

E komo mai a'e pae!
Welcome to the Next Level!



2nd Mate Training Workbook

Revised 2019

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Hawaiiana

Preface

The history of Hawai'i has been colorful and varied. Much of the stories you will learn and hear will have been passed from one storyteller to another as was the Hawaiian tradition. Hawai'i did not have a written language until the missionaries came. Before that, the chant or *oli*, was the way that stories were told, and legends were remembered. As oli were passed from generation to generation, great care was taken to preserve the accuracy of the chant. Unfortunately, the introduction of westernized diseases, much of the Hawaiian population was lost, and so was their culture.

When Captain Cook first visited the islands in 1778, the Hawaiian population was estimated between 700,000 to 1,000,000 people, similar to the current population. However, the introduction of communicable diseases such as the common cold, malaria, typhoid fever, measles, syphilis, and others, reduced the population to just over 40,000 by the early 1800's. Around this time, the first missionaries arrived to Hawai'i. King Kamehameha the Great had passed and his son, King Liholiho (Kamehameha II) negotiated with the missionaries saying that they could stay if they provided a printing press and taught palapala, or reading and writing. Within nine months, the first eight pages were printed in 'ōlelo hawai'i, or Hawaiian language. By 1829, over 120,000 spelling books were printed in 'ōlelo hawai'i. This legendary rise in literacy climbed from near-zero in 1820 to between 91-95% by 1834.

It is from the texts printed in this time period that we reclaimed Hawai'i's history. The following stories that are told are believed to be historically true but care should be taken never to argue Hawaiian history or heritage because of the broad variations in history.

The History of Aloha

The true definition of Aloha is many paragraphs long. There are several different contexts where using this word is appropriate. In general, Aloha means hello, goodbye, and love. It can be broken down into two words, *alo* – to share and *ha* – the breath of life. In traditional Hawaiian culture, greetings and partings were done by touching foreheads and literally sharing breath by first exhaling together and then breathing in the combined breath. Sadly, this practice of physically touching and sharing of breath allowed for the quick spread of air bourn diseases throughout the entire community.

The term for foreigners, *haole*, means without the breath of life. This is because in western culture, the handshake was the form of greeting and they did not share the breath. Then the two cultures met, one would try to embrace and the other would hold out a hand. The western world did not know about sharing breath, thus became known as haole. This cultural misunderstanding was just one of many that drove wedges between settling western society and Hawaiian culture.

The Legend of Lāna'i

Before it was ever called the *Pineapple Island*, or the *Private Isle*, Lana'i was a unique island with a unique history. According to myth and legend, one of Pele's sister lived on the island of Lana'i. One day when Pele (Goddess of fire) was visiting her sister, she became infatuated with her sister's lover. An argument ensued and Pele left angry. She was so angry that when she returned home to Maui, she caused Manua Kahalawai (gathering of waters) to erupt to such a height that it stole the rain clouds that used to travel to Lana'i. As a result, the residents of Lana'i and Pele's sister perished in drought. It was believed that these were some of the evil spirits that were once believed to haunt the island.

In the mid 1500's the evil spirits of Lana'i were conquered and tamed by Kaulula'au, son of Chief Kaka'alanaeo. As legend would have it, Kaulula'au was a troublesome youth who had a disliking for breadfruit. To avoid eating it he would tear up any bread fruit tree he saw by its roots in hopes of eradicating it. Because of his defiance and civil disobedience, he was banished to Lana'i. Sad to see his eldest son exiled and banished to death, the Chief placed a stipulation on his banishment, saying that if Kaulula'au survived on Lana'i and killed all of the evil spirits he was to build a great fire to signal the village on Maui. Only then would the Chief send his troops to recover his son. As the legend goes, Kaulula'au single-handedly conquered the island of Lana'i and was given the island to rule. While banished, he uprooted all of the breadfruit trees on Lana'i which is why, even today, none grow on the island.

One of the first things Kaulula'au did after becoming Chief of Lana'i was structure the Ahupua'a or land divisions. One of the Ahupua'a ran from shoreline to shoreline across the span of the island. Traditionally Ahupua'a run from the top of the mountain range to the shoreline. However on Lana'i the sheer cliffs on the western shore make access to the shore difficult and access needed to be provided.

The History of Molokini

Molokini is a unique volcano type called a cinder cone. Cinder cones only form on the slopes of much larger volcanos, such as Haleakalā. They are typically small pockets of boiling water, hot ash, or magma that work their way to the surface, similar to a pimple. They only ever erupt one time. Other examples of cinder cone volcanoes are Red Hill (Pu'u Ola'i) next to Big Beach, Diamond Head (Leahi), and Koko head Crater (Kohelepelepe) on 'Oahu. Molokini is unique as it formed over the water. There are only three cinder cone volcanoes that have ever formed over water.

Molokini was a gas and ash volcano and erupted around 230,000 years ago. You can see the layers of ash as you drive around the back side. While it was erupting, the southern wall built up higher as trade winds blew the ash to the south. These same winds and waves generated by them over time eroded away the northern wall, exposing the center of the cinder cone creating unique micro marine environments. The top of Molokini stands at 161 ft. In the summer months it is home to several nesting sea birds, most notably the 'iwa (frigate) and the pu'au kani (Hawaiian petrel).

During World War II, the United States started using Molokini for target practice until 1975. This resulted in public outcry. In 1977, Molokini and it's surrounding 77 acres of water was declared a Marine Life Conservation District. Today it is a popular snorkel destination receiving over 450,000 visitors a year.

Molokini in Hawaiian translates to many ties. There were several reasons this was significant. Culturally Molokini was believed to be the piko 'o, or umbilical cord between Maui (Hawaiian demi-god and prankster) and his mother Kanaloa. The island was used to bury the umbilical cords of the al'i. The umbilical cord was buried to prevent other kahuna (people) from obtaining the mana or spirit and essence of the children and casting spells on them.

The Hawaiian Flag

The Hawaiian flag was originally designed by a British captain who was a friend of King Kamehameha the Great in 1809. The original design contained seven stripes for the seven major islands. It was first hoisted in 1816 to represent the Kingdom of Hawai'i (1810-1893). In 1845 the flag was

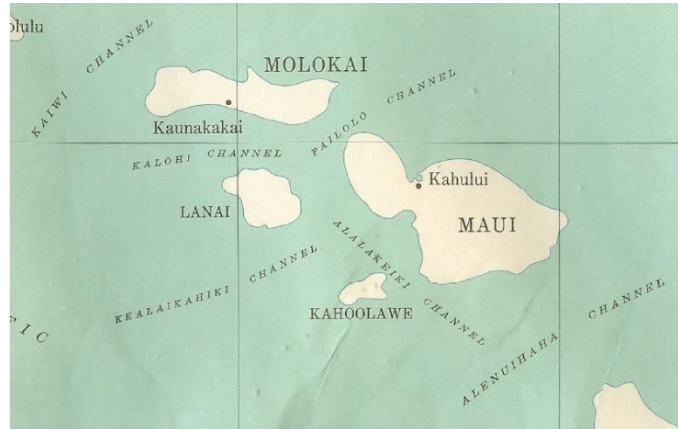


revised at the request of King Kamehameha III by Captain Hunt of H.B.M.S. Basilisk to reflect the eight major Hawaiian islands. The Union Jack was included in the design out of respect and love for the British Monarchy. The Hawaiian Flag is unique because it is the only flag to have been flown over a Kingdom, territory, republic, and state.

Channel Crossings in Maui County

Pailolo Channel – one of the windiest and roughest in the Hawaiian Islands. Pailolo translates to *Crazy Fisherman* referring to the typical sea surface conditions and who would attempt to navigate them.

'au'au Channel – one of the most protected areas of the ocean in the Hawaiian Islands. 'au'au translates to *To Take a Bath* referring to its calm bath like conditions. Maximum depths is 300ft.



Kealaikahiki Channel – It literally means *The Road to Tahiti* and was the Channel the Hawaiians mostly used as a departure for Tahiti

Alalakeiki Channel – Translates to *Crying Baby*

Alenuihaha Channel – One of the roughest channels in the world. With 10,000 ft Haleakalā on one side and 14,000 Mauna Kea on the other. Trade winds funnel through and deep currents press the opposite direction creating a washing machine effect in the dangerous channel. Maximum depth of 19,000ft.

Naturalist

Reef naturalist training

As a second mate you should be familiar with and comfortable using at least 20 fish names in both Hawaiian and English. A great reference is *Ultimate Guide Hawaiian Reef Fishes* by John P. Hoover. Another great online reference is Keoki Stender's website marinelifephotography.com. The Maui Ocean Center is another amazing place to visit and learn quite a lot about Hawaiian reef fishes.

Odontocetes

The waters surrounding Hawai'i are home to several different marine mammal species. A majority of these are odontocetes, or toothed whales. Offshore there are several deep diving species such as the sperm whale, beaked whale, melon headed whale, pilot whale, and rough toothed dolphin among others. Occasionally we do see these species in the shallow waters of Maui Nui, but it's a pretty rare occurrence. Near shore it is common to come across spinner dolphins, bottlenose dolphins, and spotted dolphins.

Spinner dolphins are a smaller dolphin typically 3-5 ft long and about 175 pounds. Spinner dolphins are easy to identify based on their behavior. As their names suggests, they like to jump out of the air and spin. They have a triangular dorsal fin, a prominent beak, and a tri-color pattern.

Our tours encounter spinner dolphins more frequently than any other dolphin species. This is due to the lifestyle of these animals. During the daytime, spinner dolphins look for shallow bays to rest and relax. It is common to see them along the cliffs of Lana'i or the north shoreline of Maui. While resting, they cluster into very large groups. Typically, the mothers and calves are towards the center while the young adults and males hang towards the outskirts. Cetaceans (whales and dolphins) don't truly sleep. They are conscious breathers which means they need to make an effort and decision to breath, opposite to how terrestrial mammals breath. Half of the brain will 'sleep' while the other half stay active for breathing and looking out for threats. Then they switch sides and rest the other half. These natural behaviors can be interrupted by human interaction like boating or swimming with pods. This is one reason you will never see a Trilogy boat motor through a pod of dolphins hoping to get some to bow ride. If animals want to come to the boat, we let them make that choice.

Spinner dolphins are nocturnal feeders. Every night, in every ocean, the largest migration occurs. A layer of animals that live 500-1000m comes to the surface to feed on plankton. Following them is a whole slue of trophic levels, this includes the dolphins. Since spinner dolphins are smaller dolphins, they are limited in their dive abilities. This means they must wait for the food to come to them. About an hour or so before sunset, you might see very active pods moving quickly towards the deeper channels between Maui and Molokai, West Lana'i, and between Maui and Big Island. They prey on opelu, aku, and squid. As the night progresses and the sun comes up, the deep scattering layer returns to the abys and the dolphins make the journey back to the bays and inlets to rest after a long night of fishing.

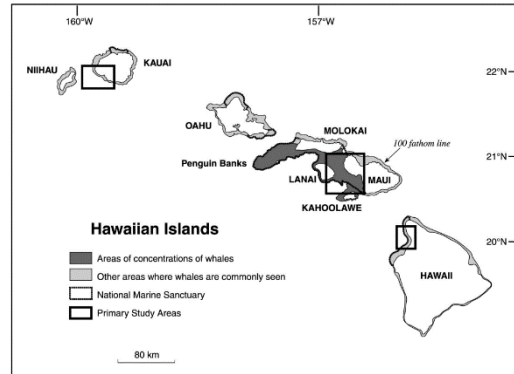
Bottlenose dolphins are very familiar to most people. They are commonly seen in captivity. They range from 8-12 feet long and weigh 400-1,000 pounds or more. We have two varieties of bottlenose that frequent Maui Nui, however they are the same species, just fill unique niches. The inshore dolphins tend to be smaller in size and lighter in color. You will sometimes see them in pods of 2-6 animals however it is not uncommon to see them by themselves. The offshore variety are much more robust and very dark in color. They can easily be mistaken for false killer whales. They also tend to have a more hooked dorsal fin. During whale season, it is common to see bottlenose interacting with Humpbacked whales.

Spotted dolphins are closely related to spinner dolphins. They are similar in size and colorations. However, as these dolphins age, spots form along their dorsal side, like freckles, that distinguish them from spinners. On the big island, it is common to see spinner and spotted dolphins in the same pod. When young, before spots have started to form, it is very difficult to tell the difference between the two. One way is to look at their dorsal fin: spotted dolphins have a hooked dorsal fin while spinner dolphins have more triangle shaped. Although these dolphins are spotted on a semi-regular basis, they are considered an offshore species. They have been spotted several hundred miles Hawaiian shores.

Mysticetes

Mysticetes, also known as baleen whales, fall under the Class Cetacea like odontocetes. However, unlike odontocetes, mysticete whales do not have teeth. Instead they have several rows of baleen that hang from the roof of their mouth and ventral pleats that expand to gulp large amounts of water. The water is then sieved through the baleen, capturing the prey inside the mouth. There are several different species of mysticete whales that have been spotted off the Hawaiian coast, like the fin whale and the blue whale. But the most common that you literally cannot miss unless you don't ever look at the water is the Humpback whale.

Humpback whales migrate to Hawaiian waters each year to mate and give birth. Their season is November -May. They make an annual migration between Hawaii, their breeding and calving grounds, to Alaska, their feeding ground. This is around 3000 miles each way. Traveling between 5-10 mph, it takes around 3 ½ weeks. Maui Nui, the waters between Maui, Lana'i, Molokai, and Kaho'olawe, host the highest concentration of Humpback whales in the world. Between 10,000-15,000 animals come to Maui Nui each year. When Humpback whales were first protected in the United States by the Marine Mammal Protection Act and later the Endangered Species Act, there was only an estimated 1200 left in the North Pacific. Today the population is estimated between 22,000-23,000.

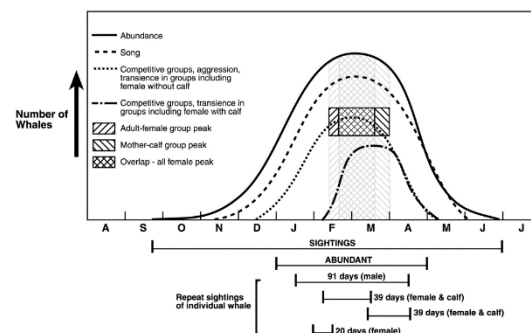


An adult Humpback whale is between 45-55 ft long and weighs 35-50 ton. However, there is evidence to suggest that animals will continue to grow throughout their lifetime. The largest humpback whales ever recorded was a female at 88 ft long. Females on average are 10 ft longer than males. The most common parts seen on a whale are the dorsal fin, fluke, pectoral fin, and blow mist from the blow hole. Each species of whale has a unique blow pattern. Humpback whales typically make a V shape almost to the point of looking like a heart. When they exhale, the air comes out at about 200mph. On a calm day this can create a plume over 30 ft high. The exchange up to 80% of their lung volume in a single breath.

The rostrum, or nose, of the whale is covered in bumps called tubercles. These are residual hair follicles from when whales were land mammals. When calves are first born, they have almost a full beard that they lose a few days later. Tubercles not only house the hair follicles but also assist with water displacement. As the whale swims the water passed over the bump creating a vortex on the back of the bump. This allows the water to flow freely over the surface of the whales' skin creating laminar water flow over the head.

Humpback whales currently hold two world records. The first is the strongest muscle in the animal kingdom, the *caudal peduncle*. This muscle attached the fluke, or tail fin, to the rest of the whale. All cetaceans have this muscle group, but humpback whales have the largest with the highest concentration of fast twitch muscles. This is what allows them to be so acrobatic. When performing a breach, humpback whales only need two to three strokes of their fluke and only 30ft of water to launch the full 50-ton animal out of the water. The second record is their pectoral fins. Humpback whale pectoral fins are the longest appendage in the animal kingdom, measuring 15-18 ft. The pectoral fins are used primarily for steering but can also be used for propulsion.

There are two primary reasons that Humpback whales endure the long journey to Hawai'i and spend weeks to months without feeding: mating and calving. Whales start arriving in Hawai'i as early as October, but the bulk of the breeding population



begins arriving in December. There is a high increase in singing behavior. Only males sing, and there is no true answer as to why. What we do know is that it is not to attract a female. Typically, when males are singing, it attracts another male. It could be a method of sizing up the competition without having to get physical, or it could be a bonding where males will then work together in a competition group. Competition groups begin to increase towards the end of January and through late March. A competitive group is when several males pursue a female. They can form in a matter of minutes and last several hours while traveling 10 or more miles. Typical behaviors include head lunges, chin slaps, peduncle throws, breaching, bubble screens, and trumpeting. Eventually a primary escort is established, and the competitive group will disperse. Males may be in this position for a few hours before being displaced themselves. Males will stay in Hawaiian waters for 2-5 months depending on fat reserves. The bigger you are, the longer you can stay and the more females you can mate with.

Females have a gestation of 11-13 months. After being impregnated, they return to Alaska to feed and bulk up for the following calving season. Females may stay in Maui Nui for 2-4 weeks if they don't have a calf and 6-7 weeks with a calf. When a calf is born, they are between 12-15 feet and weigh 1 ton (2000 lbs). They are very scrawny, light in color, and do not have any fat reserves. Within moments of being born, the mother will bring the calf to the surface for its first breath. Baby whales are born knowing how to swim. The calf will also immediately start nursing. Calves consume around 100 gallons of milk a day at around 40-50% fat (whole milk=3.2%, heavy whipping cream=36%). Because of this, calves have incredible growth rates gaining around 100 lbs a day and growing 1" – 1 ½" per day. By their first birthday, they are around 30 ft long and weight 15,000 lbs. Mama whales give birth in Hawai'i for several reason: the water is warm for young calves, the waters are relatively protected between the islands, and there are less predators for young calves.

Operations

Guest Names

By six months most crew members have devised a system to use and remember 20 names. At the very least you should be able to reference your name card after you ask someone's name in a group and figure out the rest of the party's names. Learning names is a critical part of our job. The sooner you learn a system the easier it will get. It only comes through practice. If you are having a hard time with this as a captain for pointers.

Basic Leadership Principles

You are reaching a point in your career path that will require you to assume some leadership responsibilities. The deckhands and third mates will be looking to you for answers on a layman's level. Some people are too intimidated or embarrassed to ask a senior first mate or captain questions that they feel they should already know but have forgotten the answer to. As a second mate you should start assuming a mentoring role. Just make sure you know the material you are teaching or show them that it is ok to now know the answer and to utilize the chain of command.

This brings us to different leadership styles: authoritative, delegative, mentorship, and leadership by example. Each has its strengths and weaknesses. Different leadership styles apply to different personality types. Have you ever noticed that if you tell certain people to scrub the bilge they

will just look at you? If you grab a couple of buckets and sponges and say, “Lets go scrub the bilges” you are likely to get a more positive response. It is up to you to start recognizing what works for your fellow crew members so you can interact and build the team in a positive manner.

Authoritative: telling other people what to do. These leaders have high expectations but rarely become involved in the tasks themselves. This leadership style sets standards and tends to be more critical when they are not upheld. Authoritative leaders tend to be results oriented and tend to get a lot done in a short amount of time regardless of workers feelings and conditions.

Delegative: tasks subordinates who they feel are capable. This is very affective amongst a competent crew. This tends to be effective because senior crew know how to do the tasks assigned and don't feel the need to be supervised. This leadership style is a double edge sword because without follow up and effective communication there can be a degradation in work quality. This is especially so if the crew is not as capable or does not ask for help and clarification.

Mentorship: befriend their subordinates and offer timely advice to coach the crew to their fullest potential. This is extremely effective when time is not of the essence. It allows for professional and personal counseling and development in an informal manner. Most people respond well to this leadership style. There are a few downsides to mentorship. First of all, it possibly removed a leader making other tasks suffer. It also is not effective when there are time constraints. Delegative and authoritative are more effective in those conditions.

Leadership by Example: working together with small teaching moments incorporated. This style is one of the most effective leadership styles because the crew develops confidence in and loyalty to the leader. The leader is not just telling them to do it faster, he/she is doing it with them and setting the pace. The crew quickly comes to have confidence in the leaders' ability and dedication to teamwork. The downside to this leadership is it, like mentorship, removed the leadership from other tasks. The leader may also have a harder time analyzing the efficiency of the operation because they are too involved.

This is just an overview of the four basic leadership styles. As a junior leader you will have to decide which works best for you and the other crew members you work with. At this level, Leadership by Example and Mentorship are recommended as primary styles.

Teamwork

Every team member plays a vital role in operations. Recognizing your role and the role of others around you can alleviate a lot of frustration and anxiety. The roles are not just task oriented by professionally oriented. How effective is the captain if they spend most of their time passing out fins? How effective is the 3rd mate at sharing Hawaiiana with an audience of 50? Recognizing the utilizing the strengths of each team member will deliver a phenomenal trip for the customers and make your day a lot smoother. Our goal is to avoid setting people up for failure and recognizing all crew members strengths and weaknesses is a great start.

Teaching Food and Beverage Set-up and Service

As a second mate you should be familiar with all the trips and their timelines. As a junior leader you will need to start thinking ahead to anticipate the needs of the captain and the customers. You will

be responsible for providing direction for the deckhands and third mates. Most crew members can figure out how to set up the plates and pass out silverware. Your role is to find out what the captain wants so you can teach the others. It is also important to reinforce the customer service ethics amongst the junior crew.

Timelines on all trips

As a second mate you should know all the timelines for all the trips. The timelines are given out at orientation, but it takes a while to really learn them. Knowing all the timelines makes your life easier because it allows you to prepare for the remainder of the trip.

Skiff Operations

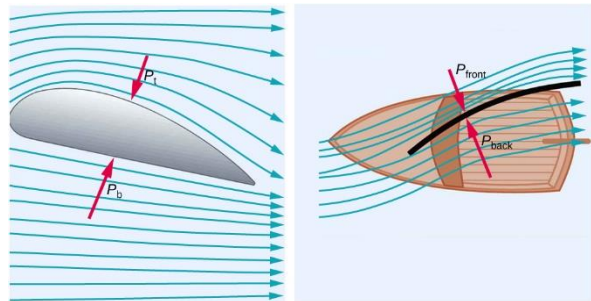
Skiff handling is a crucial skill. It seems fairly simple but somehow we seem to “Murphy” it causing several thousands of dollars in damage. Here are a few tips to help us keep our skiff happy and running.

1. Before leaving the dock, check the fuel and make sure there is fuel.
2. As you are lowering the engine, take into consideration how deep the water is and what the tide is doing to avoid hitting the bottom.
3. Do not go faster than idle in the harbor.
4. When approaching a vessel, return to neutral and coast to the sugar scoop or alongside the gate
5. DO NOT back up in waves. The waves will break over the transom and flood the boat.
6. When docking, be mindful of the bottom. Tilt the motor if needed.
7. When leaving, ensure the bow line is tied to the dock, not another boats line.
8. Raise the motor and turn off the engine. DO NOT just pull the safety switch. When that happens, the battery is still on and possibly will kill the battery.

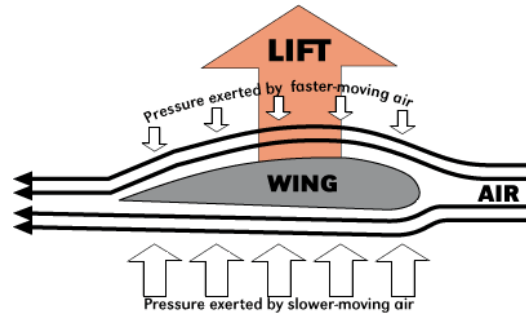
Sailing 201

Bernoulli's Theorem

To understand what makes a sailboat move forward, we will first look at Bernoulli's Theorem. This same theorem applies to airplanes and sailboats. In 1783 Daniel Bernoulli established a theorem based on pressure and velocity in a fluid. If you change the velocity of a fluid at a specific point it will create a change in pressure at that same point. By bending the wind over a sail, we are changing the velocity of the wind. The concave portion of the sail creates more resistance and increases velocity of the wind (a change in pressure and velocity). This creates high pressure. The wind on the convex portion of the sail (leeward) travels a greater distance yet moves faster because of less resistance. This has a low-pressure effect. High-pressure on one side and low-pressure on the other creates lift.



On airplanes this seems fairly simple. The lift allows the airplane to fly. How does this work on boats? If you constructed a plane wind out of cloth and stood it up you would have a sail. The sail creates lift by not in the direction we would sail a boat. The lift created by the sail is transferred to the hull. The hull has a keel that provides resistance to lateral drift. As lift is created by the sail this places pressure on the keel on the downwind side of the vessel. This creates high pressure on the downwind side of the keel.



The keel acts as a hydrofoil. The angle of the water flowing over the keel creates the same type of lift as the angle of air flowing over the sails. Notice the two foils have pressure on the opposite sides. The sails have pressure on the upwind side and the hydrofoil has pressure on the downwind side. The combination of the airfoil and hydrofoil working together allows us to move forward. In most cases we can only adjust the sails to balance the keel to move forward efficiently.

Wind Strength – True vs. Apparent

There are two winds in sailing, *true* and *apparent*. The wind direction and speed you feel when standing on the dock or sitting in your boat while it's moored is the true wind. All the win indicators on land show its direction and speed. The wind you feel when moving is the apparent wind, a combination of the true wind and the wind you create for yourself by moving through the air. If this is a difficult concept to envision, imagine you are in the car with the window down. When you are at a stop light, there is a slight breeze blowing in the window. This is the true wind. Then the light turns green and you speed up. Now the air is moving very fast into the window, this is the apparent wind, the wind you are creating by driving forward.

$$\text{True Wind} + \text{Wind You Make} = \text{Apparent Wind}$$

Here in Maui it is important to remember that we have other forces that effect wind, like the island that blocks and moved both wind and waves. For more information on True vs Apparent and different wind speeds, see *The Complete Sailor* pg 16-19. When reviewing the Beaufort scale, disregard the wave heights as they do not follow this pattern in Hawai'i.

Sail Calls

As a second mate you may want to start practicing sail calls. The sequence of criteria should be based on wind direction, wind velocity and point of sail. A good place to star would be the main sail. The table shows the breakdown of reefing based on wind speed in knots. The jib or genoa should balance the mainsail. Too much jib overpowers the main sail, yet it is easier to douse the jib or reduce the roller furling than it is to reef the main underway. Observe the study the conditions and then confer with your captain or senior mate to see if they got the same answer. If they got something different don't forget to ask why.

WIND	CALL
0-15	No Reef
15-20	1 st Reef
20-25	2 nd Reef
25 +	Full Reef

Reefing

Learning when, why, and how-to reef is extremely important. Sail area must be adjusted to match the strength of the wind. When should you reduce sail? Usually when you first begin to think about it. Shortening sail early will make your life easier and sailing more comfortable. It's time to reef when you think it is... sounds weird, but if you find yourself wondering if you should put a reef in, then you thought about it. Many of us wish we would have listened to that little voice. Reefing is don't to reduce the stress on the rigging and sail. It doesn't necessarily mean that we are sacrificing speed. Reefing is a terrific way to retain proper sail shape and trim in heavier winds. With too much main sail up we are forced to spill off too much wind and sacrifice sail shape and trim for safety reasons.

When it's time to reef, find the cringle at the appropriate reef tack. Our sails have a reinforced section of webbing with a stainless-steel ring on either side. Both rings need to be attached to the tack hooks. If this is difficult, use the topping lift to give you a little leeway to get them secure. The reason both need to be attached is because of the reef points. If you were to pay the sail down flat you might notice that the reef tack and clew are sewn online with or about a half inch above the reef points. When the tack and clew outhaul are tensioned, the reef points should be able to be tied loosely so as not to bind or pinch the foot of the sail.

Next tension the clew outhaul before you tie in the leech cringle. When tying in the leech cringle be sure to lay the line so the it does not pinch or chafe the leech of the sail. To do this pass the line through the leech cringle. Stand the flake of sail upright and make a loop under the foot and around the boom. Tie a running bowline where the loop is around the running line. When you are finished pull up on the slack making sure not to go in between sail flakes. Wrap the running line around the winch and tighten. Remember the more you reef, the flatter you want your sail and the tighter your tension.

For more information on Reefing, use *The Complete Sailor* pg 52, 88, 108 & 109

Points of Sail

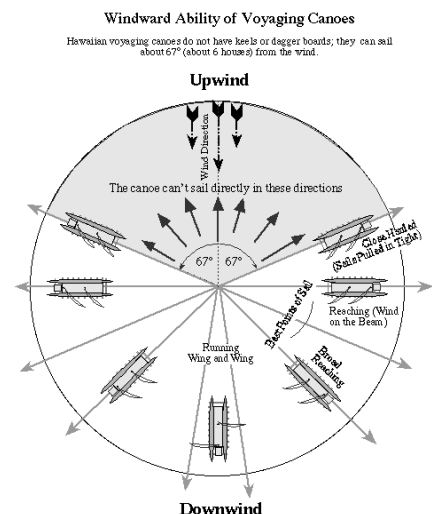
There are four main point of sail for catamarans:

Close-hauled – a sailing craft is said to be sailing close-hauled when its sails are trimmed in tightly and the boats course is as close to the wind as allows the sails to generate maximum lift.

Beam Reach – a beam reach is when the true wind is at a right angle to the boat. The wind is coming across the beam, or widest part of the vessel.

Broad Reach – a broad reach is anything between a beam reach and a dead run. In a broad reach the wind is coming from behind the vessel at an angle. Typically the sails are eased out away from the sailing craft, but not as much as on a run.

Dead Run – Also known as Running or Wing on Wing. On this point of sail the true wind id coming from directly behind the sailing craft. In this mode, the sails act in a manner substantially like a parachute.



For more reading, consult *The Complete Sailor* pg 12&13.

Tack and Gybe

Tacking and Gybing are terms used to describe the type of turn that you are going to make. For the most part, our boats tack. It is a slower smoother turn that is easier on the rigging.

On Trilogy vessels there is a lot that needs to occur in a short period of time for efficiency and customer safety reasons. When your captain says prepare to tack or ready about, that is an immediate call for all hands-on deck. First and foremost is customer safety. Ensure that all guests take a seat and remain seated until after the maneuver is completed. Specific areas may need relocation depending on the vessel.

Tack	Gybe
Bow into the wind	Stern into the wind
Jib passes first	Main passes first
Slower turn	Faster turn
Upwind turn	Downwind turn
Safer in heavy conditions	Can be dangerous; hard on rigging

When the captain is ready to turn, they will fall off slightly to pick up more speed and then round up into the wind. Once the bow passes through the wind, one crew member will man the lazy sheet until after the bow has come about and the jib is back winded and pushing the bow off the wind. Once the bow has made the turn, the mate will ease the sheet line quickly but controlled. Another or the captain will pull in the slack on the opposite side and pass the jib across the bow.

When you are taking up on a lazy sheet (the line without tension) and making it the working sheet (passing the headsail to your side), make sure that you have three wraps on the winch. Pull in the slack as quickly and as much as possible. This rate is just a dependent on the person releasing the working sheet on the opposite side. Once you cannot muscle the line any farther, put an additional two wraps on the winch and add the winch handle. When adding wraps, be aware of your fingers. The proper way is the palm the line as you make the wraps until you can get it into the teeth.

Gybing is along the same lines with the exception that the main and boom come across first. Because of this, instead of worrying about the jib sheet lines, you need to center and sheet in the main sail first. Just before the stern passes through the wind the min will blanket the jib. The captain will call to release the working sheet and the lazy sheet will become the new working sheet. This window of blanketing is very narrow so it is in the crews' best interest to time the release and sheet in quickly before the sail is loaded up. This will save a lot of effort.

For more information on tacking and gybing refer to *The Complete Sailor* pg 42 and 48.

Wing on Wing

Wing on wind or dead down wind is by far the hardest and slowest point of sail on a sailboat. Any time a Trilogy vessel is wing on wing there should be a preventer on the main to prevent accidental gybing. When feasible a preventer on the jib's working sheet is acceptable. The preventer should be sprung forward if possible. Even when all of these precautions' things can happen quickly when wing on wing. Stay at a high level of awareness and be prepared to act quickly on the captain's orders.

Preventer

A preventer is a line that attached to the boom or working sheet to prevent an accidental gybe. The preventer is tied to the boom approximately 2/3 of the length of the boom towards the rear. If

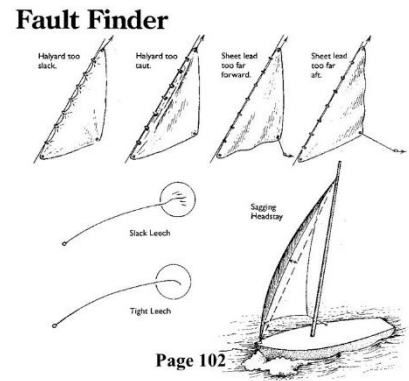
there is a tie-in point on the boom you should still go around the boom then through the tie-in point. If you are working on a vessel that does not have a tie-in point on the boom you should use a rolling hitch secured with two half-hitches on the boom. Ensure that the wraps are applied towards the load.

Recommended reading in *The Complete Sailor* pg 90.

Sail Shape and Sail Trim

The shape of your sails determines the efficiency of forward motion. Ideally, when cut across the middle, your sails should have the same shape as an airplane wing. For a sail to do its job on the wind, air must pass over it smoothly and evenly. Any turbulence or separation of flow on either side means a loss of efficiency. An example would be a luffing sail.

There are three points of attachment for each sail: head controlled by the halyard, tack which is fixed, clew controlled by the outhaul of sheet line. Refer to the Fault Finder image for how to correct issues. To trim the sails correctly, if fully tightened, ease the sheet line until the sail just starts to luff then tighten until the luff stops.



For more information on sail shape, refer to *The Complete Sailor* pg 102-107

Fairleads and Travelers

Fairleads are rollers or blocks that move on a track to adjust the shape of the jib sail. Moving them forward pulls down on the sail and removes wrinkles on the leach of the sail. Moving the fairleads to the rear removed wrinkles in the foot of the sail. The placement of the fairleads can change depending on the wind.

The traveler allows you to change the angle of the main sail without changing the sheeting line. Sheeting out on the main causes the sail to lift and twist which can spill off valuable wind. There fore using the traveler systems allow you to change the angle of the sail without sacrificing the shape.

Seamanship

Proper Radio Usage

The radio is a tool for safety and communications. It is governed by the Federal Communications Commission (FCC). All operators are required to maintain an FCC license known as a Marine Radio Operator Permit (MROP). The vessel is required to maintain a marine radio station license and have an assigned call sign which must be used. Both of the licenses are revocable is misused. Channel 16 is for official communication only for emergency communication. There are three classifications for formal communication with the United States Coast Guard (USCG). The first two are considered emergency classifications. When hailing, the classification should be repeated three times before addressing and identifying. The classifications are:

Mayday – used only for emergencies where there is an immediate or impending risk or loss of life or property. This is the highest classification of distress communication.

Pan-Pan – used for emergencies such as disabled vessel, loss of engine, discovery of sunken vessel or wreckage, etc.

Securite – used for reporting general mariners information such as hazards to navigation (submerged logs), missing vessels or persons, pyrotechnics demonstrations, etc.

When using the radio be sure to look for the plaque next to the radio for the station call sign and calling procedures. If all else fails remember when calling to key the mic for two second before speaking. Say who you are calling, let them know who you are and tell them what channel you are on. It may sound something like this:

You: Pan pan – pan pan – pan pan – United States Coast Guard this is Trilogy 3 Wiskey Alpha Zulu 8014 (call sign) on channel 16, OVER

USCG: Trilogy 3 this is the United States Coast Guard drop to channel 22 alpha OVER

Switch to channel 22A

USCG: Trilogy 3 this is the United States Coast Guard what is the nature of your emergency?

You: Unites States Coast Guard this is Trilogy 3 Whiskey Alpha Zulu 8014 on 22 Alpha. I have found two kayakers reported missing this morning. My location is.....

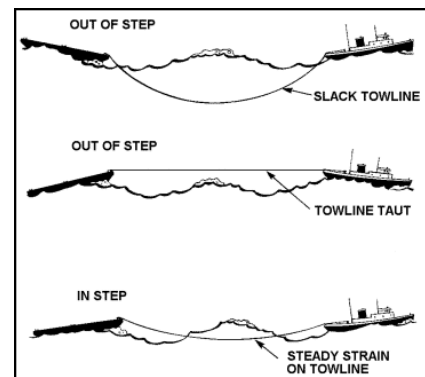
Splicing and Whipping Line

At this point in your trilogy career, you should have attended a marlinspike clinic. There are three different splicings that you should master: 1. Eye Splice in 3-strand line (dock line), 2. Eye Splice in 3-strand line with a thimble (mooring line), and 3. Eye Splice in double braided line (fender or halyard line). You will also master whipping the end of both 3-strand line and double braided line. It is recommended to review *The Complete Sailor* p152-153.

Bridling

It is important when bridling a catamaran to not stress the hulls. This is accomplished by setting the proper scope. Improper lengths can place stress on the hulls and cross braces. Ideally each length of the bridle should be 2-3 times the beam of the vessel. Both legs of the bridle must be of equal length or the shorter leg can fail. If a knot is required to secure the bridle, a bowline on a bight is preferred.

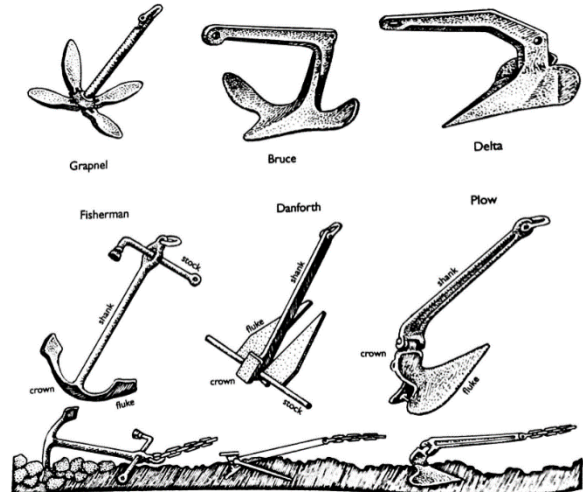
When towing, you should pay out enough line so that you are a least 3-5 wave lengths behind the towing vessel. Both vessels should be in step, or on the same part of the wave at the same time. The dip in the line is call catenary and should rest in the water just under the surface. Do not pay out so much line that a significant amount of line is in the water at any given time. This will allow for recoil absorption if the tow line parts. It is also important that a crew member should always have a sharp knife accessible to cut the line in an emergency.



Basic Anchoring

There are several different types of anchors and each has a different benefit depending on the sub-straight and the vessel. The most common are Fisherman, Danforth, and Plow. Trilogy vessels are equipped with self-setting plow anchors. Self-setting means that when the anchor is dropped, it has a bar across the crown that cause the anchor to roll and the fluke to be in the correct position to bed into the sub-straight.

The anchor is then attached to an anchor chain. The chain is spliced to a line called the rode. A common misconception when anchoring is that the anchor holds the boat in place when it is actually the weight of the chain the holds the vessel. This is why it is important to have plenty of scope when anchoring. It is recommended to have 5-7 times the length of scope to depth of the water. There for if you are anchoring 40 feet of water, you should have a minimum of 200 feet of scope.



When preparing to anchor:

1. Place the chain around the windless if not already there.
2. Flake out the remain chain and appropriate amount of rode so it is read to run. If the windlass feeds directly into the storage compartment, ensure that the chain and rode are free and clear to deploy.
3. Unsecure the anchor and lower until 1 ft above the surface of the water.
4. Wait for the all clear from the Captain and the diver that you are in the correct location.
5. Began lowering the anchor while maintaining control. Do not just drop all at once.
6. Once the anchor is on the bottom, inform the captain so they can start backing down.
7. When you have reached the preferred amount of scope, inform the captain and secure the line.
8. Make sure that the line is set in a way that you can quickly retrieve the anchor. This is important if there is an emergency or if the wind or current shift.

For more information on anchoring review [*The Complete Sailor*](#) pp 130-139.

Safety Drills

Lead MOB/Fire Drills

As a second mate you should know all of the positions for Man Overboard and Fire Drills. For the MOB drill, start looking for the small things to ensure they happen or corrected if they are not happening. Things like whether or not the spotter takes their eyes off of the victim? Was a life ring or flotation thrown into the water immediately? Is there a constant bearing and distance sounded? Does the retrieval crew member have a lifejacket on and are the tied in? Are the other crew members giving accurate information to the Captain? All of these things seem small but are monumentally critical during a real MOB situation.

For a fire drill you should be able to deploy the fire fighting apparatus and understand how to attach a fire with a hose or extinguisher. All of the vessels carry fire extinguisher, and some have engine driven fire hoses. It is the crew's responsibility to inspect equipment and report back to the captain. If you notice an extinguisher out of date or rusting through be sure to inform the captain and operations manager.

A fire needs heat, fuel and oxygen (minimum of 16%) to burn. A lack of any of the three elements will extinguish the fire. There are four different classes of fire.

CLASSES OF FIRE AND FUEL SOURCES	
Class A (Ash)	Common combustibles such as wood, paper, cloth, rubber, and plastic
Class B (Black Ash)	Flammable or combustible liquids such as gasses, greases or petroleum-based products
Class C (Current)	Energized circuits, conductors, equipment or appliances
Class D (Dust)	Combustible metals such as magnesium, titanium, potassium, or sodium

Most fire extinguishers are AB or ABC. The range on small fire extinguishers is 5 foot; on larger extinguishers it is 8 foot. When using an extinguisher, be sure to aim at the base of the fire. If you are unable to extinguish the flames retreat from the compartment and close the door.

Fire on a vessel is a life-threatening emergency and should first be reported to the captain. After notification, the captain will instruct the crew of their duties. The most important is crowd control – this crew members sole responsibility is to keep the passengers away from the source and upwind of the smoke. If it becomes necessary to abandon ship, they will also be responsible for the distribution of PFD's.

When fighting a fire on board follow these steps:

1. Cut off air supply to fire – close items such as hatches, ports, doors, ventilators, and louvers, and shut off ventilation systems
2. Cut off electrical system supply to affected compartment if possible
3. If safe, immediately use portable fire extinguishers at base of flames for flammable liquid or grease fires or water for fires in ordinary combustible materials. Do not use water on electrical fires.
4. Maneuver vessel to minimize effect of wind on fire
5. If unable to control fire, immediately notify the Coast Guard and other craft in the vicinity by telephone or VHF radio
6. Move passengers away from fire, have them put on life jackets, and if necessary, prepare to abandon the vessel

Most fires that occur in our industry are in the engine room. If the fire is occurring in a sealed compartment, identify the location of the fire (it may be moving) and look for visible signs such as heavy smoke or blistering decks or bulkheads. If you cannot find a source of heat, feel at the top of the bulkheads with the back of your non-dominant hand. If there is a lot of heat, DO NOT OPEN THE COMPARTMENT. Doing so can cause a back draft resulting in an explosion. Inform the captain. If the fire is in the engine room, the captain will instruct you to deploy the fuel shut-off and air vent shut off for that engine.

The captain may choose to also deploy the fixed CO2 fire buoy in the compartment. Afterwards, they will inform you when it is safe to open the compartment and enter with additional extinguishers. Fire on a vessel is a life-threatening emergency. You should familiarize yourself with the location of the air vents, fuel shut-offs and firefighting apparatus.

Loss of Power

Usually the captain is the first person to notice a loss of power. If this occurs mid channel, the captain will ask a senior mate to take the helm while they attempt to default the problem. If a loss of power occurs near land, the situation may be extremely urgent. If the vessel is still making forward movements, it may be possible that the captain can still steer. When there is little to no forward momentum, the vessel is now in immediate danger.

Should you find yourself in this situation, the captain may call for you to "Throw the Anchor". This is a last resort when all other possibilities have been exhausted. Throw anchor is done to avoid a catastrophe. If this call is made, stop what ever you're doing and drop anchor as quickly as possible. One minute can be the difference between minor damage and massive loss.

Loss of Steering

Loss of steering is an emergency that can usually be handled by the captain using engine power. If this is not enough, a rudder arm can be used to manually steer the vessel. These rudder extensions attach to the control arm in the rudder room. To engage the manual steering, you must release the hydraulic valve that controls the arm. Follow the hydraulic hoses from the control arm to the hydraulic actuator. If you are confused at any point, ask your captain.

Besides manually controlling the rudder, there are a few other things that can be done to correct steering. Dragging a bucket or anchor is an effective way to slow down and keep the stern to the seas while sailing down swell.

Heavy Weather

Customer Safety

The safety of our guest comes before anything else. During rough weather the captain may ask you to assist guests as they try to move about the vessel. If a person wants assistance you should stay with them until they are seated wherever they wanted to be. The same holds true if the captain asks you to clear the trampolines of the front deck. The guests will quickly oblige you if you tell them captains orders for safety reasons.

Seasickness

Seasickness can be a common experience for even the most seasoned sailor. Occasionally our guests start to feel "a little different" and have some issues with the motion of the ocean. There are several contributing factors to think about that can predispose someone to being seasick. Dehydration is a common culprit. Many times guests arrive after a long flight (fatigue and airplane air), have a couple of mai tai's to unwind (dehydration, get up early to go out with us (fatigue). Have two cups of coffee (dehydration) to wake up. Going snorkeling and swallow a little salt water (dehydration), have lunch and a few sodas (caffeine and dehydration), then don't understand why they got seasick. This has never happened to them before.

As a crewmember it is important to understand how to help them during these times. First is understanding the causes of seasickness. Even though dehydration and fatigue can predispose a person to being seasick, in reality seasickness is a physiological response to different inputs. In short, what your eyes are seeing and what your equilibrium are feeling are two different things. As a result of this your body thinks it is being poisoned. Your body then produces toxins that irritate the lining of your stomach to cause you to vomit what ever you ingested that is poisoning you. People tend to notice they feel a little better after they vomit. This is because the toxins have been released.

You can counter some of these symptoms by using ginger root and over the counter medication like Dramamine. Although we are not allowed to prescribe our guests medication, we can provide it to them if requested. Passengers must be instructed to read the warning labels. It is recommended to take it several hours ahead of time. Ginger is a natural herbal remedy that can provide quick results. This is because it soothes the stomach lining. Other food products can help like breads, complex carbs, sodas, and ice cream. Ice cream coats the stomach like Pepto Bismol providing fast relief.

At Trilogy we must remember to be compassionate towards our guests, even empathetic. Always offer to help relocated them to the calmest part of the boat, typically the stern, point them down wind and advise them to keep their eyes open and looking up. It is important to instruct them if they are going to vomit, get it off the boat. The smell alone can cause a chain reaction or perpetuate the illness for the person.

If you see a guest going below, redirect them to the stern railing. If they go below the visual input will be magnified and cause them to become extremely ill quickly. Their best bet is to tough it out on the downwind rail. Provide guests with a cold wet compress and liquid to sip on. Ice cubes on the tongue are a good trick to help re direct the brain. If someone is to the extreme and looking very pale and has been for a while, don't forget that oxygen is part of standard first aid and can be administered at any time without paperwork.

Making Ready for Rough Crossings

Making ready for rough weather is extremely critical and time sensitive. It's possible to only have a few minutes warning. It is important to prioritize. Guests are the first priority. Make sure that they are in an area that is safe. If possible explain the conditions a head of time and encourage them to move towards the stern or into the cabin.

Once guests are secure, stow any loose gear and close the portholes and hatches. Remove anything from the counters that could fall or create a hazard. The crew should already remain on watch during weather. It is important to make rounds and attend to guest, assisting them to a new location if necessary. Crew should periodically check in with the captain to assist or relay information to the rest of the crew.

Docking

Docking in heavy weather can be extremely interesting. The old saying, "A Captain is only as good as his crew" is more true here than anywhere else. During docking there can be several forces working against the captain: wind, waves and current can all effect even the most senior captains. It is extremely important to develop a docking plan in the channel before you get to the dock so everyone knows their assigned duties and where to be. Understanding and sticking to your role can mean the difference between a successful docking or thousands of dollars in damages.

Timing is extremely critical. The captain may only be able to get close enough to drop off one crew member, typically a seasoned mate. Speed and communication is important. Pay special attention to the captains orders as to spring forward or back. Just remember everything can change quickly and you must be ready to respond at a moments notice.

Mooring for Weather

During rough sea conditions and heavy weather, verbal commands are not effective. Hand signals with distance and direction are usually best. As you tie up, ensure the two lines are equal to minimize more strain on one hull. The captain will have you adjust the scope depending on conditions. In heavy surf or winds, a second set of lines is set as a back up to the first.

Storm Watch

As second mate you should start thinking about storm watches. Storm watches is coordinated by the COR, Operations Manager, and scheduler. Call and ask if they need you to help check on the boats. This is a paid hourly shift. You may not be needed but it is always nice to ask.