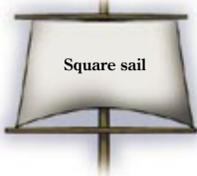


Tall ships

"Tall ships provide an index to our natural selves," said a volunteer crew member on the Lady Washington. Starting Thursday in Seattle, you can check that out for yourself — watching and visiting vessels ranging from a 1911 Dutch barque to a Spanish-built replica of Columbus' Niña. It's all part of the Tall Ships Challenge, organized by the Maritime Heritage Foundation in cooperation with the American Sail Training Association. Many ships like those you'll see in Seattle are used throughout the year — for educational cruises for young people, corporate retreats, Elderhostel programs or other activities.

Some types of sails

Square rigging



Square sails, mounted at 90 degrees to the length of the boat, are powerful drivers that harness steady winds blowing from behind the boat. Square sails do a poor job of drawing power from cross winds, so they were used largely on ships that cruised on trade winds on oceanic voyages.

Fore-and-aft rigging



Fore-and-aft sails are mounted along the length of the vessel. Acting like the airfoil of an airplane wing, they shape the wind into areas of high and low pressure that pull the ship forward. They are efficient at catching wind from all directions and are critical in steering the ship.

Sails

In the original era of tall ships, sails were made of canvas. Modern sails are usually made of Dacron fiber, which is more durable and lighter than canvas, and resists stretching or bunching with changes in weather.

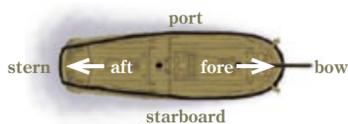
Illustrations by Andy James / The Seattle Times are adapted from original deck plans; details may vary from the vessel as it currently sails.

Sources: Lady Love/Grays Harbor Historical Seaport Authority; Research by Whitney Stensrud / The Seattle Times

Trimming sails

The rigging lines are anchored to cleats and belaying pins at 148 locations on the deck. Crew members on deck pull or let out the lines in order to adjust the position of the sails.

Basic layout of a ship



Bark Europa

A **barque** (sometimes spelled bark) features three masts, two rigged with square sails and the third, in the rear, rigged with fore-and-aft sails. (To add confusion, a barquentine is the same, except that the forward mast is the only one rigged with square sails.) The Europa is the only barque sailing among the tall ships.

Jumbo Mark II Class ferry (to scale)



Hawaiian Chieftain

A **ketch** has two masts, the forward one higher than the one in the rear (aft). In addition, the aft mast sits forward of the steering position. The Hawaiian Chieftain is a ketch. The Yankee Clipper and Cutty Sark are known as gaff ketches because their mainsails are gaff sails.



Zodiac

Schooners carry two masts, which are equal in size (or larger in the rear), with no square sails. Schooners are the most common among the tall ships on display; the Sophia Christina, Coaster II, Zodiac and Wawona are all schooners. The Bat'Kivshchyna, R. Tucker Thompson and Lavengro are all gaff schooners.



Mallory Todd

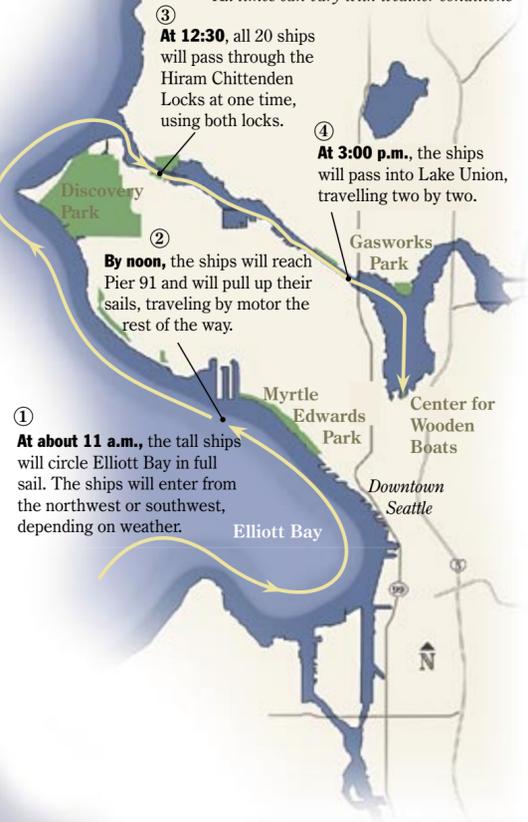
Staysail schooners are rigged principally with triangular staysails, although a four-cornered fore-and-aft sail known as a fisherman's stay-sail might be rigged between the peaks of both masts. The Mallory Todd, Suva, Copper Sky and Rejoice are all staysail schooners.

The Lady Washington

Built as a sloop in Massachusetts around 1750, the original Lady Washington served as a trading vessel. Converted to a brig with the addition of an extra mast, she joined the 1787 exploration of the Pacific Northwest and later became the first U.S. vessel to circumnavigate the world. The replica sailing in the festival was built in 1989. She sails 364 days a year as a training vessel.

Thursday's events

All times can vary with weather conditions



① **At about 11 a.m.**, the tall ships will circle Elliott Bay in full sail. The ships will enter from the northwest or southwest, depending on weather.

② **By noon**, the ships will reach Pier 91 and will pull up their sails, traveling by motor the rest of the way.

③ **At 12:30**, all 20 ships will pass through the Hiram Chittenden Locks at one time, using both locks.

④ **At 3:00 p.m.**, the ships will pass into Lake Union, travelling two by two.

Rigging

There is a total of 6 miles of rigging on the Lady Washington. The lines that are used to adjust the sails are referred to as running rig. The lines that support the masts (shrouds and stays) are referred to as the standing rig.

Shrouds

The ladder-like rigging system gives lateral support to the mast sections. Crewmen climb up the shrouds to furl and unfurl the upper square sails.

Stays

The long lines running from the masts to the fore and aft of the ship keep the masts from moving forward or back.

Spritsail

The smaller rectangular sail hangs at the bow of the boat to collect any extra windpower.

Hull

When the Lady Washington was used for exploration and trade, the hull would have been filled with traded goods such as furs, tea and ceramics. It also would have been loaded down with ample food and extra crewmembers. When sailing with little cargo, ballast (weight) is added to the bottom of the hull to keep the ship stable.

Keel

Made of lead, the keel works with the rudder to resist drifting sideways and convert sideways force to forward motion.

Crew

The Lady Washington typically sails with 12 to 14 crewmembers. Historically, it may have sailed with as many as 40 to 50.

Formula for speed

You can calculate the approximate top speed of a ship under sail (without engine power) by taking the square root of the length of the ship at waterline and multiplying it by 1.34. The Lady Washington's length at waterline is 56 feet, so: $\sqrt{56} \times 1.34 =$ about 9 knots (or about 10½ mph).

You can guess how fast a ship is traveling by watching it move through the water. Waves are created along the length of the vessel. The number of wave crests decreases as the boat travels faster. Three crests indicates that the boat is traveling at about 1/3 its top speed. Two crests is half speed, and a single crest is created when the boat is at its top speed.

