

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



1st Mate Training Workbook

Revised 2019

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Hawaiiana

The Hawaiian Society

The history of Hawai'i has been a subject of debate for generations. In this section we will not be focusing on times, dates, and who conquered who, as much as how the Hawaiian people lived. It is believed that from the original discovery until around 1250 AD that there was a monotheistic society based upon the land. There was the belief in one God over everything. The idols and statues cared during this period were to spirits of the land. It is unknown if there was a system of government or laws during this time period.

It wasn't until the second mass migration around 1250 AD from Tahiti, Samoa, and other islands that a more organized system of religion and government was established. The Tahitian religious system believed in multiple gods and would carve idols of the gods to worship. The religious system was extremely intricate and organized with a priesthood system complemented by laws and punishments. This religion was responsible for bringing the kapu system and ritual human sacrifices to Hawai'i.

The emerging Hawaiian society was a feudal based society with rulers and commoners. The rulers, or ali'i, were given a parcel of land, known as an ahupua'a, to rule over. The commoners, or maka'ainana, would work the land to provide for the good of the village, the land, and the ali'i. Unlike European feudal societies, the maka'ainana were not bonded to the land or the ali'i. This meant that if they were unhappy with their arrangement, they had to option to leave and go to a different ahupua'a and ali'i. It was in the best interest of the ali'i to rule fairly amongst all classes. Each ali'i needed to retain farmers, priests, canoe builders, healers, historians, warriors, and any other members of society necessary to make the ahupua'a viable.

The Ahupua'a

The ahupua'a was a pie shaped division of land running from the summit of a mountain range down two ridges to the ocean. The line extended past the shoreline and included the aquatic resources. The land was divided in this fashion so that an ali'i would have all of the resources necessary to sustain his people. The kukui nut tree, bird feathers, game and countless other resources could be gathered from the mountains. The mountain ranges gathered the waters for the valleys. The waters of the valleys fed the loe (taro patches) to provide a staple in the Hawaiian diet. The ili stones were gathered from the stream beds to provide the cool flooring for the canoe houses, drum houses, temples, and dwellings. The trees from the mountains were carved into canoes by the canoe kahuna to create vessels for fishing, war, and travel. Everything had a use in the ahupua'a.

Most villages were built along the shoreline of the ahupua'a because it was centralized to their way of life. The staples of the Hawaiian diet were fish and poi. Because of this incredibly simple yet complete diet it was said that the average 60-year-old Hawaiian man was in better health and stronger than the average 30-year-old sailor.

The Great Mahele

The Great Mahele was a division of the lands in 1848. King Kamehameha III released his rights of ownership to the people. Up until the Great Mahele land was owned and ruled by the ali'i. The maka'ainana had no concept of land ownership or its value as an independent unit. King Kamehameha III issued an edict in 1848 requiring all maka'ainana to register their parcel of land. After registry it was

given to the chieftains or purchased by the maka'ainana as kuleana land. Kuleana lands are lands that pass directly to the descendants of the maka'ainana without title and typically contain necessary resources. This was done statewide, and all land not registered was at the king's disposal to award as he saw fit. This edict regulated who owned the land and how the land was divided

Some historical accounts say this was done as a result of western influences in a subversive attempt to acquire land ownership from the maka'ainana by the haole. Western investors planted the seed of doubt in the ali'i's head that it was necessary to give land to commoners to retain loyalty and build the kingdom. This caused the ali'i to fear that his people would fall prey to a growing western influence and lose their lands. To avoid this, all land should be registered so there could be no disputes. The haole knew that if kuleana lands were given, the maka'ainana would have no grasp of the value of the land. The thought of being able to trade a musket for a parcel of land would have made even the most righteous of men deviant. We will never truly know the motives behind the Great Mahele, but it laid the foundation for the atrocious law called quiet title action, or quick deed.

Quiet title action

In the early 1800's the western influences in the Hawaiian Islands was growing. The Hawaiian monarchy was enamored with the British monarchy and system of government. A court system was introduced during this time period and was quickly established to pass laws to govern the people and regulate the growing commerce. The newly founded court systems were a perennial Trojan horse for the Hawaiian monarchy.

Since the court system was foreign to Hawaiians, who had only the Kapu system before western influences, many legal and court appointments were given to westerners versed in law or government. The primary white courts leaned heavily toward supporting the expansion of commerce and establishment of western society. Land ownership was not overlooked.

The common argument of the day was who owned what parcel of land. Because of the Great Mahele and the edict issued to the Maka'ainana, the lands were registered to owners. The argument was that a deal could be made, and land sold with no legal finality to the agreement. To end these disputes, the Quiet Title Action Law was proposed. The proposed law stated that if a person laid claim to land you own, a notice would be posted on the land and the landowner had 90 days to show up in court to defend the land. This seemed fair enough and seemed to have good intentions of amicably settling disputes of land ownership and therefore was adopted by the court. However, this law became responsible for the theft of the lands from the Hawaiian people.

The language of the court system was English. Only affluent Hawaiians had the benefit of an English education. Much of the population at the time, could not read or write in Hawaiian much less English. There was also the issue of the court's location. The courts were held on O'ahu, the hub of Hawaiian government. For the maka'ainana, this meant that even if you found the piece of paper and took it to someone who understood it, you had 90 days from when it was issued to get in your canoe and paddle to O'ahu. This would be a problem if you lived on the Big Island. Thousands upon thousands of Hawaiians literally had their lands stolen away by legalities. Sadly, this is a cause of much civil unrest, and hatred even today.

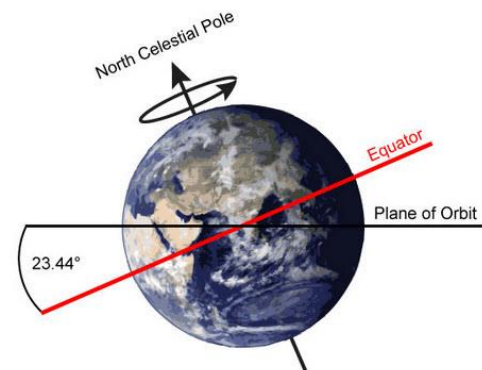
Weather

Introduction to Weather

Weather is probably one of the most difficult subjects to teach. Forecasting is both an art and a science relying upon basic laws of physics and an ever-changing local environment. During this introduction you will be given the knowledge of the major causes of weather. It will be up to you to pursue and practice your knowledge beyond the basics. Finetuning takes years.

Our planets weather is created because the planet is tilted on its axis 23.5° . This causes different areas to be exposed to the sun longer than others. Different topographic features also heat at a different rate depending on geographical composition (water vs. land) and latitude (closeness to the Equator). The temperature of the air creates movements in the atmosphere. Areas where hot air rises are known as low-pressure cells. The void of hot air moving up forces cooler air to fill in known as a high-pressure cell. This convection of air moving and circulating is then effected by the rotation of the Earth known as the Coriolis Effect.

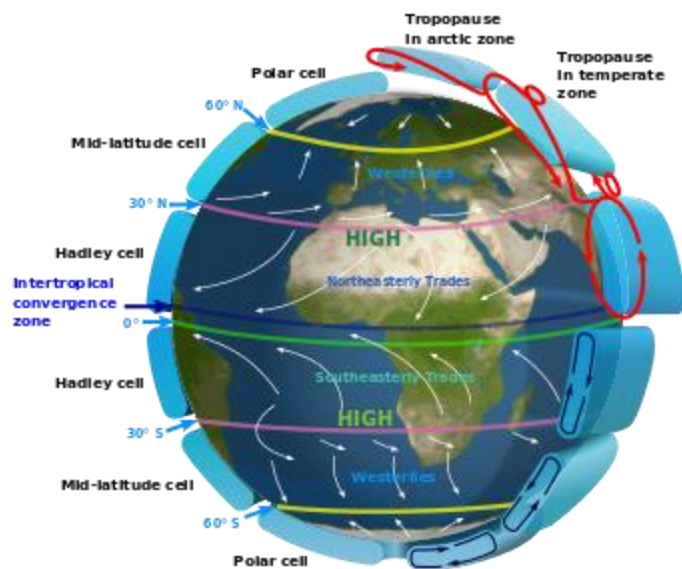
There are two main types of heat variation in the atmosphere. There are daily changes cause by the rotating earth known as diurnal variation and seasonal changes caused by the Earth rotation around the Sun known as seasonal variation. Seasonal variations exist again because of the planets tilt. Summer occurs when the Earth is tilted towards the sun and winter occurs when the Earth is tilted away from the sun. It takes $365 \frac{1}{4}$ days to rotate around the sun. Therefore every 4 years we have a leap year that contains an extra day.



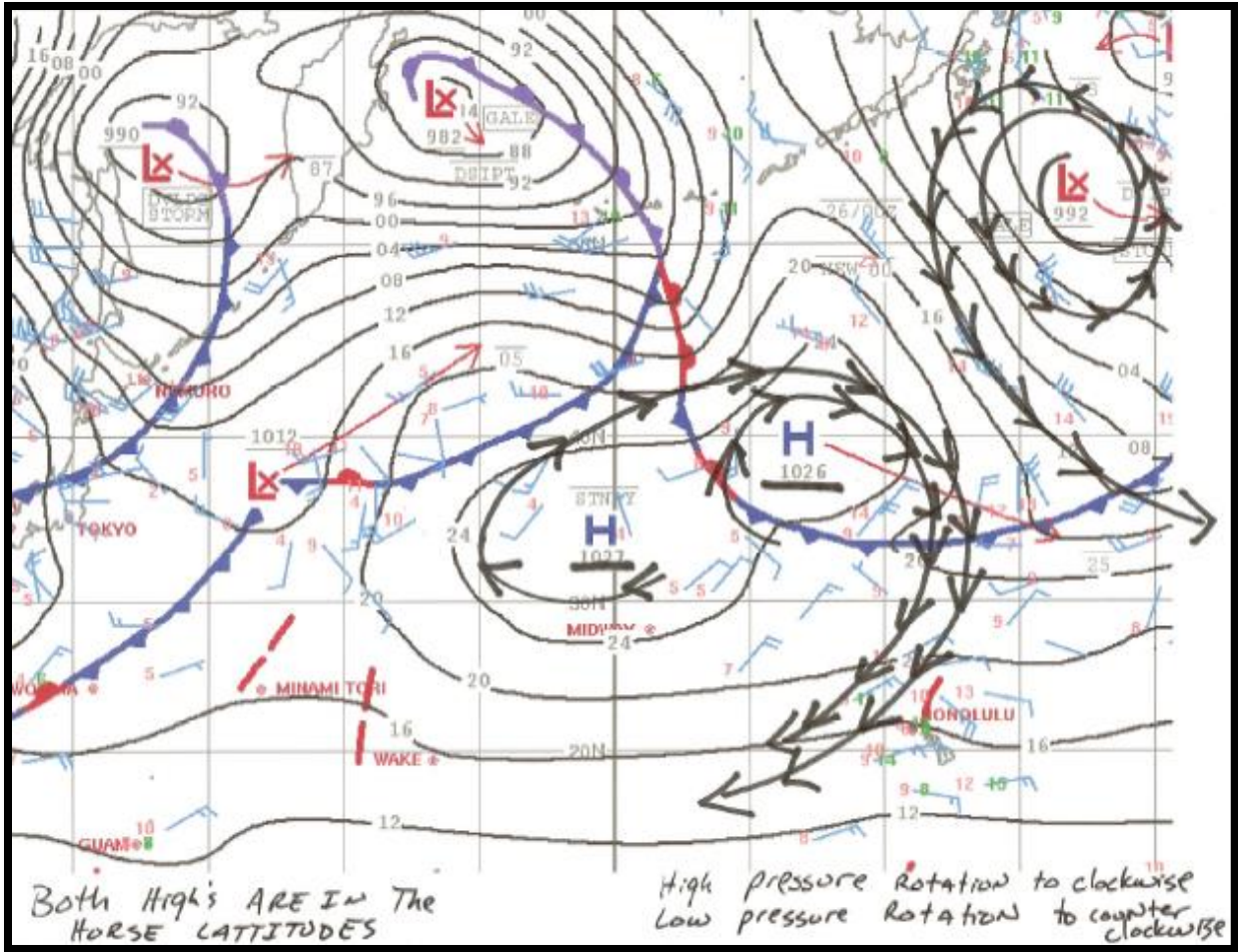
If you want to sum it up easily, weather is a result of the unequal heating and cooling of the Earth's surface as it rotates on its axis. Diurnal variation happens 365 days a year. As a result, certain weather patterns begin to develop.

Highs and Lows

In the last section we touched briefly on high- and low-pressure cells. This section will discuss how those pressure systems affect us daily. In the Northern hemisphere the Coriolis effect cause the wind in a high-pressure cell to rotate clockwise. Conversely, the wind in a low-pressure cell rotates counterclockwise.



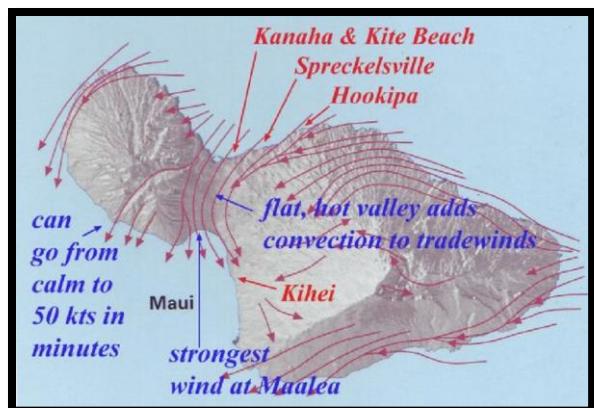
During the winter most of the high-pressure cells are North of us. These high-pressure cells push cool, dry air on top of warm moist air. This creates a cold front that creates precipitation. Most cold fronts pass quickly. A good rule of thumb is the faster fronts arrive, the faster they leave.



Looking at the above figure you can see that the two high pressure systems are feeding each other and rotating clockwise. The low-pressure cell up by Alaska is rotating counterclockwise and is helping accelerate the wind between the two pressure systems.

Note the wind direction and speed flags. A full pennant on the flag means 10 knots and half pennant means 5 knots. By looking at our location just south of the high-pressure cells, you can reasonably forecast Maui will receive 15-25 knots of wind from the ENE. These are the Easterly Trade winds named so by the sailing trading vessels from the 1500-1900's that used them to get from point A to point B.

The Hawaiian Islands are unique because of their massive volcanoes that dramatically rise out of the ocean. As wind rushes across the open ocean, it is abruptly stopped and diverted by Hawai'i's massive volcanoes. On Maui, winds run into Haleakalā and the West Maui Mountains and must go around either side. The daily heating and cooling of the land also effects the local winds. As



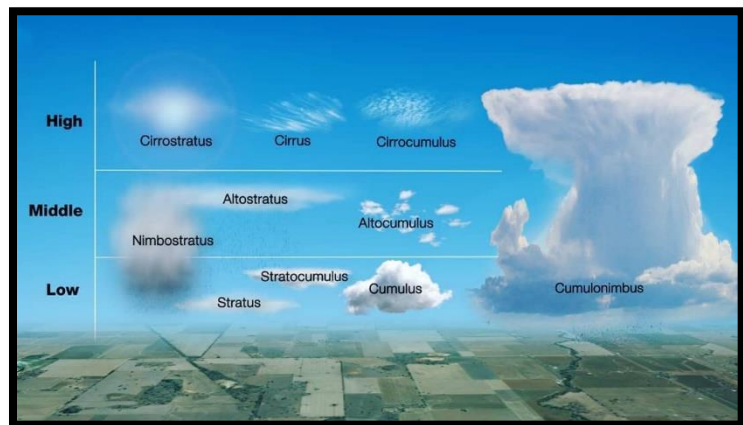
the land heats up, it powers the trade winds, driving them through the valley harder and faster. This is why Ma'alaea is one of the windiest Harbors in the world and why Kanahele is the windsurfing and kitesurfing capital of the world.

After the sun sets, the land begins to cool, and the ocean is now warmer. Hot air over the water raises and pulls the cool air down from the mountain creating an offshore breeze and neutralizing the trade winds. When the sun rises and the land is heating up, the opposite occurs sending cool sea breezes towards the island until the trade winds fill in and overpower the local pressure cell. While the winds are changing direction there is a slight pause. Therefore, there is less wind in the morning and a few hours after sunset. This is why Trilogy and other boating companies run their snorkel charters in the morning and sailing charters in the afternoon.

Clouds and their Meanings

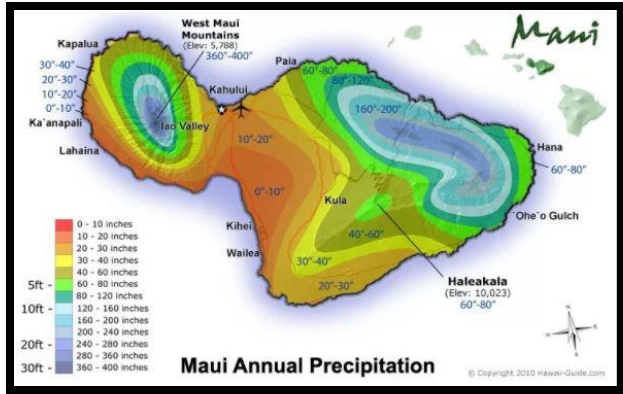
Clouds are categorized into three different levels: high, middle, and low altitude. These clouds can help accurately predict local weather. The high-altitude clouds are cirrus, cirrostratus, and cirrocumulus. They tend to be an indicator of weather that is several days away. Middle level clouds are altostratus and altocumulus. These cloud types indicated weather to come within 24 hours. The lower level clouds are real time indicators of impending weather. They are stratus, stratocumulus, nimbostratus, and cumulus.

Most people are familiar with cumulus clouds. This cloud is often thought of as a low, fair weather cloud. However, they have the potential to quickly develop into a foul weather cloud. As the cloud grows vertically it retains more moisture, turning into thunderstorm clouds like the cumulonimbus or anvil head. The anvil head is formed when the cumulonimbus reaches the height where the wind is stronger, and the top of the cloud starts to shear off. This is an incredibly volatile cloud.



As you watch clouds move, you can get an idea of how the weather is changing. Clouds that are ascending indicated that the moisture is rising and separating meaning fair weather. These clouds tend to be thin and white. As clouds descend, the moisture in the air is condensing and foul weather may be on its way. These clouds are dense and dark in color.

Here in Maui we also have several local weather changes. As mentioned in the above Highs and Lows section, Maui's volcanoes can alter and change the wind. When winds that are carrying moisture encounter the North Shore of the island, they must alter course. Some get forced to higher latitude



where the moisture they carry is cooled and begins to condense creating clouds. As the day progresses on, the clouds become fuller and fuller and eventually it begins to rain. This creates a wet (windward) and dry (leeward) side of the island. This same pattern occurs on all of Hawai'i's islands. The taller the volcanoes, the more dramatic the difference between the windward and leeward sides of the island. On the Big Island, for example, Hilo averages around 400 inches of rain a year. That's more

than 30 ft of rain! On the opposite side of the island, Kona averages around 4 inches of rain per year. These two towns are only ~70 miles away from each other.

Operations

30 names

As a first mate you should be learning and using 30 names on a daily basis. Your name card should have all of the manifested passengers names and should double as a back-up for the captain's name card. The practice is a prime example of leadership by example. It is easy to get pulled into running things behind the scenes. You cannot allow this to distract you from doing your primary job which is taking care of the guests.

Engine Types

Boat	Engine Type	Horse Power	Tier
T1	Cummings QSB 6.7	300 HP	Tier 3
T2	Yanmar 6LY3-ETP	370 HP	Tier 2
T3	Cummings QSB 6.7	300 HP	Tier 3
T4	Cummings QSB 6.7	300 HP	Tier 3
T5	Cummings QSB 6.7	300 HP	Tier 3
T6	Yanmar 6LY3-ETP	370 HP	Tier 2

*T6 is the only remaining nonelectric diesel in our fleet

Checking the Engines

1. CHECKING OIL – checking the oil is more than just looking at the level of fluid. You should look for fluid level, color, texture, and smell. The fluid level should be just below the full line when the engine is cold. This allows for the expansion of the oil as the engine heats up. NEVER overfill an engine with oil. This can raise the oil pressure and cause problems with the gasket and seals

When you are looking at the color, black or opaque brown (new oil) are the acceptable colors. Milky white, muddy brown, or grey means there is a serious problem and you should notify the Captain and maintenance immediately. These colors mean the oil has been

contaminated (usually with water) and different colors represent the stages of the oil breaking down. If you see this, do not start the engine.

The texture should be smooth not gritty. The dipstick on most engines nearly touches the bottom of the oil pan. This is so grit, metal shavings, and other contaminants could be identified on the dipstick.

When checking the smell, you are smelling for fuel that may have gotten into the oil.

2. COOLANT RESERVOIR – check the coolant reservoir while the engines are cool. Like the oil, coolant expands when the engine heats up. Therefore, do not overfill the reservoir.
3. TRANSMISSION FLUID – to locate the dipstick for the transmission, stand directly behind the engine while straddling the shaft. The transmission dipstick is a red handle on the top left side of the transmission housing. Check the fluid level on the transmission while cold ensuring it is within the lines.
4. HOSES AND FITTINGS – after checking the different fluids, inspect the engine block for leaks and cracked hoses. Slightly tug on hoses and belts to detect loose fittings. Check around the fuel injectors and RACOR for puddles of diesel.

Conducting Daily Safety Briefings

First mates should be capable of giving the snorkel safety briefing on the vessels and at the beach. Briefings are important for giving information to the guests on the sight, safety concerns, and structuring the experience. If you listen to several captains' briefings, you will notice that they are all different but contain the same ingredients: safety and convenience. Over 90% of the issues we face every day are covered in our briefings. Whether you are snorkeling from the beach or from the boat, the safety briefing should include the following:

1. LOCATION – give a site briefing on the location's name and highlight some features. Describe terrain and wildlife above and below water to let the guests know what they might be seeing. Be sure to set boundaries for the guests based on conditions and staffing.
2. FLOTATION – mandatory flotation for all guests. Go over the two options for flotation. Be sure to include the pros and cons of each type. Demonstrate how to do them correctly.
3. ENTRY AND EXIT – When pointing out entry and exit points, be sure to include safe practices. This includes tips such as "No fins on the deck" or "no fins on the beach". To further prevent incidences, structure your briefing to walk guests through getting in and out, where to put their fins on and where to take them off.
4. SAFETY – Let the guests know about the roaming lifeguard as well as the stationary lifeguard. Remind them that we are here to assist them in any way possible. The stationary lifeguard should help people in and out of the water. By doing this we can identify people who may need special attention and clue the roaming lifeguard in on the situation. The roaming lifeguard should stand by just outside of the entry point to provide assistance for those who need it without congesting the entry for the rest of the guests.

5. **CONVENIENCE** – this section of the briefing would be for such topics like the location and proper usage of the de-fog, boogey boards, and wetsuit tops. This would also be a perfect time to mention the snorkel class after the briefing.
6. **TIMELINE** – Let the guests know when we expect to leave. By doing so we alleviate them from having to ask or guess how long they have to play. Just remember that they are on vacation so tell them to be back 5 minutes sooner than you actually need them.

Know All Trip Schedules

As a 1st Mate you should have an intimate working knowledge of the trip schedules and timeline. Not only will the customers expect you to know, the crew will also be looking to you for leadership. Because of the ever-changing environment, the best person to ask is your captain. It is all the little things that make the day go smoothly. Be sure to talk with your captain to solidify the game plan so you can help lead the team.

Advanced Leadership Theory

In the 2nd Mate workbook we discussed leadership types. We also covered how to pick a leadership style what works for you and the team. These are essential skills when it comes to working with people. The other side of leadership is managing the systems to ensure the success of the crew. There is a system of operation in every organization. Becoming acquainted with and identifying problems within the system can be crucial to your success. What good is it to have a great crew supporting you as you lead the charge into a problem you cannot overcome? Not only will it lower the moral of the crew, it will cause them to lose faith in you as a leader. Leaders are not born, they are developed over time.

To be a successful leader, you must:

1. **Face challenges and having courage** – a great leader is brave yet prudent. Courage is the physical and mental control fear and is essential to leadership. Courage is a mental quality that allows you to recognize fear yet enables you to meet danger or opposition with calmness and firmness. By facing challenges courageously, you attain a quality of mind that gives you personal control, allows you to accept responsibility, and act in dangerous situations. This also includes control of your emotions.
 - a. Place responsibility over your personal desires or feelings
 - b. Look for and readily accept responsibility
 - c. Speak in a calm tone, keep and orderliness in your thought process and not make any physical danger or hardship bigger than it really is
 - d. Stand for what is right even in the face of popular disfavor
 - e. Recognize fear but control your emotions
2. **Be honest** – Integrity is the quality of absolute honesty, trustfulness, and uprightness of moral character and principles. As a leader, you must have unquestioned integrity. Honesty, a sense of duty, and moral principles must be placed above all else. You must be totally trustworthy for employees to have faith in you and for the seniors and managers to have confidence in you. The trait of integrity is developed by these four practices and habits:
 - a. Practice absolute honesty and be trustworthy not only with your self but with other. Never shade the truth.

- b. Be accurate and truthful in all statements. Don't tell people what you think they want to hear. Tell it as it is but do it tactfully.
 - c. Stand for what you believe in, even if it's unpopular
 - d. Place honesty and your responsibilities above all else, include your feelings
- 3. **Win trust** – your team will become engaged and loyal if they feel they are surrounded by people they can trust. The first and most important aspect of building trust is to get involved in other crew's everyday work problems. Pay close attention to those that are behind everyone else and devote some time to explaining their tasks to them. But don't overdo it – no one likes micromanagers. An easy way to gain the trust of your coworkers is to be dependable. A dependable leader can be relied on to carry out any task to the best of their ability.
- 4. **Demonstrate knowledge** – Nothing will gain the confidence and respect of your coworkers more quickly than demonstrated knowledge. As a leader, you should develop a program of self-learning. Development of knowledge and skills is important. We should not only keep up with our own professional knowledge, but also be aware of matters of general interest in the everyday world. One way we can attain general knowledge is from discussion with people of sound judgement and experience. Ask these people questions every time you have the chance. The bottom line is, before you can teach someone else how to do something, you first must know how to do it your self.
 - a. Read articles or take courses
 - b. Listen to experienced captains and crew
 - c. Ask questions, be inquisitive
- 5. **Keep calm** – good 1st mates rarely show their emotions. You have to stay focused and if you feel overwhelmed, it is better to take a minute, breath and come back to the task or situation. Everyone makes mistakes include you; you can never allow yourself to correct them in anger. Instead, calmly explain the situation and what you expect them to do in the future.
- 6. **Listen and observe** – If you want to be a excellent 1st Mate, you will have to be the best at listening and observing. People express themselves with their manners, words, and body language every day. You can tell a lot about a person if you observe them. See what tasks make them excited, which tasks make them gloomy, and which seem to make them happy.
- 7. **Be decisive and take Initiative** – Decisiveness is the ability to weight all the facts in a situation; analyze that facts, and then arrive at a sound and timely decision. But before you make any decision you must be sure that you have all the facts. Decisiveness is largely a matter of practice and experience.

Initiative is simply seeing what has to be done and doing it without having to be told to do it. As leaders, we must develop initiative, not only in ourselves, but in our employees. To develop initiative in employees we should assign them tasks according to their ability and experience, setting them up for success.

8. **Set an example** – be the kind of leader you would follow. You may not know every task 100%, but it is essential to understand how to solve or better improve each situation. Your aim as a leader is to set the example; so for example if you want them to dry the boat after your wash down, do it your self and encourage them to assist you. Know that no task is beneath you.
9. **Stay organized** – keep your boat clean and organized. Your orders should be easy to understand. You should know the plan for each day.
10. **Be fair** – Although it is an obvious statement, many leaders tend to pick their favorites. Even if you are close friends with someone on your team, it doesn't give you the right to be totally permissive to them while throwing most of the work to others.
11. **Be sympathetic** – although you have to be tough sometimes, you should also understand that we are all human beings, and sometimes it won't hurt you to cut some slack to those that are going through a rough time.

Problem Solving Skills

Whether you are managing systems or people, you will encounter problems. Here are a few steps to help you problem solve both:

1. Identify and isolate the problem
2. Develop multiple solutions to solve the problem
3. If you cannot come up with a solution, ask for help
4. Decide the best course of action to solve the problem with minimal impact to the guests and crew
5. When dealing with guests or crew always be sure to exercise tact and self-control
6. Afterwards, look at why the problem happened and try to prevent it in the future

Training New Crew

All 1st mates inherently become the lead trainers of all new crew. This is because the captain can't walk away from the help to teach the basics all the time. As a 1st mate it is your responsibility to correct incorrect behavior of new crew. Even if you are not involved in the initial training of a crew, you should always feel empowered to step in to correct mistakes and encourage correct behaviors. Fortunately, you will also have your 2nd mates to assist you.

When teaching a new task or correcting an incorrect behavior, it's important to approach the situation with a positive note and not spend too much time on the correction. Simply state the incorrect behavior, why it's incorrect and how to correct it. Here is an example with improper line coiling:

“Hey Jodi, when the line is coiled and tied like that, it can easily get tangled on itself which could be a safety issue if we need to drop sail quickly. Coil and hang it like this.”

Here we are identifying what is wrong. Notice how it is presented does not blame Jodi for doing it wrong, but simply identifying where the behavior went wrong. This is important from a psychological standpoint because Jodi cannot change who she is but can change the behaviors she does. This

statement also identifies why the behavior needs to change. In this instance it's a safety concern. Then as the first mate, you demonstrate how to do it correctly and safely.

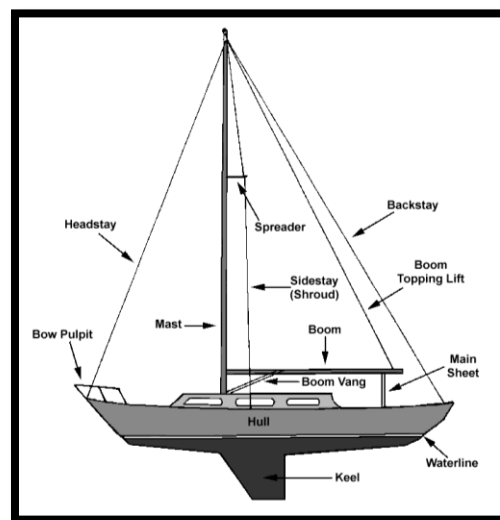
A key point to remember when training a person is to remember that there are different ways of doing things that do not affect the safety of our crew or guests or the quality of the trip. If you, as a first mate, see something you would do differently but don't have a safety reason or quality reason why to change it, it might be something you can just let go of. It's important to not become one of those very knit-picky first mates that no one can please. If it bothers you enough, just change it yourself and let it go.

Sailing 301

Standing Rigging

The primary purpose of standing rigging is to support the mast or masts. The two main categories are *shrouds*, which provide athwartship bracing, and *stays* for fore-and-aft support. Stays are also used for hang sails (collectively known as *staysails*) such as the jib or genoa. Standing rigging is further subdivided into a variety of specialized types, the most common of which are shown on the rig image to the right.

Stays and shrouds are attached to the mast by metal strips called *tangs* and joined to the hull by *chainplates*. The rig is usually tensioned by turnbuckles. On some racing boats backstay tension can be changed underway, using hydraulic or mechanical adjusters to affect mast *rake* (angle) and bend. There are also *running backstays*, which are used when no permanent backstay can be fitted or when extra bracing is needed.



A boat's rig is often named for its forestay. Larger boats typically have *masthead rigs*, with the forestay attached to the top (head) of the mast (the forestay is then properly called a headstay). Smaller craft, or those wanting more control over for-and-aft mast bend, use *fractional rigs* with the forestay attached only partway up the mast. Many fractional-rigged boats, such as Lightnings and Stars, use *juniper stays* above the forestay to stiffen the mast against the pull of the sail and backstay.

Checking the Rigging

Rigging inspections should be a daily as well as a monthly event. Taking note of the condition of the rig and reporting any issues back to the captain should be second nature. All too often the Captain is oblivious to something that you may have noticed for a few days. This is a natural occurrence since they are driving the boat more than walking around on it. A good captain always appreciates the information, even if it's the third time you told them.

When checking the rigging the sensible place to start would be the chain plates and bolts. Look for rust and hairline cracks on the head of the bolt and the body of the chain plate. Check the threads and cotter pins on the turnbuckles for wear. Finally, when inspecting the swedging and cables, look for

cracks in the swedge or strands of cable that are worn flat, popped, or fish hooked. And of these items need to be reported to the captain immediately.

Lead Sail Calls

As a first mate, make it your game to guess the sail call before the captain tells you what to put up. Be prepared to make the call and lead it after the captain gives the approval. That often means taking the newer crew up with you to learn how to shake our put in a reef, change out a sail, or run the sheet lines. A good first mate will anticipate the captain and lead the crew.

Steering by Sail Trim

It is possible to steer a boat under sail without a rudder. Steering by sail trim is a subtle art form that can take years to master. In this section we will cover the basics.

When choosing a course, the first sail to trim is the jib or genoa. Let it out until it begins to luff, then sheet in slightly as you maintain your course. As you sheet out your main sail, you can center your helm (if you are using it) until you are sailing a constant course.

To alter your course by sail trim, just remember that each sail provides resistance and propulsion. If you are sailing on the wind, tightening your jib will help you fall off. If your jib is trimmed perfectly than sheet out your main to take pressure off the main. This will keep you from rounding up and will allow your jib to pull you along. When traveling off the wind, the same principles should apply. A proper sail call and trimmed sheets should make the vessel effortless to sail.

Reefing and Shaking a Reef Under Sail

It is easier to unreef a sail than reef a sail under way. To shake a reef while sailing the captain may come closer up on the wind. This will help place the boom over the cabin top. Ensure the topping lift is on before easing out the halyard. Untie the down haul, loose the outhaul and untie the reef hook at the tack. The final step will be hoist the sail up while the cars are under load.

To put in a reef in while under sail is just as much fun. The first few steps are the same. Ensure that the topping lift is on before easing out the halyard. Use the clue outhaul to pull down the main. Use the reef hooks to tie in the tack. Tighten the clue outhaul, tie the downhaul and hoist the main. If you do this a few times it may help you re-evaluate your sail calls as well as how you set your reefs. The bottom line is reefing and unreefing your main takes practice and forethought. It can be difficult and dangerous. For those reasons we tend to be conservative on the main. It is much easier to reef a roller furling.

Drogues in Heavy Swell

Drogues can be used to steady a vessel running before a storm. They can be used as supplemental steering if you've lost a rudder. Drogues can be used for many things, but in our world are seldom used for anything. So why bother going over it? Because in a pinch it can save the boat. What happens when you're sailing down wind on a broad reach and the vessel strikes a log and loses a rudder? Instead of surfing uncontrollably down the waves and possibly broaching or even worse flipping, you can throw out a drogue that will slow you down enough to retain control as you drop the sails or figure out the safest course of action. Although we don't carry formal drogues onboard, there are several things that can be used as a drogue like a bucket or an anchor attached to a long line. Anything will do as long as it provides resistance in the water.

Lee Shore

In Maui, our unique topography provides several protected places for us to do non-sailing activities like serve food and drinks or watch whales. These places are called Lee Shore. Getting caught on a lee shore in modern times isn't as big of a deal as it used to be because we now have engines. Nowadays we simply fire up the motors or go close hauled and cruise away from the shoreline. This wasn't always the case.

Kedging

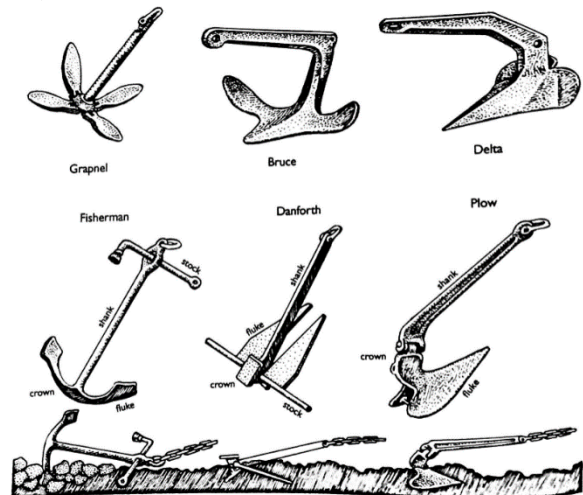
Kedging is a term used for manually hauling a vessel off the shore or away from a lee shore. To do this, carry out a lightweight anchor in the dinghy or by wading or swimming (using a PFD to support the anchor). When rowing, put the kedge and its rode in the dinghy, making the bitter end fast to the boat aground. Set the kedge as far from the boat as possible to maximize scope. Haul away with a sheet winch or tackle. Try to swing the bow around, then the stern. If she won't budge, keep the rode taut and look for opportunities. A wave or changes in tide may lift her enough to pull free. Further reading in *The Complete Sailor* pages 162-163.

Seamanship

Types of Anchors and Their Uses

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.



Preparing and Setting the 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. Begin 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.

Weighing Anchor

If a horizontal pull digs an anchor in, a vertical pull should break it out.

1. Pull all slack out of the rode.
2. Have the captain drive the vessel over the anchor until the rode is perpendicular to the beam of the vessel. Communication is important so the captain does not go too far and drag the anchor, causing it to get caught or propping the line. You should be taking up on all slack in the rode.
3. Once the anchor rode is vertical, heave the line by hand or using a windlass to retrieve the anchor.
4. Stow the anchor in the cradle and secure both the anchor and chain. The rode should be stowed in the forward compartment below the windlass.

Boat Handling in Close Quarters

As a first mate it is time for you to start thinking about boat handling. The Captain will rarely volunteer to teach you unless you express a desire to learn. Each captain will assess your abilities and decide if they think you are ready to handle the conditions of the day. A key point to remember is to only go as fast as you want to hit something, but not so slow that the elements can change the boats position.

Start by simply learning the rudder control for the vessel. A good time to do this is when we are out at sea and there is nothing to hit. Then learn the throttle controls. A good place to start is when we are putting the cross lines on and positioning the boat for overnight. This gives you a chance to better understand the throttle controls and where the boat pivots.

Once you are comfortable here, your next step is taking the boat out of the slip or off the dock. If you are working in Lahaina, start on the North Dock, then the Face, then the South dock without a boat on the face. Finally, after you have mastered pulling out and are comfortable moving in the basin, start offering to pull the boat into the harbor. This can be even more challenging in the afternoon as the winds increase.

As a working first mate, you should feel comfortable and confident bringing the boat into and out of the harbor. You are the back up if anything should happen to the captain. It will become your responsibility to get the boat and passengers home safely. If you are not ready for this responsibility, you should re-consider applying for your first mate test right now until you possess these skills.

COI, Annual Inspections, and Dry Docks

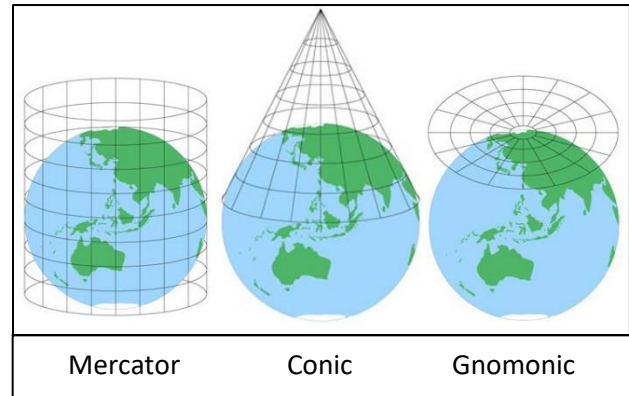
Part of learning about the vessel systems is inspection preparation and dry dock. Nothing will cause you to become more aware of vessel care than fixing something that someone else has broken. It is important to not only take care of our vessels but understand how many hours it take to correct

mistakes that can happen in seconds. Every ding, dent, gouge, or scrape will mean hours of labor spent sanding, chipping, and painting. At this stage in your mariner career, it becomes abundantly clear why we properly train the crew to preserve and protect the vessel.

COI and annual inspections will familiarize you with the legalities of operating a documented vessel. These inspections will also lay the foundation for a working relationship with the USCG when you become a captain. As a first mate you will be required to complete at least one of these three events per year.

Introduction to Charts and Plotting

Navigation is a lifelong skill that can become very complex. The objective of this section is not to teach you to become a master navigator, but to familiarize you with how charts work. Charts are a graphic representation of the round earth's surface projected onto paper. There are three major types of charts: Mercator, Conic, and Gnomonic. The most common type of projection is the Mercator. The Mercator chart is reasonably accurate between 70° North and 70° South. The closer it gets to the poles the more distortion there becomes.

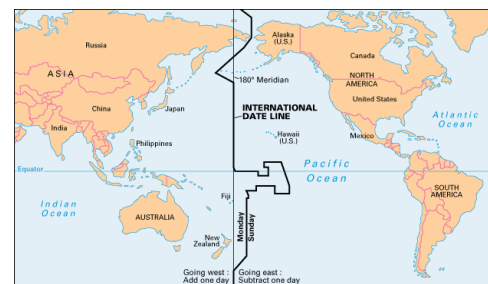


Latitude

The parallel and horizontal lines you see on the chart are latitudes and longitudes. Latitude represents your position North to South and longitude represents your position East to West. Northern and Southern hemispheres are divided in the middle by the Equator. The equator represents 0° and the poles are positioned at 90° North or South. Each degree can be divided into 60 minutes (60') and further into 60 seconds (60"). The position in Lahaina is 20° 53' 5.99" North. Celestially the Northern Hemisphere latitude can be determined by your angle to the North Star which sits directly over the pole. If the North star is 20° off the horizon, you are at roughly 20° North. Similarly, in the Southern Hemisphere you can use the Southern Cross.



Longitude is a little different and more difficult to determine without GPS. Longitude is defined by the Greenwich Meridian aka GMT or Greenwich Mean Time. This is a hypothetical line that was drawn from the North Pole to the South Pole through the town of Greenwich, England which sits at 0° Longitude. A sphere has a 360° circumference. So you can go 180° East or West of the GMT. Like latitude, degrees are divided into minutes and seconds. The longitude for Lahaina is 156° 40' 17.39" W. The East and West meet up at the International Date Line (IDL). This



line, as depicted in the figure, is not a straight line due to country boundaries. The way that it is drawn allows an entire country to stay on the same day. Countries to the right of the IDL are one day behind countries to the left.

In olden sailing times, before GPS, your longitude was determined based on your time difference from GMT (hence why degrees are divided into minutes and seconds). When a vessel would leave England, they would sync their clock to GMT. Then every day at noon, they would see what the difference was between their high noon and when it would be noon in Greenwich. This gave them an idea how far they had traveled longitudinally. We still use this concept to determine time zones which were not invented until railroads became popular in the 1800's. This is one of the reasons that the accuracy of Polynesian travel was so incredible because they were able to keep track of both their latitude and longitude based solely on celestial markers.

Plotting

When referring to our position, we always say our latitude than our longitude. Here are some examples:

Lahaina	20° 53' 05.99" N	156°40' 17.39" W
San Francisco	37° 46' 29.74" N	122° 25' 09.89" W
Sydney, Aus	33° 52' 02.95" S	151° 12' 25.16" E

Safety and Emergency Drills

De-masting

In any emergency the primary concern is the safety of our guest. Move the guests form danger areas and render first aid. The remaining crew members should try to secure the sails and rigging to the vessel while the captain determine who to call for assistance. If the mast is destroying the vessel or creating an unsafe environment due to high seas or wind, the captain may order the mast cut away. If they is the case the crew members should pull out the de-masting kit and begin cutting away the shrouds. Keeping a sharp knife on you always is highly recommended. Care should be taken when cutting away material to wear eye protection.

MOB Under Sail

Man Overboard under sail is a time critical maneuver. It may take a while for the vessel to stop depending on the point of sail. It is extremely important to deploy flotation quickly and ensure the spotter keeps eyes on the person in the water. The captain may head to wind and drop sail. Be prepared to direct the guests out of danger areas that could be created by the sheet or boom. Further read is recommended in *The Complete Sailor* p164-165.