anchoring at the minimum safe depth (300 feet of water) could be problematic. This must be taken into consideration before moving your boat offshore.

2. Most large harbors and ports are under the control of a harbor authority and a vessel traffic system. If the harbor authority orders a forced evacuation of vessels to deeper water, you will need to be aware of the marine traffic, especially if it will impact you and your boat.

3. If a tsunami does strike, your cellular phone may not work if power on shore is knocked out. Multiple methods of communication are preferable. With a marine VHF-FM radio, you can call for help if you are adrift. **If you go more than one mile from shore your vessel must be equipped with a VHF radio or an Emergency Position Indicating Radio Beacon (EPIRB) according to state law**. If you only have an EPIRB and you are in distress, it is possible no one will respond to your MAYDAY call during a tsunami. A marine VHF-FM radio is your most practical piece of communication equipment during a tsunami event. It allows you to monitor Channel 16 for information from the U.S. Coast Guard and harbor management agencies, and hear when it is safe to return to your harbor. You can also hail other vessels and ask for depth readings or signal that you are in distress. Remember that Channel 16 is for distress, safety, and calling (hailing) another vessel. Once you are in contact with another party, agree to switch to a working channel designated for noncommercial vessels. Even if you do have a VHF radio on board, it doesn't hurt to have the EPIRB, a fully charged cellular phone and a working transistor radio in your survival kit.

4. If an official announcement has not been made that it is safe to return to your harbor for some time, operate your vessel in a manner that will conserve

fuel. The Tsunami Warnings and Advisories may last for hours and harbor/ocean conditions following the tsunami may not permit a quick return to port.

5. There will be a lot of boating traffic in your area, so do not linger near harbors, ports, and channels. If you actually have adequate line to anchor and it's after sunset, put on your anchor lights to indicate you are stationary. If you are underway, put on your running lights. At night or when visibility is limited, your navigation lights may save lives.

6. Monitor VHF Radio Channel 16 or go to Port Status Navigation Center (https://www.navcen.uscg.gov/port-status?zone=HONOLULU) to remain aware of any commercial port restrictions established by the U.S. Coast Guard Captain of the Port. Those without internet or VHF access can also call the U.S. Coast Guard Command Center at 1-808-842-2600.

Boats at Sea After a Tsunami

1. Damaging wave activity and dangerous currents can affect harbors for an undetermined period of time following the impact of the tsunami on the coast. Do not return to port until there is an official announcement that it is safe to return to your specific harbor. Remember cancellation of a Tsunami Warning and instructions that the public on land can return to the evacuation zone is different than an all clear signal for boaters to return to the harbor since there may be lingering currents or waves in the water hours after the threat of inland wave inundation has passed. An announcement that it is safe for boaters to return will not be given until a Tsunami Advisory is cancelled. Even if a Tsunami Advisory is cancelled, the harbor will still need to be surveyed before it is reopened for traffic. This will allow navigation hazards to be removed or identified prior to your returning to port and allow better protection for you and your vessel.

2. While waiting aboard your boat, be alert for people who may have been swept out to sea by the tsunami as well as large amounts of debris that could become hazards to navigation.

3. Be prepared to yield to or assist emergency personnel involved in rescue or salvage operations.

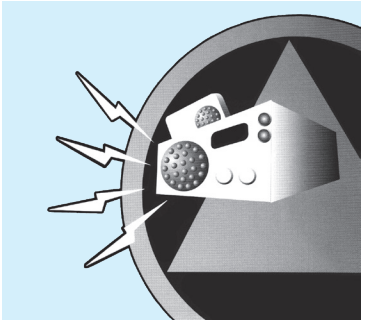
4. Monitor VHF Radio Channel 16 or go to Port Status Navigation Center (https://www.navcen.uscg.gov/port-status?zone=HONOLULU) to remain aware of any commercial port restrictions established by the U.S. Coast Guard Captain of the Port. Those without internet or VHF access can also call the U.S. Coast Guard Command Center at 1-808-842-2600.

Hilo, Hawai'i. The tsunami that struck Hilo on May 23, 1960 was caused by a magnitude 9.5 earthquake off of Chile the day before. Water and debris carried enough force to crush wooden buildings and twist parking meters by the time it hit Hilo 15 hours later. Photo courtesy of NOAA/ NGDC and the Pacific Tsunami Museum.

For more information on tsunamis in Hawai'i, visit hawaiitsunami.org

Part 3

EMERGENCY ASSISTANCE INFORMATION



When the All-Hazard Statewide Outdoor Warning Siren System sounds, turn on your TV and/or radio to listen for emergency messages from your local emergency management. Sirens, TV, radio, as well as wireless emergency alerts (WEA) and your county emergency apps form an integrated redundant system to inform the public.

Important Phone Numbers

State of Hawai'i (non-O'ahu callers)	
National Weather Service Recorded Forecasts	1-808-973-4380
State Emergency Management Agency	1-808-733-4300
City and County of Honolulu (island of O'ahu)	
National Weather Service Recorded Forecasts	1-808-973-4380
NOAA Weather Radio Recording	1-808-973-6109
National Response Center	1-800-424-8802
Ambulance, Fire, and Police	911
American Red Cross	1-808-734-2101
Marine emergencies, nearshore 0-3 miles: fire rescue	911
Honolulu Department of Emergency Management	1-808-723-8960

U.S. Coast Guard Station Honolulu	1-808-842-2980
U.S. Coast Guard Sector Honolulu Command Center 24x7	1-808-842-2600
U.S. Coast Guard District 14 Command Center 24x7	1-808-535-3333
Maui County (islands of Maui, Molokaʻi, Länaʻi, and Kahoʻolawe)	
National Weather Service Recorded Forecast	1-866-944-5025
NOAA Weather Radio Recording	1-808-935-5055
National Response Center	1-800-424-8802
Ambulance, Fire, and Police	911
American Red Cross	1-808-244-0051
Marine emergencies, nearshore 0-3 miles: fire rescue	911
Marine emergencies, offshore 3-200 miles: Coast Guard	1-800-552-6458
Marine emergencies, offshore 200+ miles: Coast Guard	1-800-331-6176
Maui Emergency Management Agency	1-808- 243-7285
Hawaiʻi County (island of Hawaiʻi, the Big Island)	
National Weather Service Recorded Forecast	1-866-944-5025
NOAA Weather Radio Recording	1-808-935-5055
National Response Center	1-800-424-8802
Ambulance, Fire, and Police	911
American Red Cross: Hilo	1-808-935-8305
Marine emergencies, nearshore 0-3 miles: fire rescue	911
Marine emergencies, offshore 3-200 miles: Coast Guard	1-800-552-6458
Marine emergencies, offshore 200+ miles: Coast Guard	1-800-331-6176
Hawaiʻi Civil Defense Agency	1-808-935-0031
U.S. Coast Guard Marine Safety Team Hawaii (Hawaiʻi County	1-808-329-3987
Kauaʻi County (islands of Kauaʻi and Niʻihau)	
National Weather Service Recorded Marine Forecast	1-808-245-6001
NOAA Weather Radio Recording	1-808-245-2919
National Response Center	1-800-424-8802

Ambulance, Fire, and Police	911
American Red Cross	1-808-245-4919
Marine emergencies, nearshore 0-3 miles: fire rescue	911
Marine emergencies, offshore 3-200 miles: Coast Guard	1-800-552-6458
Marine emergencies, offshore 200+ miles: Coast Guard	1-800-331-6176
Kaua‘iEmergency Management Agency	1-808-241-1800
U.S. Coast Guard Station Kaua‘i	1-808-246-0279

Important Radio Frequencies

In Hawai‘i, according to HRS 200-37.5, vessels operating more than one mile from shore must be equipped with a properly functioning marine VHF-FM (156-162 MHz band) radio or Emergency Position Indicating Radio Beacon (EPIRB).

Channel 16 (International Public Hailing Channel)	156.800 MHz
Radio Amateur Civil Emergency Service (RACES)	
State RACES Link on O‘ahu	147.060 MHz PL103.5
State RACES Link on Kaua‘i and Maui	147.040 MHz PL103.5
State RACES Link on Hawai‘i	147.020 MHz PL103.5
Citizens Band (CB) Radio	Channels 9 and 23
NOAA Weather Radio Network for Hilo and Honolulu	162.550 MHz
NOAA Weather Radio Network for all other areas	162.400 MHz
Coast Guard Medium-Frequency (MF) Sideband	2182/2670 kHz
NWS/KVM-70 Radio Fax Weather Data	9982.5 kHz, 11090.0 kHz, 16135.0 kHz, 23331.5 kHz

Public Evacuation Shelters

Your Hurricane Plan should include the locations of public evacuation shelters that you and your family might use. For the locations of potential public evacuation shelters, or refuge areas, check with your county Emergency Management or Civil Defense Agency before or at the beginning of each hurricane season.

During a Hurricane Watch or Warning, listen to the Emergency Alert System announcements for the location of shelters or refuge areas that are open. Do not call your Emergency Management or Civil Defense Agency (for more information visit: Hawai'i Emergency Management Agency | About Hurricane Evacuation Shelters in Hawaii).

The status of a shelter or refuge area will be announced by local TV, radio, official social media sites, the websites of your county's emergency management or civil defense agency, and on the emergency notification apps for each county listed below:

Kaua'i – Use the Wireless Emergency Notification System WENS at: http://www.kauai.gov/KEMA

Honolulu – Emergency Notifications at: hnlalert.gov

Maui – Get Maui Emergency Management Agency "MEMA" alerts at: http://www.mauicounty.gov/mema

Hawai'i County – Use the Everbridge app. at: https://www.hawaiicounty.gov/civil-defense

The County Emergency Notification System Apps for your county should be installed on your phone and tested before the beginning of each hurricane season. The websites for each county's emergency management or civil defense agency can be found in the Resource section of this manual. For more information visit: Hawai'i Emergency Management Agency | About Hurricane Evacuation Shelters in Hawaii.

Resources

- Baker, Edward, and Maria Villanueva. 1993. Analysis of Hurricane Andrew Economic Damage and Recovery Options for the Boating, Marina and Marine Service Industries. Technical Paper 72, Boating Research Center.
- California Boater Checklist and Brochure: http://nthmp.tsunami.gov/documents/boatingpamphlet_v4-7-12.pdf
- Central Pacific Hurricane Center: https://hurricanes.gov/cphc
- Haraguchi, Paul. 1979. Weather In Hawaiian Waters. Honolulu: Hawaii Reprographics.
- Hawai'i County Civil Defense Agency: http://www.hawaiicounty.gov/civil-defense/
- Hawai'i State Emergency Management Agency: Hawai'i Emergency Management Agency (hawaii.gov)
- Hawaiian Electric Company. 2024. Hawaiian Electric Company's Emergency Preparedness Handbook: Emergency Preparedness Handbook | HawaiianElectric
- Honolulu Department of Emergency Management: http://www1.honolulu.gov/dem/ Home | Department of Emergency Management (honolulu.gov)
- Hwang, Dennis, and Darren Okimoto. 2019. Homeowners Handbook to Prepare for Natural Hazards, Fourth Edition. Prepared for the University of Hawai'i Sea Grant College Program, NOAA. Homeowner's Handbook to Prepare for Natural Hazards – Hawaii Sea Grant
- International Tsunami Information Center (ITIC): https://tsunami.ioc.unesco.org/en/pacific/itic and http://www.tsunamiwave.info
- National Hurricane Center (noaa.gov)
- Pacific Ocean | Tsunami Program UNESCO-IOC
- Kaua'i Emergency Management Agency: Kauai Emergency Management Agency - Kauai County, HI
- Maui Emergency Management Agency: Maui Emergency Management Agency | Maui County, HI Official Website
- Metro-Dade County Office of Emergency Management. Hurricane Manual for Marine Interests. Miami.
- National Weather Service Forecast Office: Honolulu, HI (weather.gov) - https://weather.gov/hfo/ or for the Central Pacific Hurricane Center - National Hurricane Center (noaa.gov)
- Pacific Tsunami Warning Center (PTWC): U.S. Tsunami Warning Centers
- Rosenstiel School of Marine and Atmospheric Science, University of Miami.

- State of Maryland. 1992. Maryland Guidebook for Marina Owners and Operators on Hurricane and Severe Weather Preparedness: MD-Marina-Owners-Hurricane-Preparedness.pdf (maryland.gov) and Maryland guidebook for marina owners and operators on hurricane and severe weather preparedness (noaa.gov)
- University of Puerto Rico: Tsunami Guideline Plan for Operators of Caribbean Ports: http://www.prsn.uprm.edu/English/tsunami/media/TsunamiGuidelinePorts_October2011.pdf and Tsunami Guideline Plan for Operators of Caribbean Ports (weather.gov)
- United States Coast Guard Sector Pacific Area Website: https://www.pacificarea.uscg.mil/Our-Organization/District-14/D14-Units/Sector-Honolulu/
- United States Geological Survey (USGS): http://walrus.wr.usgs.gov/tsunami
- University of Washington: UW Tsunami Modeling Projects (washington.edu)
- Villanueva, Maria L., and Donald W. Pybas, editors. 1994. Recommendations for Hurricane Preparations and Responses for Boating Communities and Industries. Sponsored by the Florida Sea Grant College Program in cooperation with the University of Miami Boating Research Center and the Florida Sea Grant Extension Program. Technical Paper 75, Florida Sea Grant College Program, Gainesville. Recommendations For Hurricane Preparations and Responses For Boating Communities And Industries (noaa.gov)

Locals watch as the ocean swept up Waianuenue Avenue in downtown Hilo, Hawai'i on April 1, 1946. Photo: PTM Kerschner Collection, courtesy of the Pacific Tsunami Museum

Appendix A:

Southern O'ahu Tsunami Evacuation Regulated Navigation Area

33 CFR § 165.1413 - Regulated navigation area; Southern Oahu Tsunami Evacuation; Honolulu, Hawai'i.

(a) ***Location.*** The following area is a regulated navigation area (RNA): All waters of the Pacific Ocean south of the southern side of Oahu, HI extending from the surface of the water to the ocean floor, and is bound by a line connecting the following points: 21°17'14" N, 157°55'34" W; 21°13'30" N, 157°55'34" W; 21°13'30" N, 157°48'20" W; 21°14'14" N, 157°48'20" W thence westward along the 50-fathom line to the beginning point. These coordinates are based upon the National Oceanic and Atmospheric Administration Coast Survey, Pacific Ocean, Oahu, Hawai'i, chart 19357.

(b) ***Regulations.*** You may contact the Coast Guard on VHF Channel 16 (156.800 MHz) or at telephone number 808-842-2600 to obtain clarification on RNA transits and locations. Operations permitting, the Coast Guard plans to provide on-scene direction using Coast Guard patrol boats and assets. During the enforcement period persons and vessels wishing to remain inside the RNA must abide by the following stipulations:

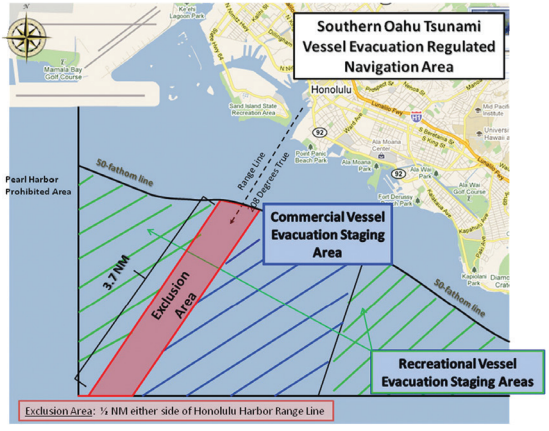


Diagram 200-1
Southern Oahu Tsunami Vessel Evacuation Regulated Navigation Area

(1) No person or vessel may enter into an exclusionary area 3.7 nautical miles long by 1 nautical mile wide, centered lengthwise and along a line running seaward at 208 degrees southwest of Honolulu Harbor Front Range Light, except to transit to or from the staging areas or other areas outside the zone. See the map. Loitering or lingering in the exclusionary zone is prohibited.

(2) The Western Recreational Vessel Staging area is bound by the following points: 21°17'14" N, 157°55'34" W; 21°13'30" N, 157°55'34" W; 21°13'30" N, 157°55'17" W; 21°16'46" N, 157°53'23" W and then along the 50-fathom line to the beginning point. This staging area is intended for recreational vessels departing from and returning to the Keehi Lagoon area.

(3) The Commercial Vessel Staging Area is bound by a line connecting the following points: 21°16'48" N, 157°52'10" W; 21°13'30" N, 157°54'05" W; 21°13'30" N, 157°51'36" W; 21°15'55" N, 157°50'58" W and then along the 50-fathom line to the beginning point. This staging area is intended for use by all commercial vessels intended to remain in the RNA during a tsunami treat.

(4) The Eastern Recreational Vessel Staging Area is bound by the following points: 21°15'55" N, 157°50'58" W; 21°13'30" N, 157°51'36" W; 21°13'30" N, 157°48'20" W; 21°14'14" N, 157°48'20" W and then along the 50-fathom line to the beginning point. The Commercial Vessel Staging Area borders this staging area's western edge. The dividing line between the Commercial Vessel Staging Area and the Eastern Recreational Vessel Staging Area can be determined visually. The private dayboards located in the Ala Wai Small Boat Harbor and the La Ronde Rotating Restaurant roof top restaurant form a natural range that mariners can use in daylight hours to gauge the eastern boundary of the Commercial Vessel Staging Area and the western boundary of the Eastern Recreational Vessel Staging Area. This eastern recreational staging area is intended for use by recreational vessels departing from and returning to the Ala Wai Small Boat harbor and Kewalo Basin.

(5) Located between the Western Recreational Vessel Staging Area and the Commercial Vessel Staging Area is an Exclusion Area. This area is bound by the following points: 21°16'46" N, 157°53'23" W; 21°13'30" N, 157°55'17" W; 21°13'30" N, 157°54'05" W; 21°16'48" N, 157°52'10" W and then along the 50-fathom line to the beginning point.

(6) All vessels staging in the RNA must be seaward of the 50-fathom (300 foot) line.

(c) ***Enforcement period.*** Paragraph (b) of this section will be enforced when a tsunami warning has been issued for the Hawaiian Islands by the Pacific Tsunami Warning Center. The COTP will notify the public of any enforcement, suspension of enforcement, or termination of enforcement through appropriate means to ensure the widest publicity, including the use of broadcast notice to mariners, notices of enforcement and press releases.

(d) ***Penalties.*** Vessels or persons violating this rule are subject to the penalties set forth in 46 U.S.C. 70036.

[USCG-2012-0080, 79 FR 13324, Feb. 28, 2014, as amended by USCG-2018-1049, 84 FR 7813, Mar. 5, 2019]

Lebu, Chile. A major 8.8 magnitude earthquake off the coast of Chile on February 27, 2010 caused massive destruction of buildings as well as a devastating tsunami which destroyed several coastal towns and commercial fishing vessels. Photo courtesy of National Geological and Mining Survey (SERNAGEOMIN) 2012 and UNESCO/IOC - NOAA International Tsunami Information Center.

O'ahu, Hawai'i. In response to the large earthquake and tsunami in Chile on February 27, 2010, a tsunami watch and later warning was issued in Hawai'i. Here boats at Kewalo Basin on O'ahu head to deeper water. The Coast Guard vessel in the background is observing operations and ready to provide assistance. During a tsunami warning, boats going to sea should stay at depths greater than 300 feet and at least 2 miles from the channel entrance. Photo courtesy of Dennis Hwang.

2025

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