

An annual special issue of
PROFESSIONAL MARINER

AMERICAN TUGBOAT REVIEW 2020

11
TOP
TUGS

**Construction continues
during COVID-19 pandemic**

**Western Towboat updates
proven Westrac design**

**Crowley Maritime delivers
ice-class ATB to Alaska**

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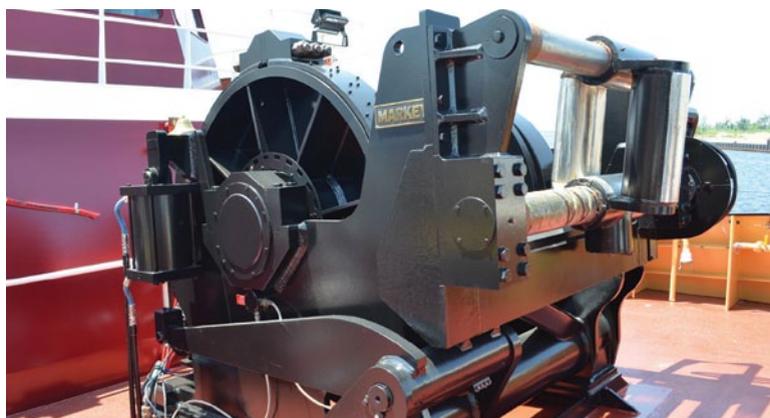
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Annual 2020
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Cover: Western Towboat Capt. Russell Shrewsbury thought long and hard about upgrades to the company's Westrac harbor tugboats. *Mariner*, profiled on page 28, builds on the successes of its predecessors. Photo by Casey Conley

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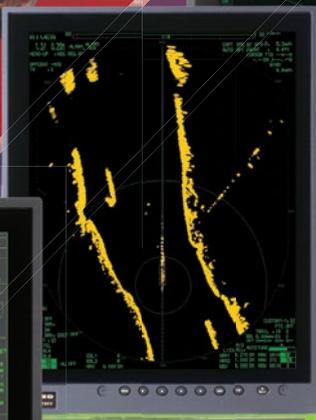
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VT Halter Marine put the finishing touches this spring on the 5,100-hp tugboat Q Ocean Service and barge Q-LNG 4000, left, undergoing final outfitting. The articulated tug-barge is scheduled for delivery in summer 2020.

VT Halter Marine

COVID-19 pandemic clouds construction picture

By Casey Conley

Around this time last year, the tugboat building industry in the United States showed signs of a rebound. They weren't exactly the "good old days," but after some lean years the industry appeared heading in the right direction.

Then, shortly after the new year, a once-in-a-century pandemic brought economies around the world to a screeching halt. By mid-May, more than 95,000 Americans had died from COVID-19 and more than 36 million lost their jobs from the ensuing economic disruption.

Projections about the recovery yield wildly different timetables, ranging from six months to a year to five years or longer. But how soon the economy rebounds, both in the U.S. and in big industrial countries around

the world, could determine how soon tugboat operators feel comfortable committing to major capital investments.

"My crystal ball is pretty murky right now," said Mike Fitzpatrick, president of Robert Allan Ltd.

The company, based in Vancouver, British Columbia, had more than 20 tugboat design projects under development when the World Health Organization declared a pandemic in mid-March. Two months later, all but three projects were still proceeding. "This suggests to me that our owner and shipyard clients think, or at least are betting, that the market will recover sooner rather than later," Fitzpatrick said.

Not surprisingly, new

Right, Bollinger Shipyards completed the Alaska-class ATB Aveogan/Oliver Leavitt for Crowley Maritime this spring during the COVID-19 pandemic.

business for the firm slowed dramatically during March and April when the pandemic raged across Europe, North America and parts of Asia. "We typically sign six or seven new projects every month, whereas in the past six weeks we have only contracted one new project," Fitzpatrick noted. "That said, we have seen new inquiries pick up in the

past couple of weeks and I believe we will sign closer to a typical number of new projects in May."

Robert Allan Ltd. is an international company with clients in major shipping hubs around the world. That global reach could provide a softer landing in hard times. Yet in the U.S., where the economy effectively shut down for six to



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Left, P&R Water Taxi has built more than a dozen tugboats at its Kewalo Shipyard in Honolulu. Railroad tracks are used to maneuver the vessels into position before launch. Below, the lead boat in Moran Towing's new class of ship-assist tugs coming together earlier this year at Washburn & Doughty. Bottom, Sylte Shipyard in British Columbia built the 60-foot Gemini Warrior for Gemini Marine Services.

eight weeks, there was still some new activity during the depths of the virus-related doldrums.

Kurt Redd, chief executive of Diversified Marine in Portland, Ore., said he has received multiple inquiries during the pandemic. He signed a contract for a new tugboat this spring and has had discussions with another about building a 100-ton bollard pull tugboat.

"I don't see the market as stopping by any means," Redd said in a recent phone interview. "It is still moving forward. The companies that are building vessels are going to continue with those programs.

"The marine market is an interesting market," he added. "Ships need to dock and things need to move, so I believe once it rebounds it will go back to how it was."

That might not be particularly reassuring for some shipyard managers. New tug and towboat construction has slowed in recent years. The lingering effect of the building boom that preceded EPA Tier 4 emissions rules

is one key factor. Operators in many cases sped up construction plans to avoid higher costs associated with building to the new EPA standards.

The persistent slowdown in the Gulf of Mexico oil patch is another factor, eliminating demand for offshore supply boats and other support vessels that kept many shipyards humming. More yards are competing for tugboat contracts these days, creating thinner and thinner margins. Coast Guard Subchapter M rules also have raised construction costs on top of increases associated with Tier 4.

"We went from building three boats a year to two boats a year," Redd said of

the pre-COVID market. "I am not going to say it hasn't slowed some."

During a downturn, some companies hunker down and reduce spending to ride out the storm. Others see a time to invest when the market is softer. Barring a rapid economic rebound, the trajectory of the tugboat sector over the next year or so will likely depend on how many companies decide to invest, and how many stay on the sidelines.



Moran Towing

Building during a pandemic

Even as the pandemic raged through the U.S. this spring, shipyards in some of the hardest-hit states continued building vessels. States largely determined these industries were "essential," meaning workers could remain on the job. Bollinger Shipyards in Amelia, La., completed Crowley Maritime's new articulated tug-barge (ATB) *Aveogan/Oliver Leavitt* during the height of the pandemic.

Chris Remont, Bollinger's executive vice president for new construction programs, said employees focused on safety and quality while tak-



Gemini Marine

ing steps to protect themselves, their peers and customer representatives in the shipyard from COVID-19.

“We were able to overcome any vendor-related issues and delays while still maintaining focus on delivering the tug,” he said in an email. “We were, and still are, keenly aware of cleanliness and hygiene, and keeping ourselves, our workspaces and our surroundings clean and sanitized.”

Washburn & Doughty in East Boothbay, Maine; Nichols Brothers Boat Builders in Freeland, Wash.; Diversified in Portland; Great Lakes Shipyard in Cleveland; and Kewalo Shipyard in Honolulu are among the yards that delivered tugs during the pandemic. Western Towboat of Seattle completed final outfitting on its new harbor tug *Mariner* during the outbreak that hit the city early and hard.

Western implemented new protocols early in the pandemic to keep its tug crews safe, including a questionnaire about personal health and any recent contacts with sick people. Capt. Russell Shrewsbury, a Western vice president, said the same rules also went into effect for the company’s shipyard, which built *Mariner* (profiled on page 28) and maintains the company’s tug fleet.

One new procedure requires the tugs to be empty of crew before repairs start. Shipyard workers also must notify vessel captains about the nature of the planned repair work, when it would take place and how long the work would take, Shrewsbury said. “As far as our other work in the shipyard goes, most of the time guys are

staying a reasonable distance away from each other during the day unless absolutely needed,” he said.

Similar trends define tugboat market

Tugboat operators working in major U.S. ports have spent the past few years adding more powerful vessels with higher bollard pull. This year was no different. Companies on all three coasts took delivery of new 80- and 90-ton bollard pull tugboats built to handle the bigger containerships and tankers calling on U.S. ports.

Foss Maritime, for instance, is building four new 90-ton bollard pull tugboats at Nichols Brothers Boat Builders, all of which likely will be assigned to busy California ports (*Jamie Ann* profiled on page 35). Meanwhile, operators on the East Coast and Gulf of Mexico also are bulking up their fleets to safely handle bigger boxships.

Suderman & Young Towing and Bay-Houston Towing are each building five new ship-assist tugboats designed with enhanced high-speed escort capabilities (*Mazu* profiled on page 24). And McAllister Towing and Transportation, one of the more prolific builders over the past five years, added two new 90-ton tugs within eight months to solidify fleets in Charleston, S.C., and Port Everglades, Fla. (*Eileen McAllister* and *Capt. Jim McAllister* profiled on page 32).

“The *Eileen McAllister* was constructed specifically to meet the needs of handling the ever-increasing size of vessels calling into Port Everglades,” said Capt. Chuck Runnion, vice presi-

dent and general manager of McAllister’s Port Everglades office.

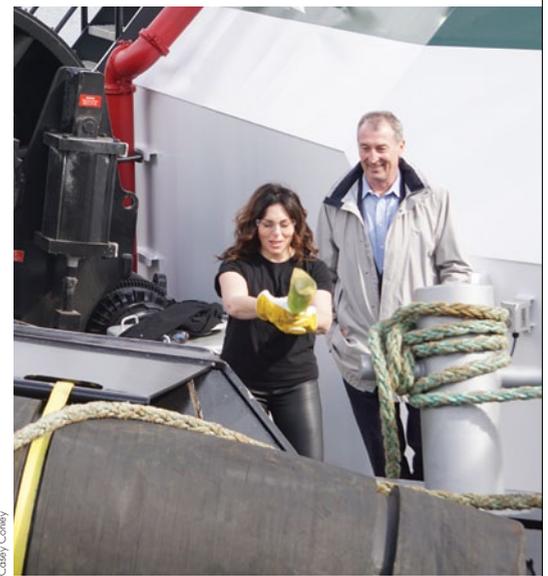
The push toward 90 tons within a 90- or 100-foot hull has been made possible thanks largely to new designs and new engines. It also could signal the upper end of what’s cost-effective and what’s necessary for typical ship-assist and escort work in most U.S. harbors.

In a late November inter-

tugs, the first of which is scheduled for delivery this summer, will have roughly 70 tons of bollard pull.

Late last year, Seabulk awarded a contract to Master Boat Builders of Bayou La Batre, Ala., for four new harbor tugs with 80 metric tons of bollard pull. Two tugs will feature the Advanced Rotortug design, while the others will have diesel-electric hybrid propul-

Jamie Ann Goldberg christened her namesake tugboat, Foss Maritime’s *Jamie Ann*, in late February at Nichols Brothers Boat Builders in Freeland, Wash. Shipyard CEO Gavin Higgins watched from behind.



view, John Parrott, then-president and chief executive of Foss Maritime, suggested the 90-ton threshold could be the ceiling, at least in the near term. “A 90-ton tug is a lot of horsepower. One of these tugs will go on some of these very large ships, and in the whole evolution, they are using a very small percentage of all that horsepower,” he said.

Tug projects on the horizon

Moran Towing, which has at least 18 tugboats with 6,000 or more horsepower operating along the East and Gulf coasts, has dialed back the horsepower for its new tugboat series under construction at Washburn & Doughty. The 5,100-hp

sion. Deliveries are expected starting in mid-2021.

Dakota Creek Industries in Anacortes, Wash., is moving forward with a new series of 90-foot tugboats designed by Robert Allan Ltd. for the U.S. Navy. Farther south in Tacoma, Modutech Marine is building two 63-foot z-drive tugs for the Navy based on Robert Allan Ltd.’s RAScal design.

Reinauer Transportation, Crowley Maritime and Quality Liquefied Natural Gas Transport (Q-LNG) are among the companies building new ATBs scheduled for delivery within the next year. Crowley’s 55,000-barrel unit will be built to ABS ice-class and IMO Polar Code standards for work in Alaska. ●



Bollinger Shipyards

AVEOGAN | Crowley Maritime, Jacksonville, Fla.

Crowley's rugged ice-class ATB built to withstand Alaska's harsh climate

By Casey Conley

Alaska has notoriously challenging weather conditions and climate. Crowley Maritime built an articulated tug-barge (ATB) rugged enough to safely sail through these icy waters and nimble enough to steer itself into berth.

The 128-foot Alaska-class tugboat *Aveogan* is paired with the 100,000-bbl *Oliver Leavitt*. The tug and barge pair up through an Intercon C-Series coupler with a first-of-its-kind "modified wave" lightering helmet to allow for ship-to-ship transfers. Propulsion comes from twin 3,384-hp GE Tier 4 engines paired with Schottel z-drives.

The double-hulled ATB

meets both ABS Ice Class and IMO Polar Code standards. The tug is equipped with a closed-loop ballast system that transfers water between the tugboat and barge as the tugboat burns fuel. *Oliver Leavitt* is outfitted with spill response equipment to protect Alaska's pristine waters and coastlines.

Crowley Shipping's petroleum services group will operate the ATB for Crowley Fuels Alaska. Jensen Maritime Consultants designed the ATB, and Bollinger Shipyards built the vessels at its Louisiana yard. Petro Star Inc., based in Anchorage, chartered the vessels for Crowley to carry fuels to some of Alaska's most remote communities, including

Aveogan and the 100,000-bbl barge Oliver Leavitt will deliver fuels to some of Alaska's most remote communities.

Dutch Harbor, located 700 nautical miles from Anchorage.

"It is a very capable ATB," said Lev Yampolsky, Petro Star's vice president of logistics and terminal operations. "The capabilities we will get with this ATB from Crowley are things we are very excited to see: the ability to move fast, switch cargo and quickly prepare the barge for different cargo configurations. That is going to give us good operational flexibility."

Aveogan is named for Oliver Leavitt, a former chairman of Arctic Slope Regional Corp. (ASRC) and a current member of the company's board of directors. *Aveogan* is Leavitt's Iñupiat name. ASRC is an

★ Meets IMO Polar Code and ABS Ice Class D0 ★ Closed-loop freshwater ballast transfer system ★ Z-drive propulsion

Alaska Native corporation that acquired Petro Star in 1987, three years after it launched.

Petro Star operates two refineries — one in Valdez and the other near Fairbanks — that make jet fuel, heating oil and other refined products for the Alaska market. Its commercial distribution arm uses ATBs to deliver fuels to hubs like the Port of Alaska in Anchorage, as well as the far-flung fishing outpost on St. Paul Island. Petro Star also supplies U.S. military jet fuel in Alaska.

Crowley subsidiary Jensen Maritime of Seattle designed *Aveogan* and *Oliver Leavitt* to work in Alaska's challenging environment. Its naval architects used computational fluid dynamics to optimize the hull form for efficiency while underway, according to Jay Edgar, Jensen's vice president of engineering. The work paid off: *Aveogan* and *Oliver Leavitt* should maintain at least 10 knots when pushing a loaded barge.

Speed is a huge advantage

AVEOGAN

SPECIFICATIONS

OWNER/OPERATOR: Crowley Maritime

BUILDER: Bollinger Shipyards

DESIGNER: Jensen Maritime Consultants

DIMENSIONS: 128' x 42' x 19'2"

MISSION: Transporting fuels in Alaska

CREW SIZE: 8

PROPULSION:

◆ Engines: (2) Tier 4 GE

8L250MDC, 3,384 hp

◆ Bollard pull: 97 short

tons

◆ Vessel speed: 10 knots

◆ Z-drives: (2) Schottel

SRP 560 with Vulkan

carbon-fiber shafts

◆ Auxiliary generators: (3)

99-kW John Deere; (1)

88-kW John Deere

◆ Cranes: (1) 1,000-pound

Toimil knuckle-boom

crane

◆ Fendering: Schuyler

Companies

CAPACITIES:

◆ Fuel: 122,000 gallons

◆ Water: 11,200 gallons

◆ Lube oil: 3,700 gallons

◆ Ballast: 79,400 gallons

FIREFIGHTING:

◆ Monitors: Marsis

◆ Pumps: Marsis

ADDITIONAL

INFORMATION:

◆ ABS Ice Class D0 nota-

tion; designed for IMO

Polar Code; SOLAS

DECK EQUIPMENT:

◆ Winches: Oil States

◆ Capstan: (1)

300,000-pound Oil

States

◆ Coupler system: Intercon

C-Series Model 50 with

"modified wave" lightening

helmet

when working in a state as big as Alaska. "If you think about the map and the ability to go 1 to 2 knots faster, over 1,000 miles, it adds up," Yampolsky said.

Designing *Oliver Leavitt* to ABS Ice Class D0 standards required additional framing and thicker hull plating at the bow to withstand first-year ice. The 400-by-85-foot barge is beamier than barges with similar capacity to maintain a shallow draft required in some parts of coastal Alaska. Its maximum draft at full capacity is 22 feet.



Crowley Maritime

The ATB is packed with innovation and industry firsts. One is the patented closed-loop freshwater bal-

last management system that pumps ballast water back and forth between the tug and a 79,000-gallon storage tank located in *Oliver Leavitt's* aft rake. The first-of-its-kind system eliminates the need for ballast water treatment and means the tug has zero ballast discharge. *Oliver Leavitt* is outfitted with two Pansia ballast water treatment systems operating at 350 cubic meters per hour.

"As you're burning fuel on the tug, instead of having to adjust the coupler pins, we can transfer ballast from the barge retention tank back to the tug to keep on a constant draft without overloading the pin system," said Christopher Clark, Crowley Maritime's manager of new construction.

The Intercon C-Series Model 50 coupler system with a "modified wave" lightening helmet design marks another industry first. The aft side of

Above, *Aveogan* features an advanced suite of Furuno navigation electronics. Right, the Intercon C-Series coupler on *Aveogan* has the first-of-its-kind "modified wave" lightening helmet allowing for ship-to-ship transfers.



Crowley Maritime



Crowley Maritime

the helmet has a smooth friction plate, while the forward face has a wave pattern without the “teeth” design found on many coupler systems. Hydraulic pressure on the wave side maintains the connection in dynamic sea conditions.

“This ATB will be doing coastal transits in Alaska waters most of the time, but it is also able to conduct ship-to-ship transfers from a larger vessel,” said Matt Yacavone, a vice president at Crowley Fuels. “Larger tankers can’t get into some of the ports ... so this vessel will be able to go alongside and pick up a smaller cargo and carry it to the terminals.”

Vessels working in Alaska — whether they’re fishing vessels, ships or oceangoing ATBs

Jensen Maritime Consultants designed Aveogan, above, with a patented freshwater ballast transfer system between the tug and barge. The tug is equipped with Schottel z-drives, right, for maneuverability in compact Alaskan ports. Bottom, Aveogan and Oliver Leavitt will work on charter for Petro Star, an Alaska-based fuel refiner and distributor.

— must be robust enough to get where they’re going. They also must be maneuverable enough to get into berth in smaller ports, many with shorter docks and challenging geography. Crowley solved this problem with the 483-foot ATB by installing Schottel SRP 560 z-drives.

“The z-drives offer the vessel much more maneuvering ability when we’re going into some of the restricted ports where they don’t have assist tugs to get into the dock or mooring location,” Yacavone said.

The ice-hardened z-drives and Vulkan carbon-fiber shafts are paired with twin 3,384-hp GE 8L250 engines that meet EPA Tier 4 emissions standards. The tugboat achieved 97 tons of bollard pull during testing and trials at Bollinger. Ship service power comes from three 99-kW John Deere gensets; a fourth John Deere 88-kW emergency generator is installed to meet the



Crowley Maritime

IMO International Convention for the Safety of Life at Sea (SOLAS) requirements.

Aveogan is one of the first U.S. ATBs specifically designed to meet IMO Polar Code standards for service in Alaska. Under these rules, the vessel designers and operators performed risk assessments and considered the potential hazards of operating in polar waters to determine additional features necessary in such a challenging environment. The tug also was designed to maintain stability with a limited amount of ice accumulation.

Aveogan can support up to 11 crewmembers, and its breadth ensures plenty of space for each person. The main deck has a mess-lounge and galley, a self-serve area that also functions as a food prep area, a pantry and laundry room. It also has a well-equipped exercise room and coupler pin rooms accommodating the Intercon equipment.

Three single cabins and two double cabins are located on the 01 deck, along with the emergency generator room and heating and cooling machinery. The 02 deck has another double cabin, along with four singles including cabins for the captain and chief mate. The 03 deck has a dedicated stateroom for a pilot.

The electronics room and a small head lead up to the wheelhouse with a 50-foot height of eye above the waterline. Beier Integrated Systems of Houma, La., designed and installed the wheelhouse navigation electronics primarily consisting of Furuno equipment. Off-ship communication equipment includes an Iridium FleetBroadband system and Cobham SAILOR GMDSS.

Aveogan has a robust deck equipment package that includes a 300,000-pound capstan and forward winch, both



Crowley Maritime

supplied by Oil States. A 1,000-pound Toimil knuckle-boom crane is installed on the boat deck for loading provisions. Marsis supplied the electrically driven fire pump and manually operated monitor installed on the 03 deck. The tug has a 2,800-gallon tank for firefighting foam.

“Given the *Aveogan/Oliver Leavitt’s* strong performance capabilities, Crowley Fuels will be working closely with Petro Star to operate the vessel to meet their fuel transportation and distribution needs to serve Alaska,” said Rick Meidel, vice president and general manager of Anchorage-based Crowley Fuels Alaska. “The vessel’s functions add a new dimension for our fuel supply services in the state.”

Oliver Leavitt is divided into 12 cargo tanks with piping that allows for six segregated cargoes.

Each tank is fitted with dedicated electric deep-well pumps supplied by MarFlex, and a vacuum stripping system that removes virtually all cargo residue after discharge. The barge has a combination windlass/winch that handles the bow anchor and four additional electric winches pro-

“The capabilities we will get with this ATB from Crowley are things we are very excited to see: the ability to move fast, switch cargo and quickly prepare the barge for different cargo configurations.”

Lev Yampolsky
VP, Logistics,
Petro Star

vided by Oil States, allowing for a total of eight mooring lines on powered drums.

North Pacific Crane Co. supplied *Oliver Leavitt* with two 10-ton cranes primarily used to handle hoses for loading or discharging petroleum products. The cranes also can lift the three 8-by-18-foot Yokohama pneumatic fenders permanently stored on the barge into position during ship-to-ship transfers. *Oliver Leavitt* has a self-contained hydraulic boom reel with 2,000 feet of inflatable boom that can be deployed using a dedicated 17-foot aluminum skiff.

Aveogan and *Oliver Leavitt* represented a unique project for Bollinger Shipyards in Amelia, La. The COVID-19 pandemic posed entirely new challenges during the final weeks before delivery; completing the vessel in those conditions, Yampolsky said, deserves recognition.

Chris Remont, executive vice president for new construction at Bollinger Shipyards, said the yard worked closely with the Jensen and Crowley team throughout construction. This collaboration, he said, allowed crews to address issues as they

arose. It ultimately led to a high-quality finished product the yard and its workers are proud of.

“I think that, with all of the barriers and circumstances that surrounded the project, given the pandemic in particular — and especially the complex and innovative design of the vessel — provided for a truly impressive tug that was delivered in spite of issues that were presented in the project,” Remont said.

Aveogan and *Oliver Leavitt* is the first Crowley ATB designed specifically for the Alaska trade, but it won’t carry the distinction for long. Master Boat Builders in Bayou La Batre, Ala., is building a new Jensen-designed Tier 4 ATB tug that will serve Western Alaska with a 55,000-bbl barge that Greenbrier Marine (formerly Gunderson) is building in Portland, Ore. Like *Aveogan/Oliver Leavitt*, the vessels will meet ABS Ice Class and IMO Polar Code Standards.

The two new ATBs will give Crowley a continued foothold in the Alaska market with some of the most innovative and capable vessels working anywhere in the world. ●

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Capt. Michael Howard/SLSDC

SEAWAY GUARDIAN | Saint Lawrence Seaway Development Corp., Washington, D.C.

Muscular Seaway Guardian has big shoes to fill

By Brian Gavin

Tugboat watchers along the Saint Lawrence Seaway between Massena, N.Y., and Lake Ontario will witness a changing of the guard during the 2020 shipping season.

The 118-foot *Seaway Guardian* — a massive, muscular and well-equipped icebreaking tug — will replace the venerable 61-year-old *Robinson Bay*. The new vessel will perform icebreaking and barge-handling duties in addition to tending aids to navigation on the United States' 100-mile section of the 2,300-mile marine highway.

The Saint Lawrence Seaway Development Corporation (SLSDC)

Above, *Seaway Guardian* will break ice, handle barges and tend navigation aids along a 100-mile stretch of the St. Lawrence Seaway. Right, Simrad and Furuno navigation electronics populate *Seaway Guardian's* wheelhouse.

opened its 62nd navigation season April 1. The Seaway consists of 15 locks: 13 on the Canadian side of the border, and the Eisenhower and Snell Locks on the U.S. side.

The SLSDC chose Robert Allan

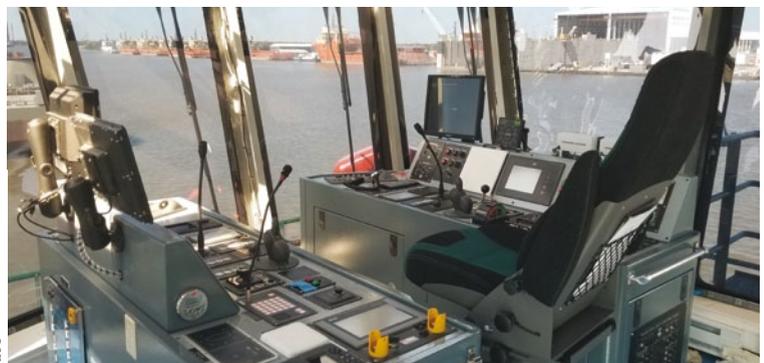
Ltd. of Vancouver, British Columbia, to adapt its proven Tundra 3600 ice-class tug design for work on the St. Lawrence. Gulf Island Shipyards of Houma, La., built the vessel.

“Representatives from Robert Allan Ltd. recommended the Tundra 3600-class tug primarily because its hull provided the greatest flexibility in design to meet our requirements,” said Capt. Michael Howard, SLSDC’s executive officer.

Officials from the SLSDC and Robert Allan Ltd. toured *Ocean Tundra*, a Tundra 3600 ship-assist and tethered-escort tug operating for Ocean Group in Quebec. *Seaway Guardian’s* primary mission differs from the Canadian boat, but the tour gave SLSDC officials a better understanding of the size, layout and capabilities of the Tundra 3600 series.

Howard, as *Robinson Bay’s* captain, has headed out each spring and fall for the past seven years to commission and decommission buoys as the Seaway opens and closes the shipping season. “The tug’s primary mission is retrieving and deploying (navigation) aids in fall and spring,” he said. “This can be accomplished using the vessel by itself or by pushing the corporation’s buoy barge.”

The new tug, fitted with a push knee on the bow and a Markey Machinery towing winch on the stern, will be the prime mover of *Grasse River*, a 300-ton derrick crane barge employed for the most part lifting gates at the Snell and Eisenhower Locks. Having the abil-



SLSDC

★ Modified Tundra 3600 design ★ ABS Ice Class A1 notation ★ First Tier 4 tug working on the Seaway

ity to tow from the bow and stern is advantageous for tending barges on construction and repair projects. Firefighting, assisting grounded boats, hazardous spill response and ship assist during high water round out the tug's mission.

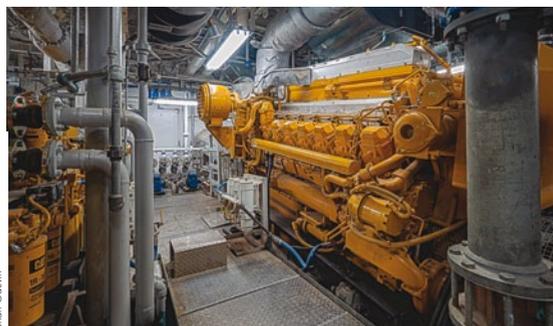
"It is nice to have new assets for our area," said Nate Jarvis, an SLSDC port engineer. "We will be able to do much more work and provide more services. And with the (ABS) FF-Capable classification, we have firefighting capability for the new tankers transiting the Seaway."

Seaway Guardian, with 14 berths, spill response equipment and a workboat for deploying an oil-skimming boom, can serve as a mother ship and command center for emergency response operations. And with an ABS Ice Class A1 notation, it can break through 3 feet of ice at 3 knots.

Mounted on the starboard quar-

ter of the stern deck is a powerful Rapp Marine HP40-40kE knuckle-boom deck crane. When extended to its maximum reach of 40 feet, it boasts a lifting load capacity of 19,700 pounds.

The crane, by and large employed in buoy tending, rises over an OSV-style aft deck lined with wood planks and side rails. The aft deck is fitted with a Markey tugger winch, a Schoellhorn-Albrecht capstan, Smith Berger shark jaws and a Smith Berger stern roller.



Brian Cavvin

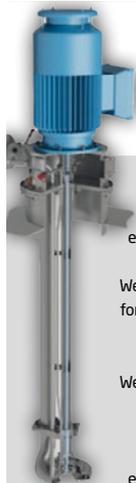
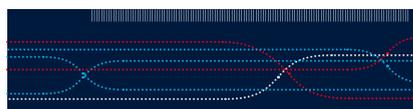
The propulsion package on *Seaway Guardian* consists of Kongsberg/Rolls-Royce z-drives, right, paired with twin 2,682-hp Caterpillar 3516 Tier 4 engines, below.



Brian Cavvin

In line with the robust design of *Seaway Guardian*, the brawny Markey TES-34UL electric towing winch is housed in an enclosed compartment for protection against the elements. The winch is wound with 1,000 feet of 2-inch cable. "This will primarily be used for towing, but could be used as a backup for buoy tending," Howard said.

The stern equipment supports the tug's essential role as a buoy



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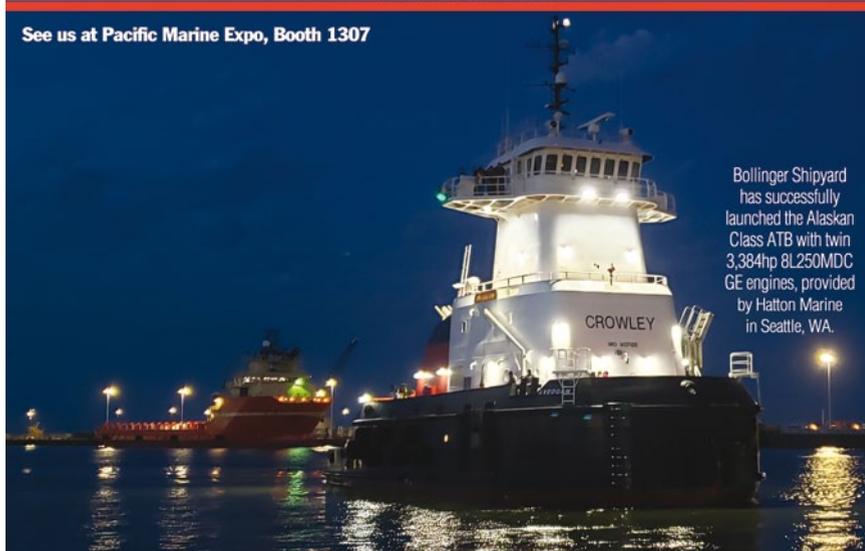
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Bollinger Shipyard has successfully launched the Alaskan Class ATB with twin 3,384hp 8L250MDC GE engines, provided by Hatton Marine in Seattle, WA.



Brian Gavrin

tender, but the variety and configuration lends itself well to marine construction projects. “We can do construction — with less equipment and barges — right off the stern,” Jarvis said.

Two Patterson deck winches and another Schoellhorn-Albrecht capstan are installed on the fore deck. The push knees, lined with M-type fendering on the bow, facilitate a model-bow barge makeup. The port

SEAWAY GUARDIAN

SPECIFICATIONS

OWNER/OPERATOR: Saint Lawrence Seaway Development Corp.
BUILDER: Gulf Island Shipyards
DESIGNER: Robert Allan Ltd.
DIMENSIONS: 118' x 45' x 17.5'
MISSION: Buoy tending, icebreaking
CREW SIZE: 4

PROPULSION:

- ◆ Engines: (2) Tier 4 Caterpillar 3516E, 2,682 hp
- ◆ Bollard pull: 65 tons
- ◆ Vessel speed: 13.5 knots
- ◆ Z-drives: (2) Kongsberg/Rolls-Royce US 35 CP
- ◆ Auxiliary generators: (2) 250-kW Cat C9.3; (1) 150-kW Cat C7.1

NAVIGATION GEAR:

- ◆ Radar: Furuno FAR-21x7-BB Series X/S-band radar
- ◆ Electronic chart display: Furuno
- ◆ Compass: Simrad GC80 gyrocompass; Lilley & Gillie MK2000S binnacle magnetic compass
- ◆ AIS: Furuno FA170
- ◆ Autopilot: Simrad AP70

DECK EQUIPMENT:

- ◆ Barge winches: (2) Patterson WWP 75E-12.5-10 230/460-P-R
- ◆ Tow winch: (1) Markey TES-34UL
- ◆ Tugger winch: (1) Markey DEP-12 on port aft deck
- ◆ Cordage: 1,000' of 2" cable
- ◆ Capstan: (2) Schoellhorn-Albrecht SA1817-65-20E-G
- ◆ Shark jaws: Smith Berger Marine
- ◆ Cranes: (1) Rapp Marine HP40-40KE knuckle-boom deck crane
- ◆ Fendering: Schuyler Companies

COMMUNICATIONS:

- ◆ Radio: (2) Standard Horizon GX2200 VHF
- ◆ Satellite connection: Inmarsat SAILOR 250 FleetBroadband

CAPACITIES:

- ◆ Fuel: 34,968 gallons
- ◆ Water: 7,462 gallons

FIREFIGHTING:

- ◆ Monitors: FFS 1200/300LB monitors
- ◆ Pumps: (2) FFS SFP 250x350 XPC
- ◆ Onboard fire suppression: 3M Novec fire suppression system



Brian Gavrin

Top, Seaway Guardian's robust deck equipment package consists of Patterson barge winches, Markey winches and a Rapp Marine knuckle-boom crane. Above, SLSDC employees (from left) Capt. Rick Randal, port engineer Nate Jarvis and Capt. Michael Howard oversaw construction at Gulf Island Shipyards. The COVID-19 pandemic has delayed sea trials and pushed back delivery.

and starboard quarters have two bands of D-type rubber followed by tires amidships. Schuyler Companies fabricated the fendering.

The equipment aboard *Seaway Guardian* is rated to withstand the notoriously cold, ice-bound winter conditions experienced on the Saint Lawrence River. The decks feature a heat tracing system to reduce ice accumulation and improve crew safety while working on deck.

In the engine room, two 2,682-hp Caterpillar 3516E Tier 4 main engines are mounted, port and starboard, next to the hull. Each engine is shafted to Kongsberg/Rolls-Royce US 35 CP azimuthing z-drive units. The Cat mains employ an SCR aftertreatment system to meet Tier 4 emissions standards.

Two Fire Fighting System (FFS) fire pumps, shafted to the front of the main engines through a power takeoff, pump up to 5,280 gpm of water to FFS monitors mounted forward of the pilothouse. The two Caterpillar C9.3 250-kW generators are mounted between the mains along the centerline. A 150-kW Caterpillar C7.1 harbor genset is installed on the port side, forward of the mains.

Mike Phillips, project manager for Robert Allan Ltd., said the propulsion machinery is smaller than on Ocean Group tugs, owing to their different roles. However, *Seaway Guardian* will still generate a hefty 65 tons of bollard pull.

Another design departure from *Ocean Tundra* is the addition of an extra tier of deckhouse below the pilothouse. The addition increased the berthing from 10 to 14, accom-

modating the extra crew employed during the extended spring and fall buoy-handling operations. *Seaway Guardian* will typically have a complement of four to six crew.

Bunks in each cabin are located inboard to separate them from the cold exterior bulkheads, and to minimize the motion experienced by crewmembers when resting. The galley, generous mess area, and the captain and chief engineer's cabins are on the main deck.

“The second level of accommodation also helps to set the wheelhouse high for an improved view when pushing the buoy barge and (towing) the gate lifter barges,” Phillips said.

The wheelhouse has a split-level design with massive aft windows spanning the two levels. The forward and beam windows are generous in area, providing excellent all-around visibility. The split-level parallel forward control station further improves the helmsman's fore and aft visibility.

In January 2020, the SLSDC made another leap when it ordered *HT-60*, a 60-foot z-drive harbor tug from Washburn & Doughty of East Boothbay, Maine. Although the smallest in the Harbor Tug series developed by Glosten, the tug's broad bow — with a semi-raised foc'sle deck and generous visibility — offers operating advantages when working in tight lock chambers. Delivery is scheduled for 2021.

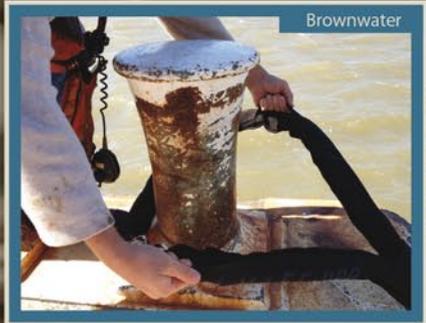
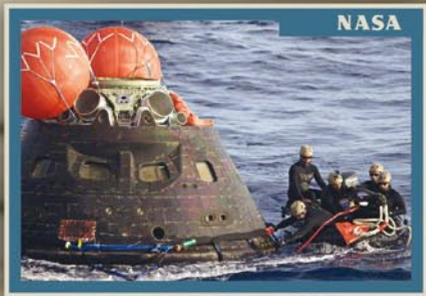
“During the winter months, she will assist with icebreaking and ice management around the locks,” said Howard. “This vessel will also have an ice scraper specifically designed to attach to either the port or starboard quarter and will allow the vessel to scrape ice off the lock wall.”

In the meantime, *Seaway Guardian* represents a six-decade leap in design, materials and technology for the SLSDC. But, lest we forget *Robinson Bay*, which now moves into a backup role with the agency for the foreseeable future. ●



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C.D. WHITE | E.N. Bisso & Son, New Orleans

E.N. Bisso & Son welcomes latest 'go-anywhere tug'

Story and photos by Brian Gauvin

For nearly four years, E.N. Bisso & Son's *Gladys B.* was the lone z-drive tugboat designed by Robert Allan Ltd. working the Mississippi River. Now, it has some company.

Eastern Shipbuilding of Panama City, Fla., delivered the 80-by-38-foot *C.D. White* in January 2020, and as of April 2020 was building a sister tug. Both are robust RApport 2400-series tugboats outfitted for ship handling and ocean towing.

"It's a go-anywhere tug," said Mike Killelea, E.N. Bisso's port captain.

The 80-foot *C.D. White*, above, goes through the paces on the Mississippi River near the E.N. Bisso & Son dock. Right, the tug is equipped with a 4-inch Stang remote-controlled fire monitor. Below, Capt. Craig Henderson helms *C.D. White*.

By that, he meant ship assist and escort duties over 230 miles of the Mississippi River from Pilottown near the river's mouth to Baton Rouge, and ocean towing primarily in the Gulf of Mexico and the Atlantic Coast.

"The tug is very stable with plenty of power and is the perfect size," said Capt. Craig Henderson. "This tug will handle any ship at any place on the Mississippi River."

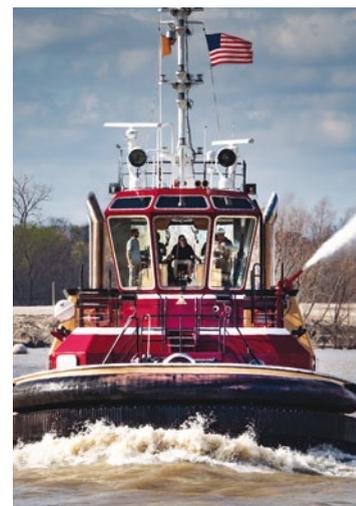
The 5,100-hp *C.D. White* is something of a sister tug to *Gladys B.*, acquired by E.N. Bisso in 2016 from Signet Maritime of Pascagoula, Miss., which built the vessel at a company yard. E.N. Bisso decided to build its new tugs with the same dimensions and general layout — albeit with some customizing from Robert Allan Ltd. and Eastern Shipbuilding. The vessel also meets Coast Guard Subchapter M standards.

"Our new boats were designed to meet escort standards, but the keel was changed to allow the boat to work well with the Mississippi River's high river current and still

ride well offshore," said Mike Vitt, an E.N. Bisso vice president.

In addition to ship-handling work in the Lower Mississippi, *C.D. White* can be deployed for escort or ocean towing work in the Gulf of Mexico, Vitt added. Its skeg is 40 percent smaller than that on *Gladys B.*, which was designed for ship-escort work.

"*C.D. White* has to work in the strong currents on the Mississippi year-round, and therefore one thing we did was limit the area of the skeg in order to give it better maneuverability when handling ships in the river currents," said Jamie McCarthy, project manager

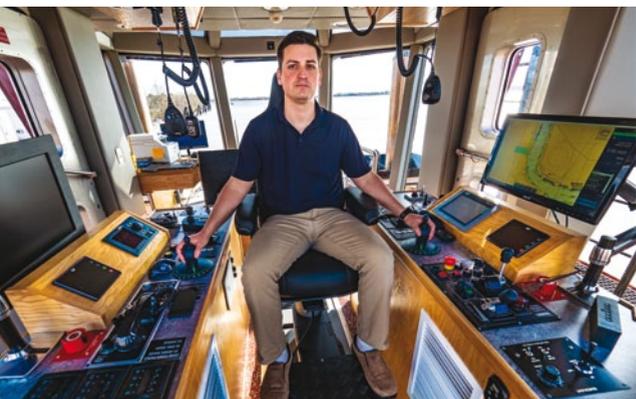


for Robert Allan Ltd.

Although they share the same pedigree, there are some notable differences between *Gladys B.* and *C.D. White*. The power plant is just one example. *C.D. White* is powered by twin Tier 4 Caterpillar 3512E mains, compared to Tier 3 MTU units on the earlier tug.

"Our experience with the various Caterpillar 3512 and 3516 plants on our tugs showed that, for our purposes, the 3512Es were the right choice for us," Vitt said. Caterpillar engines also are more familiar to the crews and personnel operating and maintaining them.

The two Caterpillar 3512E Tier 4 EPA mains supplied by Louisiana



★ Modified RApport 2400 design ★ Outfitted for ship handling, ocean towing ★ 15.5-knot free running speed

Cat are shafted to Kongsberg/Rolls-Royce US 205-P20 z-drives. The tug generates 67.5 tons of bollard pull, and can hit 15.5 knots running light. Two 99-kW John Deere generators provide electrical power.

Another change was to move from raw-water cooling to keel cooling.

“Gladys B. has raw-water heat exchanger cooling for the main machinery,” McCarthy said. “Although this works fine in the Gulf of Mexico, the Mississippi River tends to have a lot of debris, which can sometimes clog the strainers. For C.D. White, grid coolers mounted in recesses in the hull were used for the machinery cooling.”

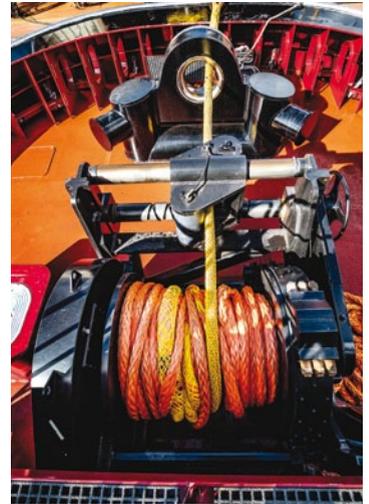
The navigation light system designed by JBOX of Harvey, La., is another difference. The new system can switch the navigation lights while towing in reverse.

Killelea borrowed the idea from Mike Nigro, a vice president with G&H Towing in Galveston, Texas.

An ASD tug towing another vessel — say, a ship in distress as opposed to standard escort and assist functions — with a line up from the hawser winch on the bow, tows in reverse. In that scenario, the navigation lights are presented incorrectly. The modified JBOX system corrects the problem.



The Markey single-drum DEPCF-42 winch, right, is spooled with 400 feet of Samson Saturn-12 line. Below, C.D. White's 2,550-hp Cat engines are paired with Kongsberg/Rolls-Royce z-drives.



Having reworked the fendering supplied by Schuyler Companies on Gladys B. to suit the tug's mission assisting ships on the Mississippi River, McCarthy said they further improved the fendering on the new tugs to provide better side protection and stand-off from vessels.

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C.D. WHITE

SPECIFICATIONS

OWNER/OPERATOR: E.N. Bisso & Son/Bisso Offshore

BUILDER: Eastern Shipbuilding Group

DESIGNER: Robert Allan Ltd.

DIMENSIONS: 80' x 38' x 13'2"

MISSION: Ship assist, escort, emergency towing

CREW SIZE: 4

PROPULSION:

- ◆ Engines: (2) Tier 4 Caterpillar 3512E, 2,550 hp
- ◆ Bollard pull: 67.5 tons
- ◆ Vessel speed: 15.5 knots
- ◆ Thrusters: (2)

Kongsberg/Rolls-Royce US 205-P20 z-drives

- ◆ Auxiliary generators: (2) 99-kW John Deere 4045AFM85

DECK EQUIPMENT:

- ◆ Winches: (1) Markey single-drum DEPCF-42 HS
- ◆ Cordage: 400' of 2-5/8" Samson Saturn-12
- ◆ Capstan: (1) Markey CEPB-40 tow bitt capstan
- ◆ Tow hook: (1) Washington Chain & Supply 90-ton SWL tow hook
- ◆ Fendering: Schuyler Companies

NAVIGATION GEAR:

- ◆ Radar: (2) Furuno FR8065 multicolor LCD radar
- ◆ Compass: Furuno SC70 satellite compass; Ritchie mechanical compass
- ◆ AIS: Furuno FA170
- ◆ GPS: Furuno GP39

- ◆ Depth sounder: Furuno BR-500
- ◆ E-nav software: Rose Point Navigation Systems ECS
- ◆ Autopilot: Simrad AP80

COMMUNICATIONS:

- ◆ Radio: (2) Icom M506 with (2) Icom HM-195 command microphones; (1) Icom M802 SSB
- ◆ Loud hailer: Furuno LH-5000
- ◆ Intercom: Jotron CIS 3100
- ◆ Satellite connection: KVH Fleet One

CAPACITIES:

- ◆ Fuel: 28,000 gallons
- ◆ Water: 8,750 gallons
- ◆ DEF: (2) 850-gallon tanks
- ◆ Lube oil: 750 gallons

FIREFIGHTING:

- ◆ Monitors: 4" Stang remote-controlled fire monitor
- ◆ Pump: (1) Counterfire ES-125-400, 1,500 gpm at 100 psi
- ◆ Onboard fire suppression: FM-200

A 40-hp Markey Machinery DEPCF-42 HS single-drum electric hawser winch and a Smith Berger bow staple with muscular side bitts dominate the foredeck. The winch is wound with 400 feet of Samson 2-5/8-inch Saturn-12 soft line.

The compact design of the RApport 2400 has limited space on the aft deck. The winch and H-bitt on *Gladys B.*, fitted for barge towing on the hip, were not well suited to the new tug's mission. These were replaced by a stern tow bitt, a Markey capstan and a 90-ton Washington Chain & Supply tow hook in a stacked configuration. The result is a significantly smaller equipment footprint, while maintaining redundancy for towing and gear retrieval functions with an optimal pivot point location.

C.D. White is configured to tow in three different ways: from the bow with the Markey winch; with the bow staple, which has bitts that are rated for 150 tons of static bollard pull; or from the stern with the tow hook.

The new tugs are equipped with six fixed-mount CCTV cameras and one PTZ (pan-tilt-zoom) camera. These monitor the engine room, z-drive room, and stern and

Above, the crew aboard *C.D. White* (from left): OS Kevin Johnson, mate Kyle Taylor, chief engineer Chris Lambert, Capt. Craig Henderson, Port Capt. Mike Killelea and port engineer Dwayne Brady. Right, Lambert demonstrates features on the Cat 3512 engines.

forward deck areas. The PTZ camera is mounted high on the mast and remotely operated from the wheelhouse.

Most tugboats are a second home for crew members, making comfort and amenities an important element in the design and construction. Henderson, impressed with how quietly the tug runs, is equally impressed by the bridge, his third home. "The windows are outstanding," he said. "There is great visibility forward and back. All of the systems are at your fingertips."

The Bisso name spans five generations, beginning with founder Capt. Joseph Bisso. The first vessel was a rowboat used to ferry people across the Mississippi at New Orleans. In 1946, Capt. Edwin



Napoleon Bisso, with six tugboats, formed E.N. Bisso. Today, the company boasts seven ASD tugs in its 14-vessel New Orleans fleet. Three conventional tugboats are based at the company's Gulfport Towing fleet in Gulfport, Miss. E.N. Bisso Canaveral, in Port Canaveral, Fla., runs two tugboats, including a 5,000-hp ASD vessel.

C.D. White is the second tug named for Cornelius Dee "Jack" White Jr., an E.N. Bisso owner who also married the company's then-president, Beverly Bisso White. He was instrumental in E.N. Bisso's management and growth through the 1970s.

A. Thomas Higgins, the second tug in the series due for delivery later this year, is named for a current E.N. Bisso owner, A. Thomas "Tommy" Higgins.

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TIGER 21 & 22 | P&R Water Taxi, Honolulu

Nimble next-gen Tiger tugs keep Hawaiian commerce moving

By Casey Conley

P&R Water Taxi built its first Tiger tugboat in 90 days in 2002 after winning a U.S. Navy ship-assist contract in Pearl Harbor. The Honolulu-based company built 10 more over the next nine years as its Navy contracts and ship-assist work took off. Almost two decades later, the original Tiger design has evolved into a nimble ship-assist platform optimized for Hawaii's commercial ports. P&R built *Tiger 21* and *Tiger*

22 at its shipyard in Kewalo Basin, located just a few miles west of Waikiki Beach. Company founder and owner Charlie Pires collaborated with Stoddard Marine Design of Hilo, Hawaii, on the design.

Tiger 21 and *Tiger 22* are essentially next-generation versions of the original 94-foot Tiger tugs Pires and Stoddard developed in 2002. The two series have plenty in common, including the twin Caterpillar 3516 main engines. There are also differ-

Above, *Tiger 21* and its sister tug *Tiger 22*, delivered this spring during the COVID-19 pandemic, are redesigned versions of the venerable Tiger tugs that handle Navy ships at Pearl Harbor. Right, P&R Water Taxi owner Charlie Pires. Left, Tiger Tugs are based in every major Hawaiian port. The vessels that serve Honolulu tie up at the company's Kewalo Shipyard near Waikiki.



P&R Marine Services

ences: The new tugs are about 20 feet shorter than their predecessors, and they lack the stern winches and off-ship firefighting equipment that came standard on tugs working in Pearl Harbor. Capt. Curtis Iaukea, who operates *Tiger 21*, said the vessels are powerful and agile, particularly when moving side to side. "It's great for assist work because you can stay at the 90," he said, referring to keeping the tug's bow at a 90-degree angle relative to a ship's hull. "You can hold that position longer."

Hawaii's ship pilots are glad to have *Tiger 21* and *Tiger 22*. Tom Heberle, president of the Hawaii Pilots Association, called them a welcome addition to Hawaii's fleet of ship-assist tugboats.

"With their compact length and excellent maneuverability, these



P&R Marine Services

★ Second-generation Tiger design ★ Custom shipyard-built hawser winch ★ Designed and built in Hawaii

are ideal tugs for the type of close-quarters ship-assist work we do

TIGER 22 SPECIFICATIONS

OWNER/OPERATOR: P&R Water Taxi/P&M Marine Services

BUILDER: Kewalo Shipyard

DESIGNER: P&R Water Taxi/Stoddard Marine Design

DIMENSIONS: 75' x 33' x 11.5'

MISSION: Ship assist and barge handling

CREW SIZE: 3

PROPULSION:

- ◆ Engines: (2) Tier 3 Caterpillar 3516, 2,200 hp
- ◆ Bollard pull: 53 tons (est.)
- ◆ Vessel speed: 10 knots
- ◆ Z-drives: (2) ZF Marine Series ZF 7000
- ◆ Auxiliary generators: (2) 65-kW John Deere 4045TF
- ◆ Keel coolers: Duramax DuraCooler; DuraCooler SuprStak

- ◆ Fendering: Custom yard-built package

NAVIGATION GEAR:

- ◆ Radar: Furuno 1935 X-band radar
- ◆ Electronic chart display: Garmin GPSMAP 1042xsv
- ◆ Compass: Ritchie Navigation
- ◆ AIS: Em-trak E100
- ◆ Radio: (2) Standard Horizon GX6000

CAPACITIES:

- ◆ Winches: Shipyard-built custom double-drum hydraulic
- ◆ Cordage: Cortland Plasma 2" line
- ◆ Fuel: 9,000 gallons
- ◆ Water: 800 gallons
- ◆ Lube oil: 200 gallons

here," Heberle said. "The addition of these two brand-new z-drive tugs reaffirms P&M's commitment to station modern tractor tugs in all of Hawaii's commercial harbors."

Pires is a native Hawaiian who earned his first mariner's license at age 17. He founded P&R in 1978, and its name harkens back to the company's original business running crew boats back and forth from Hawaiian oil refineries. The company still operates crew and supply boats in and around Hawaii.

P&R entered the ship-assist

Tiger 22's bow staple, right, is designed to reduce friction and wear. Below, twin 2,200-hp Caterpillar 3516 engines paired with ZF z-drives deliver more than 50 tons of bollard pull.



business in 2002 after winning the Navy solicitation for a single z-drive ship-assist tugboat. That 94-foot vessel, ASD Neil Abercrombie, came together in 90 days. Ten days later, it was working in Pearl Harbor. P&R

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later won additional Navy work, and these days it is the lone ship-assist operator at the massive naval base.

The company branched out into commercial ship-assist work in 2007 through its P&M Marine Services subsidiary. P&M relied on that same basic 94-foot design to launch its fleet. Tiger tugs now operate in every major Hawaiian port, competing for ship-handling work with Foss Maritime.

“Our boats are extremely nimble,” Pires said in an interview at Kewalo Shipyard in

March, just days before the World Health Organization declared the coronavirus a global pandemic. “Tractor tugs are nimble by nature because of the design of the tractor drive ... but our hull design just makes it more maneuverable, I think, than anyone else’s.”

Just why, exactly, is something of a trade secret. Pires acknowledged the hull form itself is a key piece, along with the placement of the drives. That is about all he will say about the closely held design that he

feels gives his crews — and by extension, the company — a competitive advantage.

One detail Pires will share: The vessels don’t have many bells and whistles. They are meant to be simple to build, simple to maintain and simple to operate. This simplicity, which extends from design to final outfitting, is a point of pride within the company. It’s how the lean, locally owned firm can compete against much bigger operators with deeper pockets.

“You have the same platform all the way across. You can duplicate it, and you have a whole fleet that’s the same,” said P&R Port Capt. Eric Tang. “It makes it easier to order parts, for knowing how to fix them, and for crew jumping from one boat to the other.”

P&R built 11 first-gen Tiger tugs between 2002 and 2011, all at Kewalo Shipyard. The first handful of Tiger tugs were outfitted exactly to Navy specs. That meant z-drives, winches forward and aft, firefighting monitors and specific fendering requirements. Subsequent tugs have raised bows and different fendering for working under flared hulls on modern commercial ships.

Those design elements made their way into *Tiger 21* and *Tiger 22*, which were built for commercial work rather than handling Navy ships. The company eliminated the stern winch rarely used by its commercial crews, as well as off-ship firefighting equipment.

The engine rooms aboard *Tiger 21* and *Tiger 22* are compact, with low ceilings and flat floors. Piping is kept at a minimum to simplify construction. Twin 2,200-hp Cat 3516 Tier 3 engines are installed forward of two 65-kW John Deere gensets. Steel shafts connect the mains to ZF 7000 z-drives with 86-inch bronze propellers. Bollard pull is 53 tons ahead. Duramax supplied the DuraCooler and DuraCooler SuprStak keel coolers.

The deck offers several defining features of a Tiger boat. It is nearly flat, without the slope from stern to bow found on many ship-assist tugs. The bow bulwarks rise more than 5 feet off the deck, and elevated platforms are installed near the staple to facilitate line handling and other tasks.

The massive bow staple is another Pires innovation. Instead of the common inverted “U” shape, the staple has a diamond shape with an oval “pig-nose” opening.

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P&M Marine Services

The wheelhouse is outfitted with Furuno and Garmin electronics.

The design emerged after years of watching lines rub up against the underside of the staple when under tension. The pig-nose opening is positioned closer to the rope's natural elevated position when working a ship, thus reducing friction and wear on the expensive hawser lines.

The hydraulic double-drum winch standard on all Tiger tugs sits prominently on the bow. Shipyard workers fabricated these winches at the yard, saving money on a product that performs perfectly fine for crews. Pires said the big-name winch makers offer a beautiful product with plenty of useful features, but he believes even the best winches have their limitations.

"When you are working and you part a line, even with a fancy automatic-tension winch, you still have just one line," he said. "So how do you recover? For us, if we part a line, we recover immediately," he said, by way of explaining the benefits of the double drum.

Tiger 21 and Tiger 22 are outfitted as day boats, owing to the fact that crews typically go home when their shifts end. The deckhouse is equipped with a galley and lounge area, a desk workstation and a head. There are two bunks for rare occasions when crews spend the night on board.

Each aluminum wheelhouse was built in Louisiana by Aluma Marine & Fabrication, and placed atop the steel deckhouse at Kewalo Shipyard. P&M leaves the wheelhouse unpainted, instead finishing it with a fish-scale pattern after it arrives at the yard. The wheelhouse features a Furuno radar and Garmin electronic chart reader. Crews use Apple iPads loaded with MobileOps software for recordkeeping, scheduling and other tasks. Forward-mounted iPod Touch devices capture video and audio of each job.

In another example of P&R's thriftiness, which the company proudly touts, the wheelhouse captain's chairs came from a local office supply store. The shipyard bolted them to a heavy metal base, giving each roughly the same height as a high-end marine helm chair. Money saved in outfitting the tugs is reinvested elsewhere in the company.

Crews at some bigger outfits might bristle at how these tugs are outfitted. P&M mariners seem plenty content with Tiger

tugs, particularly with how they perform. Pires also maintains a good relationship with the company's crews, many of whom are native Hawaiians hired with little or no maritime experience.

Pires acknowledges P&R is something of a throwback in that it designs, builds and operates its own tugboats. Even so, he's proud of the company he's built, the tugs it operates and the work they do. He's plenty content for P&R to fly under the radar from its remote outpost in the Pacific. •



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MAZU | Suderman & Young Towing Co., Houston

Texas tug operator builds fleet to handle bigger ships

Story and photos by Brian Gauvin

Mazu Capt. Nick Payne stood by while mate Brandon Conner approached the containership *Molly Schulte* midway between Bayport Channel and

Barbours Cut in the Houston Ship Channel.

Conner, who was training in real time on the new tugboat, maneuvered to the stern. Ordinary seaman Richard

Suderman & Young's ship-assist tugboat *Mazu*, above, churns ahead on the Houston Ship Channel. Right, the wheelhouse in the Robert Allan Ltd. Z-Tech 30-80 design is clean and functional with large windows for all-around visibility. Left, *Mazu* works the 2,345-TEU containership *Molly Schulte* in the Houston Ship Channel with mate Brandon Conner at the controls.

Fernandez attached the heaving line to the hawser and got the line on the ship centerline aft.

With *Mazu* tethered to *Molly Schulte*, Conner steered to starboard out of the ship's wake. *Mazu* ran with the cargo ship



on its way to the Barbours Cut Container Terminal.

Jobs like this one are common in the Houston Ship Channel, and as ships get bigger, tugboats that work them are getting more powerful and more capable. *Mazu*, the third Z-Tech 30-80 tugboat in the Suderman & Young Towing Co. fleet, is but one example.

★ Updated Z-Tech design ★ Hull sponsons boost stability, performance ★ First Tier 4 vessels in fleet

Gulf Island Shipyards of Jennings, La., built the 98.5-by-42.6-foot tugboat based on an updated Z-Tech design from Robert Allan Ltd. of Vancouver, British Columbia. Two earlier tugs in the series, *Ted C. Litton* and *Apollo*, joined Suderman & Young's 22-tug fleet earlier in 2019. *Mazu* is the company's 13th z-drive tug. The vessels work in the Texas ports of Houston, Galveston, Texas City, Freeport and Corpus Christi.

"As our customers' ships have increased in size, we continue to meet their needs by servicing them with larger, more powerful tugs," Suderman & Young President Kirk Jackson said. "Specifically, increasing demand to escort and assist VLCCs (very large crude carriers) and larger container vessels was a big driver."

Suderman & Young is a long-time Robert Allan Ltd. customer. The Houston-based towing company welcomed the 4,300-

hp z-drive tugboat *Jess Newton* in 2001. Six years later, the 6,300-hp Z-Tech 30-75 tugboat *Thor* joined the company's fleet. Suderman has five Z-Tech 24-60 tugs.

The Z-Tech platform incorporates the best characteristics of a true tractor tug and an ASD tug with one hawser winch on the bow, the tug's working end. The Z-Tech tugboats have good omnidirectional speed, and bollard pull is comparable whether the vessel is pulling forward or astern.

The new class of Z-Tech 30-80 tugs evolved from the 30-75 design. The ves-

Xuhui "Bill" Hu, project director at Robert Allan Ltd., has said the firm developed the unique sponson hull form specifically for escorting large vessels. Adding

Mazu's Markey DEPCF hawser winch is sturdy enough to handle larger tankers and container-ships regularly calling Texas ports. The winch is wound with Samson Saturn-12 mainline.



MAZU

SPECIFICATIONS

OPERATOR: G&H Towing Co.
OWNER: Suderman & Young Towing Co.
BUILDER: Gulf Island Shipyards
DESIGNER: Robert Allan Ltd.
DIMENSIONS: 98'6" x 42'8" x 16'8"
MISSION: Escort and harbor assist

PROPULSION:

- ◆ Engines: (2) Tier 4 Caterpillar 3516E, 3,386 hp
- ◆ Bollard pull: 81.5 metric tons
- ◆ Vessel speed: 13 knots
- ◆ Z-drives: (2) Schottel SRP 510 FP
- ◆ Gearbox: Luffkin MV1600S, 2:1 ratio
- ◆ Auxiliary generators: (2) 125-kW John Deere 6068AFM85

- ◆ Electronic chart display: CNS Systems Aldebaran III
- ◆ Compass: Furuno SC70 satellite compass; Casens & Plath magnetic compass
- ◆ AIS: Furuno FA170
- ◆ GPS: Furuno GP170

COMMUNICATIONS:

- ◆ Radio: (2) Icom M506 VHF; (1) Standard Horizon HX-series handheld

DECK EQUIPMENT:

- ◆ Winches: Markey DEPCF-52
- ◆ Cordage: Samson Quantum-12 backer; Samson Saturn-12 mainline and pendant
- ◆ Fendering: Schuyler Companies

CAPACITIES:

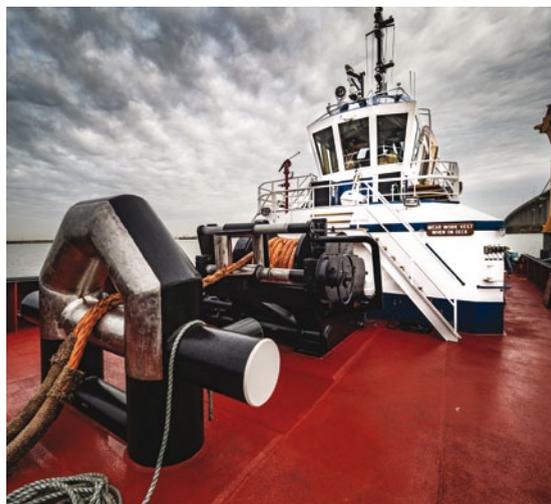
- ◆ Fuel: 42,626 gallons
- ◆ Water: 6,699 gallons
- ◆ Lube oil: 815 gallons

FIREFIGHTING:

- ◆ Monitor: (2) FFS monitors
- ◆ Pumps: (2) FFS 6,200-gpm pumps driven by (2) Cat C18 engines

NAVIGATION GEAR:

- ◆ Radar: Furuno FAR-1518



sels are built to meet Subchapter M standards, which did not exist during earlier iterations. The new design also incorporates sponsons that add 44 inches to the width of the tug. This feature helps provide greater stability and safety while improving escort performance.

the sponson to the hull form generates greater steering and/or braking forces hydrodynamically at speeds of 8 to 10 knots, he said in an interview last year about Bay-Houston Towing Co.'s *Mark E. Kuebler*, which shares the same design.

"The proven escort performance of the Z-Tech was enhanced by the addition of hull sponsons," Jackson said of the 30-80 series.

Bay-Houston and Suderman & Young operate independently and compete for business in the Gulf of Mexico, although both are operated by G&H Towing. Both companies have ordered five of the Z-Tech 30-80 tugs. *Gemini* and *Mercury*, the final two tugs in Suderman's five-vessel order, are scheduled for delivery by 2021.

The machinery space aboard

Mazu, fore to aft, consists of two 125-kW John Deere generators followed by two Caterpillar 3516E Tier 4 main engines driving Schottel z-drive units in the aft drive room. The Cat engines produce 6,772 total hp at 1,800 rpm, delivering 81.5 metric tons of bollard pull.

“All of our tugs in the new class pulled in excess of their design specification of 80 metric tons,” Jackson said.

Propulsion aboard *Mazu* comes from two Cat 3516E Tier 4 engines paired with Schottel z-drives.



The extreme flare common on modern ships influenced the tug’s design. The heavily fendered bow has a flat sheer leading to a house located well aft for work under the flare. Similarly, the bulwarks are sloped back and lowered, and the stacks are located inboard, aft of the house.

Mazu’s Cat engines utilize a selective catalytic reduction (SCR) system to reduce NOx in engine exhaust emissions and meet EPA Tier 4 requirements. The system consists of a catalytic converter on each engine and insulated, stainless-steel tankage for 2,134 gallons of diesel exhaust fluid (DEF) made from a water and urea mixture.

The SCR dosing system mixes a precise combination of compressed air and DEF, then transfers it to the SCR module and injects it into the exhaust stream. The water evaporates and the

DEF is converted into ammonia.

Mazu chief engineer Joe Wiegand predicted the SCR equipment would require a bit more vigilance to detect leaks before they cause corrosion. Urea must be contained and transferred in stainless-steel tanks, piping and fittings.

The name *Mazu* is a departure from Suderman & Young’s typical naming practice of following a Roman or Greek mythology theme. “For this series of tugs, we researched other cultures’ mythology and felt the name, *Mazu*, fit in well since she was both a goddess of the sea and protector of seafarers,” Jackson said.

Mercury, *Gemini* and *Apollo* are named for the first three NASA manned space programs — fitting, given the proximity to the nearby Johnson Space Center. *Apollo* was delivered a few days before the

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50th anniversary of the Apollo 11 landing on the moon, Jackson noted.

Markey Machinery supplied the robust, reliable hawser winch on *Mazu's* bow. The Markey DEPCF-52 winch with Render/Recover is driven by a 75-hp electric motor. The winch is wound with Samson Rope backer line, mainline and pendant, a configuration Samson dubs "The Ultimate Towing System."

Back in Barbour's Cut, Conner powered up the tug and performed a full-powered indirect pull to starboard, turning *Molly Schulte* around Morgan's Point and into the cut. He then ran inline/slack line with the ship to the turning basin and executed a direct 90-degree pull to port. He responded, as directed, to the pilot's commands, from slow to full power, and pulled the ship around.

Once the ship was turned and facing outbound, Fernandez took in the line and Conner quickly maneuvered the tug around to the port quarter. Fernandez put a line up to the containership and Conner docked the vessel.

Conner, a graduate of Texas A&M Maritime Academy's four-year program, spent a year decking on Suderman & Young's conventional tugs before training

Right, the spacious engine room in Z-Tech 30-80 series tugboats leaves plenty of space for chief engineer Joe Wiegand, left, and OS Richard Fernandez. Below, crew spaces aboard *Mazu* are comfortable and well appointed.

on its z-drive vessels. He had a good teacher in Payne, who has 32 years of tugboat experience and has delivered or worked on 10 ASD tugs in the fleet.



Payne is complimentary of the new Z-Tech tugs, particularly their handling. Taken together, they'll help Suderman's crews handle all comers along the Texas coast.



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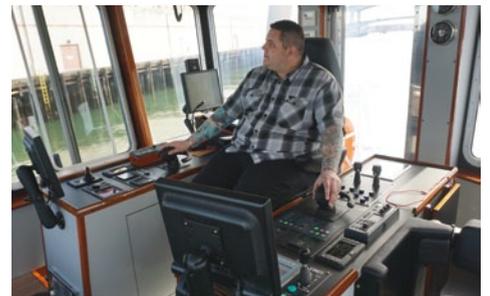
Versatile *Mariner* turns heads along Seattle waterfront

Story and photos by Casey Conley

Capt. Mark Williamson steered Western Towboat's newest harbor tug into Elliott Bay on a cool, clear late February day. Other mari-

ners working in the busy harbor took notice.

"That's a nice-looking boat," said David Trickett, who oversaw lightering of gypsum from



Capt. Russell Shrewsbury spins *Mariner* in Seattle's Duwamish Waterway, top, just south of Harbor Island Marina where Western Towboat's harbor tugs tie up. Above right, Shrewsbury, seated at the controls, worked with KraftMar and Argonaut Marine to update Western's proven Westrac design. Left, *Mariner* guides a barge along the Duwamish Waterway.

the bulk carrier *Astoria Bay* anchored nearby.

"Roger that," Williamson responded. "Taking it for a test run here."

Mariner is the third of Western's Westrac-series tugboats, and like its two predecessors *Westrac* and *Westrac II*, it was built at the company's shipyard along Seattle's Lake Union. Capt. Russell Shrewsbury, whose grandfather started Western Towboat in 1948, worked with KraftMar Design and Argonaut Marine, also of Seattle, to fine-tune the plans.

Western began integrating the 80-by-32-foot *Mariner* into its harbor fleet in February. Williamson, a 20-year employee with the



★ Updated Westrac design ★ First U.S. DMT winch installation ★ 55 tons of bollard pull

company, gave the new vessel high marks after his first turn at the controls.

"It is just a lot more power than I am used to, but it's real steady in the water," he said.

Shrewsbury spent years thinking about upgrades to the Westrac design first conceived by his father, Bob Shrewsbury, in the mid-1980s. *Mariner* retained many characteristics of the Westrac series, particularly its nimbleness while working in the narrow Duwamish Waterway. That said, the tug is loaded with modern amenities designed for efficiency, crew comforts and reduced maintenance costs.

Mariner shares the same distinctive look as its predecessors, but with almost 4,000 hp it is 65 percent more powerful than *Westrac II*, built in 1995. *Mariner* is 2 feet wider at the beam for better stability. It's also 1 foot

deeper at the keel for improved tracking when handling barges — which accounts for roughly 75 percent of Western's harbor work.

The winch package and z-drives also changed on the new vessel, in part to accommodate its more powerful engines. *Mariner* delivers almost 55 tons of bollard pull, compared to about



Right, the DMT Marine Equipment winch on *Mariner's* bow is the company's first installation on a U.S. tugboat. Western Towboat's shipyard crews built the towing winch, below, at the company's yard.

25 tons for *Westrac II*.

These gains in power and pull ensure Western can continue serving existing customers with



bigger ships. It will allow for local rescue tows and help with maneuvering massive cargo barges bound for Alaska. Western operates a fleet of z-drive oceangoing tugboats that tow containers,

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“When we built the (first two) Westracs, the barges that were going to Alaska were 300 feet long. Now they are 420 by 105 (feet), so it is nice to have the extra power,” Shrewsbury said. “Being in the 4,000 (hp) range, we can do a lot more with these boats but we are in the same size power package.

“We are not trying to be ship dockers in Puget Sound,” he continued. “We just want to have the ability to do these jobs if we need to.”

Propulsion aboard *Mariner* comes from twin Caterpillar 3512 Tier 3 mains producing 1,970 hp each, paired with Schottel z-drives with Nautican propellers and nozzles through

MARINER SPECIFICATIONS

OWNER/OPERATOR: Western Towboat Co.
BUILDER: Western Towboat Co.
DESIGNER: Western Towboat Co./KraftMar Design Services/Argonaut Marine
DIMENSIONS: 80' x 32' x 15'
MISSION: Ship and barge assist
CREW SIZE: 4

PROPULSION:

- ◆ Engines: (2) Tier 3 Caterpillar 3512C, 1,970 hp
- ◆ Bollard pull: 55 tons
- ◆ Vessel speed: 13 knots
- ◆ Propellers: 80" Nautican 3-blade skewed props
- ◆ Thrusters: (2) Schottel SRP 1215 with Nautican nozzles
- ◆ Auxiliary generators: (2) 75-kW John Deere, Tier 3

DECK EQUIPMENT:

- ◆ Bow winch: DMT Marine Equipment 011-H350kN single-drum ship-handling winch, 40-ton line pull
- ◆ Stern winch: Western Towboat-built single-drum winch; 1800' of 1.75" galvanized tow wire; 200' of 2.5" Plasma line
- ◆ Auxiliary stern winch: Pullmaster M50, 25-ton line pull; 150' of 2.5" Plasma line
- ◆ Tow pins: (2) Western Towboat-built hydraulic stainless units
- ◆ Cordage: 500' of 2.5" Cortland Plasma line
- ◆ Fendering: Schuyler Companies; Shibata

NAVIGATION GEAR:

- ◆ Radar: (1) Furuno NavNet TZtouch2; (1) Furuno FAR-1426
- ◆ GPS: (2) Furuno GP33
- ◆ BNWAS: (1) Furuno BR-500
- ◆ Compass: Ritchie
- ◆ AIS: (1) Furuno FA170
- ◆ Enav software: Rose Point Navigation Systems; Furuno NavNet TZtouch2
- ◆ Autopilot: Simrad AP70 Mk2 with GC80 Gyro System

COMMUNICATIONS:

- ◆ Radio: (3) Raymarine Ray73

CAPACITIES:

- ◆ Fuel: 30,000 gallons
- ◆ Water: 4,500 gallons
- ◆ Lube oil: 900 gallons

FIREFIGHTING:

- ◆ Pumps: Cascade Machinery 2.5" deck hose, 150 gpm
- ◆ Onboard fire suppression systems: Kidde CO2

Centa carbon-fiber shafts. Two 75-kW John Deere generators installed forward of the main engines provide electrical power.

The deck equipment also represents an upgrade over the earlier tugs. The DMT Marine Equipment ship-handling winch installed on the bow is the Romanian company's first installation on a U.S. tugboat. The single-drum hydraulic winch has 40 tons of line pull and is spooled with 500 feet of 2.5-inch Cortland Plasma line.

Shrewsbury chose DMT after conducting extensive research. DMT winches, he said, are common in Europe and found on some Canadian tugs. Shrewsbury liked DMT's service and willingness to customize the winch.

Western Towboat port engineer Ed McAvoy designed the hydraulic towing winch installed aft of the house. The single-drum unit is loaded with 1,800 feet of 1.75-inch galvanized steel towing wire and 200 feet of 2.5-inch Cortland Plasma line. A Pullmaster M50 winch with 25



tons of line pull provides additional capability.

Western's shipyard fabricated the stern rollers and hydraulic towing pins, along with the bow staple and H-bitts on the port and starboard sides. The



Engineer James Gaines, above, alongside one of *Mariner's* two Cat 3512 engines. Below, Western Towboat deck-hand Andrew Donaldson, mate Calvin Grenkavich, Capt. Mark Williamson and Gaines on *Mariner's* aft deck.

upgraded Schuyler Companies and Shibata fendering package is softer along the bow and runs higher along the bulwarks to protect the lines when towing barges on the hip.

“We just need to keep our versatility open,” Shrewsbury said. “We can do anything with this boat.”

Mariner is typically crewed with a master, mate and deck hand/engineer for work within the Duwamish. A second deck hand comes along for jobs farther afield. Although there are bunks for five people, most crew go home when their shifts end. Even so, Shrewsbury made sure to include plenty of comforts for downtime between jobs or rare occasions when crew sleep on board.

Mariner has an open-concept galley, mess and lounge area, along with a head and captain's cabin on the main level. The settee in the lounge, made of leather instead of vinyl, is long enough for a crewman to lie down during spare minutes. The space is outfitted with rich mahogany wood accents, and a separate refrigerator near the wheelhouse stairs is loaded with grab-and-go soft drinks.

Other decisions regarding the crew spaces will save time, money and future headaches. The fridge, for instance, is an

oversized household unit that can be replaced for roughly the same cost as repairing a marine unit just one time. The double bunks fit full-size beds, eliminating the need for slightly narrower — and much pricier — custom-made mattresses.

“Our biggest thing is, if we are going to ask people to be away from home for six months a year, we want it to be as nice, or nicer, than home,” Shrewsbury said.

The wheelhouse has been upgraded too, with full windows for all-around visibility and upper windows for better views when working under a ship’s flare. Furuno supplied much of the marine navigation electronics, paired with a Rose Point Navigation Systems electronic chart system. The wheelhouse has Bluetooth connectivity for hands-free phone communication.

The hull and decks are painted with a Blue Seal epoxy-fiberglass coating



The upper exhaust stacks on *Mariner* can be removed, leaving just enough space for each main engine to be lifted through the opening.

that has proven its worth on Western’s tugs making year-round trips to Alaska. Shrewsbury expects to get 15 years out of the deck on *Mariner*. The company also uses it on the nozzles to protect against cavitation.

“We put it on *Arctic Titan* in 2012, and we did the whole hull and then put an antifouling coating over it,” he said. “We haven’t had to blast the hull yet. It’s rock-hard.”

Bob Shrewsbury started Western

Towboat in 1948, and his son Bob Shrewsbury Jr. remains company president. Russell and his brother Ross, also a Western captain, still run tugs when they’re not busy working in the office.

Russell Shrewsbury recognized the irony around building the boat he wanted at a time when he’s spending less time on the water. “It’s going to be really hard for me to let go,” he said. “It’s like getting a brand-new car and just giving it away.”

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CAPT. JIM McALLISTER & EILEEN McALLISTER | McAllister Towing and Transportation Co., New York

McAllister Towing solidifies Charleston, Port Everglades fleets

Story and photos by Casey Conley

For most tugboat companies, building one new azimuthing stern drive (ASD) tugboat would make for a pretty good year. McAllister Transportation and Towing added two within just eight months.

The 6,772-hp *Capt. Jim*

McAllister left Eastern Shipbuilding in late August 2019, arriving soon afterward in Charleston, S.C. The 100-foot vessel routinely escorts and assists post-Panamax containerships calling on the sprawling Wando Welch Terminal across the Cooper River in Mt. Pleasant, S.C.

Capt. Jim McAllister, pictured above near the Arthur J. Ravenel Bridge in Charleston, is named for a second-generation McAllister captain. Eileen McAllister, left, launched earlier this year from Washburn & Doughty Shipyard, was christened by Eileen Buch, Eileen Duane Donovan and Eileen Fitzsimons, three direct descendants of company founder James McAllister.

Eileen McAllister, a 93-foot, 6,772-hp, ship docking and escort tugboat built at Washburn & Doughty, provides similar services in Port Everglades, Fla. McAllister paired *Eileen* with *Tate McAllister*, built six years ago with the same hull but different propulsion and winch packages.

Both new tugs are powered by brawny Caterpillar 3516 Tier 4 engines paired with Schottel z-drives. *Capt. Jim* delivers 82.5 metric tons of bollard pull, which is roughly equal to the 93 short tons *Eileen* generates. Both are the most powerful ship-assist tugboats working in their respective ports.

“In the past, we have seen up to 1,000-foot containerships,” said Capt. Chuck Runnion, McAllister’s general manager and



McAllister Towing

★ Most powerful ship-assist tugs in respective ports ★ Built to handle post-Panamax containerships ★ Bollard pull exceeds 90 tons on both vessels



Capt. Jim engineer Michael Cobb stands alongside one of two Cat 3516E units delivering 3,386 hp each.

vice president in Port Everglades. “And with the *Eileen* we are handling these 1,000-footers with the greatest of ease.”

McAllister’s tugboat crews in Charleston are similarly upbeat about *Capt. Jim*. It is the final tugboat in a four-vessel order, and the only one of the bunch to leave the shipyard with a Coast Guard certificate of inspection under Subchapter M.

“It’s hard to impress me at this point, but that boat floored me,” said Capt. Steve Kicklighter, a McAllister vice president and Charleston general manager. “It has the most environmentally friendly diesel engines, and the accommodations spaces for the crew are unsurpassed.”

“Without a doubt,” he added, “this is the best of all four.”

McAllister announced the four-tug series of ship assist and escort tugs in early 2016, becoming one of the first operators with a multiboat Tier 4 order. Horizon Shipbuilding won the contract and built the lead boat, *Capt. Brian A. McAllister*, before running into financial trouble and ultimately declaring bankruptcy in late 2017.

Eastern Shipbuilding of Panama City, Fla., finished construction on *Rosemary McAllister* and *Ava McAllister*, the second and third vessels in the series, which arrived at the shipyard in varying stages of



Mate Josh Kicklighter steers Capt. Jim into McAllister’s North Charleston dock during the late afternoon sun.

completion. Eastern built *Capt. Jim McAllister* from the keel up, a point that Kicklighter said makes the tug stand out. *Capt. Brian* and *Ava* work in New York, McAllister’s headquarters, while *Rosemary* is based in Norfolk, Va.

The four boats are designed for escorting and docking ultra-large container vessels now calling on major East Coast ports. Jensen Maritime Consultants of Seattle, a longtime McAllister partner, designed the 100-by-40-foot hull. It features a modest skeg, but relies heavily on its wide beam for effective high-speed escorts.

Propulsion also is the same across the 100-foot series. All four are powered by twin Cat 3516 engines each delivering 3,386 hp

at 1,800 rpm. Straight carbon-fiber shafts connect the mains to Schottel z-drives turning 110-inch nibrals props encased in nozzles. Three Cat C7.1 generators provide ship service power.

The tugs have tankage for 2,500 gallons of diesel exhaust fluid needed to meet EPA Tier 4 emissions rules. The urea and water mixture injected into the exhaust stream is kept in climate-controlled spaces to prevent degradation. The engineering control panels also are segregated from the main engine space, providing a quieter and more comfortable working environment for the engineer.

Capt. Jim, like *Ava McAllister* before it, is outfitted with a 75-hp Markey hawser winch and a single-drum towing winch on the

CAPT. JIM MCALLISTER SPECIFICATIONS

OWNER/OPERATOR: McAllister Towing and Transportation Co.

BUILDER: Eastern Shipbuilding Group

DESIGNER: Jensen Maritime Consultants

DIMENSIONS: 100’ x 40’ x 16’4”

MISSION: Ship assist, escort and rescue towing

CREW SIZE: 4-6

PROPULSION:

- ◆ Engines: (2) Tier 4 Caterpillar 3516E, 3,386 hp
- ◆ Bollard pull: 82.5 metric tons ahead
- ◆ Vessel speed: 12 knots cruising, 14 maximum
- ◆ Z-drives: (2) Schottel SRP 4000 FP turning 2,800-mm nibrals 4-blade props
- ◆ Auxiliary generators: (3) Tier 3 Cat C7.1 engines driving 118-kW generators

- pass; Ritchie Globemaster magnetic compass
- ◆ AIS: Furuno FA310 series
- ◆ E-nav software: Rose Point Navigation Systems
- ◆ Autopilot: Anschutz PilotStar D
- ◆ GPS: (2) Furuno GP32

COMMUNICATIONS:

- ◆ Radio: (3) Standard Horizon GX2200
- ◆ Loud hailer: Standard Horizon VLH-3000

CAPACITIES:

- ◆ Fuel: 58,710 gallons
- ◆ Lube oil: 545 gallons
- ◆ Urea: 2,500 gallons
- ◆ Potable water: 3,075 gallons

FIREFIGHTING:

- ◆ Monitors: (2) FFS 300M manually operated monitors, 1,500 gpm each
- ◆ Pumps: (1) FFS SFP150x200HD pump rated at 3,000 gpm, powered by (1) Cat C9.3 engine
- ◆ Machine space fire suppression system: FM-200 fixed system

DECK EQUIPMENT:

- ◆ Bow winch: Markey DEPCF-52 single-drum 75-hp hawser
- ◆ Stern winch: Markey DEPC-42 single-drum 40-hp hawser
- ◆ Cordage: 800’ of 10” Samson Saturn-12 HMPE line
- ◆ Fendering: Viking

NAVIGATION GEAR:

- ◆ Radar: (2) Furuno FR-8122 with ARPA and 4’ antenna
- ◆ Chartplotter: Furuno NavNet TZtouch2
- ◆ Compass: (2) Anschutz Standard 22 gyrocom-

stern. Firefighting consists of two 1,500-gpm FFS monitors fed by a 3,000-gpm fire pump driven by a Cat C9.3 engine.

Josh Kicklighter, the mate on *Capt. Jim McAllister* alongside his brother, Capt. Matt Kicklighter, considers the Markey hawser winch a good match for the tug. He likened good winches on powerful tugs to top-quality tires on a sports car: They complete the package to deliver superior performance.

"The winches they put on here, they are light-years above some of the stuff I have used in the past," he said, adding that he has come to



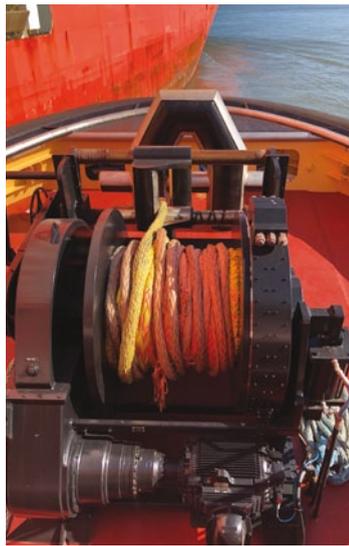
trust the winch completely.

Josh Kicklighter demonstrated *Capt. Jim's* abilities on a sunny, clear fall day in Charleston. *Capt. Jim* easily pulled the bow of the 462-foot *Bochem Singapura* off Kinder Morgan Berth 4, then spun the tanker 180 degrees for departure. An hour later, again paired with the 5,000-hp *Moira McAllister*, *Capt. Jim* backed the 656-foot vehicle carrier *Toledo* off the Columbus Street Terminal. The tug used no more than half power for both jobs.

"But when you want the power, it's there," Kicklighter said. "When you put rubber to steel and start pushing stuff around, you can see it does what it is supposed to do."

McAllister crews in Fort Lauderdale feel the same way about *Eileen McAllister*, which arrived in early April. Port

Right, Markey Machinery supplied the DEPC-42 stern winch and single-drum DEPCF-52 hawser winch shown on *Capt. Jim's* bow. The tug is outfitted with Schottel SRP 4000 FP z-drives, below.



Everglades is undergoing extensive upgrades to facilitate calls from larger containerships. Post-Panamax cranes should arrive around Christmastime, and the main container port is adding 3,900 feet of dock space. Dredging also is in the works.

Getting post-Panamax ships safely in and out of these berths will require some muscular tugboats. Capt. Todd Cooper, co-managing pilot of the Port Everglades Pilots Association, described a challenging entry into the port requiring a high-speed tethered escort preceding a 110-degree turn into the Intracoastal Waterway. The waterway shrinks to 390 feet at its narrowest point.

Eileen McAllister, Cooper said, is the right size and has plenty of power to handle large ships in tight spaces. "What it is going to do is allow us and Port Everglades to ramp up and allow bigger ships into the port, especially with the port expansion projects we have going on," he said.

Runnion, McAllister's general manager in Port Everglades, said Washburn & Doughty's 93-foot hull makes the tug a good fit for the confined harbor. The design has proven itself repeatedly over the years for Moran Towing, Marine Towing of Tampa and Harbor Docking & Towing, among others. The tugs, in short, are stable during escorts but plenty maneuverable when docking ships.

"The reason we like that brand of boat, the Washburn & Doughty boat, is because they are shorter and they can fit into the tanker slips," Runnion said. "The tug captains like the Washburn & Doughty hulls ... because they seem to maneuver well either way, going ahead or astern, and you don't have to muscle it around."

Eileen shares the same 93-by-38-foot design as *Tate McAllister* but has a host of upgraded components. Tier 4 Cat 3516s replaced EMD Tier 3 engines, adding about 772 horsepower. Bollard pull jumped from 79 to 93 short tons. *Eileen's* Cat engines turn Schottel SRP 490 FP z-drives, and a Cat C18 engine drives a fire pump that supplies a single 6,000-gpm FFS monitor with foam injection capability.

The winch package also changed. *Eileen* has the same Markey DEPCF-52 winch on the bow as *Capt. Jim* with 600 feet of 8.5-inch Cortland Plasma LoCo rope. The Markey DEPC-42 tow winch installed on the aft deck is spooled with 450 feet of 2.25-inch Samson AmSteel-Blue. *Tate McAllister*, meanwhile, has JonRie winches forward and aft.

"With the *Eileen* and *Tate McAllister*, we will be able to handle anything that comes into Port Everglades," Runnion said.

Eileen and *Capt. Jim* typically operate with four crew. Both have four cabins, along with a full galley and mess, giving each person their own room under typical conditions. *Eileen* has three heads, something Runnion said he insisted on during the design phase. "The tug is designed for comfort, which leads to crew retention," he said.

Martin Costa, McAllister's engineering manager who helps oversee new construction, suggested the company will take a break from new construction after a busy few years. "I think we'll take a breather," he said. "Five boats is a lot to get done in four years." ●



Foss Maritime

JAMIE ANN | Foss Maritime, Seattle

Foss updates proven Valor-class design for the Tier 4 era

By Casey Conley

Foss Maritime Company has updated the venerable Valor-class azimuthing stern drive (ASD) tugboat for a new era.

Foss, a Saltchuk subsidiary based in Seattle, took delivery of the 100-by-40-foot *Jamie Ann* this spring from Nichols Brothers Boat Builders. Jensen Maritime Consultants and Foss partnered on upgrades to the existing design that include new safety features and crew amenities. The MTU Tier 4 engines are the first for any U.S. tugboat.

Jamie Ann, named for Saltchuk co-founder Fred Goldberg's daughter, will work in Los Angeles-Long Beach, Calif., escorting and assisting containerships and tankers. It is also equipped with large fuel tanks and a sturdy towing winch to handle rescue tows far from shore. Bollard pull is 92.36 tons off the stern and 90 tons off the bow.

"It's a good, solid, 90-ton harbor boat," John Parrott, Foss's former president and COO, said in an interview late last year. "It's

Jamie Ann, above and right, is the latest iteration of Jensen Maritime's Valor class, and the first with Tier 4 engines. The 6,866-hp tug is the lead boat in what Foss calls its ASD-90 series.

well built and should last us 20 to 25 years using a design that is tried and true."

Foss has one of the more capable harbor tugboat fleets on the West Coast. Its sleek 8,000-hp *Garth Foss* and *Lindsey Foss* deliver nearly 88 tons of bollard pull, and the 113-foot, 6,772-hp *Caden Foss* can pull 90 tons. Ever-larger ships regularly calling the West Coast have increased demand for high-powered tugs for escort and docking.

"Our customers," Parrott said, "want us to have more 90-ton tugboats available in our fleet."

Nichols Brothers, based in Freeland, Wash., has built 11 Valor-class tugs over the past 14 years. Baydelta Maritime of San Francisco ordered the original *Valor*, completed in 2006 and chartered by Crowley along with



Foss Maritime

sister tug *Vigilant*. Last spring, Baydelta took delivery of *Delta Teresa*, the first diesel-electric hybrid in the class, now working in Los Angeles-Long Beach.

Valor-class tugs are known for high horsepower, impressive bollard pull ratings and assertive skegs for effective escorts. They have comfortable crew spaces and an enormous engine room. Foss built on these characteristics for *Jamie Ann*, the lead boat in the new ASD-90 class, and upgraded the design by increasing the fuel tank capacity for long voyages and rescue towing well offshore.

"The design has been proven. That is for sure," said Janic

★ Updated Valor-class design ★ Enclosed harbor genset for reduced noise ★ Bollard pull exceeds 90 tons

Trepanier, Foss' project manager for the series of ASD-90 vessels.

The biggest difference between *Jamie Ann* and its predecessors can be found in the engine room. Foss replaced the Caterpillar 3516-series engines that powered all 10 previous vessels with twin 3,433-hp MTU Series 4000 Tier 4 mains. Those mains are paired with Kongsberg/Rolls-Royce US 255 z-drives — a

Jamie Ann's MTU Series 4000 engines, below, are the first on any U.S. tugboat that meet EPA Tier 4 emissions rules. Bottom, MER Equipment built a custom enclosure for its 65-kW Bollard harbor genset that sharply reduces noise.



Foss Maritime

Rolls-Royce division that produced z-drives.

Three John Deere gensets, two generating 120 kW and a third harbor unit producing 65 kW, provide electrical power. All three are installed forward of the main engines. Hiller supplied the FM-200 fire suppression system in the engine room. Firefighting equipment consists of a 100-hp Flowserve fire pump and forward-mounted Stang 2.5-inch monitor that can dispense 900 gpm.

The MTU mains, like nearly all Tier 4 engines on the market, use a selective catalytic reduction (SCR) process to sharply reduce nitrogen oxides and particulate emissions. These units, installed above the engines in the ventilation spaces, required modest rejiggering of the machinery trunk, which in turn relocated a bathroom from the fiddley space to the lower accommodations.

Nichols Brothers developed a 3D model of the updated vessel design, allowing the entire vessel to be reloffed before construction began. Trepanier said the 3D model provides better awareness of the vessel and a better sense for where the piping and machinery will go.

"The first one is always the hardest," she said of the lead tug in the series. "The model made it

a lot easier to build, and numbers two, three and four are going to be easier because we have a complete model after troubleshooting for the first one."

There are numerous other changes to the original vessel design to improve efficiency, crew comfort and safety. Some examples include rescue doors built into the bulwarks, and extensive use of mineral insulation in the engine room to reduce noise in crew compartments.

Foss encapsulated its 65-kW harbor generator inside a Bollard Sound Enclosure built by MER Equipment. *Jamie Ann* is the first tugboat with the Bollard enclosure, which was originally developed for the recreational market.

Each custom enclosure system is completely sealed from the engine compartment and uses the generator's cooling fan to draw air into the unit. The exhaust leaves

constant since the namesake vessel — through a Vulkan carbon-fiber shaft.

Multiple factors influenced the switch to MTU engines. Cost was one; another, Parrott explained, is the growing push among manufacturers to sell propulsion systems as a single package. Caterpillar, for instance, is keen to pair its engines and drives. The same was true with MTU and Rolls-Royce a few years back when Foss was equipping its new tugboats, he said. Kongsberg Maritime has since acquired the



Foss Maritime

JAMIE ANN SPECIFICATIONS

OWNER/OPERATOR: Saltchuk/Foss Maritime
BUILDER: Nichols Brothers Boat Builders
DESIGNER: Jensen Maritime Consultants
DIMENSIONS: 100' x 40' x 20'8"
MISSION: Ship escort and assist
CREW SIZE: 8

PROPULSION:

- ◆ Engines: (2) Tier 4 MTU Series 4000, 3,433 hp
- ◆ Bollard pull: 92.36 short tons ahead
- ◆ Z-drives: (2) Kongsberg/Rolls-Royce US 255
- ◆ Auxiliary generators: (2) 120-kW John Deere; (1) 65-kW John Deere harbor unit

- ◆ Autopilot: Simrad AP70

COMMUNICATIONS:

- ◆ Radio: Icom
- ◆ Satellite connection: Iridium

CAPACITIES:

- ◆ Fuel: 72,500 gallons
- ◆ Water: 1,050 gallons
- ◆ DEF: 5,777 gallons
- ◆ Lube oil: 1,720 gallons

DECK EQUIPMENT:

- ◆ Winches: (1) Markey DEPGF-52R 75-hp hawser; (1) Markey TESS-34AS 75-hp tow winch
- ◆ Cordage: 525' of 9" Corland Plasma line on bow; 2,600' of 2.25" wire on stern

FIREFIGHTING:

- ◆ Monitors: (1) 2.5" Stang, 900 gpm
- ◆ Pumps: (1) Flowserve, 100 hp
- ◆ Onboard fire suppression systems: The Hiller Companies FM-200 system

NAVIGATION GEAR:

- ◆ Radar: Furuno FR-8125 and FR-8065/4
- ◆ Compass: Furuno SC70
- ◆ AIS: Furuno FA170
- ◆ E-nav software: Rose Point Navigation Systems

ADDITIONAL INFORMATION:

- ◆ Subchapter M compliant; ABS Load Line, Towing Vessel, Escort Vessel, AMS, UWILD

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through insulated ducting after cooling the John Deere engine compartment, explained Robert Allen, CEO of MER Equipment, which supplied all three of *Jamie Ann's* gensets.

"You can be in the engine room and talk to one another without shouting to be heard while the generator is running," Allen said.

Jamie Ann can carry over 72,000 gallons of fuel, giving it ample capacity for offshore rescue tows off Southern California. For these, the tug is equipped with a double-drum Markey Machinery TESS-34AS towing winch installed on the aft deck. It is loaded with 2,600 feet of 2.25-inch wire in the port drum and 440 feet of 7-inch Samson AmSteel-Blue line in the starboard drum. The winch can be controlled from the wheelhouse,

Jamie Ann's finely appointed wheelhouse is equipped with Furuno navigation electronics.

eliminating the need for crews to work on the aft deck.

A 75-hp Markey single-drum DEPGF-52R electric winch spooled with 525 feet of 9-inch Cortland Plasma line is installed at the bow, providing *Jamie Ann* and its sister vessels with the power necessary for handling some of the largest ships calling

the West Coast.

"We worked very closely with Foss engineering and operations groups to define the specific winch performance and features needed for the *Jamie Ann's* operations," said Scott Kreis, Markey's vice president of sales and engineering.

Jamie Ann's interior spaces are similar to the preceding 10 vessels, albeit with the head moved down below and the forward void converted into a storage space. The main deck has the galley and mess, a full head and two staterooms; two other staterooms are located forward of the engine room. The vessel has accommodations for eight people but normally works with a four-person crew.

The wheelhouse is equipped in what has become the industry-standard layout that puts the



Nichols Brothers Boat Builders

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helm chair between z-drive port and starboard controls. Foss chose radars and an AIS system from Furuno, Rose Point navigation software and a Simrad autopilot. Operators communicate using Icom radios and the Iridium satellite network, and can remotely monitor machinery spaces through closed-circuit TVs.

Jamie Ann Goldberg, a second-generation Saltchuk owner, formally christened her namesake tugboat on Feb. 29 — a few weeks before final delivery — on Whidbey Island. She described feeling a deep connection to the tugboat. “It is an honor to have this boat named after me,” she said in her address to the crowd of about 100 people attending the event.

The next three Foss tugboats in the series will be named *Sarah Averick*, *Leisa Florence* and *Rachael*

Markey Machinery supplied the hawser winch on the bow, right, and the towing winch, below, installed on the aft deck.

Allen, all of whom are members of the Saltchuk shareholder family. Sisters Sarah Averick and Rachael Allen are daughters of Saltchuk co-founder Leonard Shapiro. Leisa Florence is married to Jamie Ann Goldberg’s brother, Paul Goldberg, a

Saltchuk shareholder and board member.



Nichols Brothers Boat Builders



Nichols Brothers Boat Builders

Sarah Averick will be a sister tug to *Jamie Ann*, while the third and fourth tugs in the series will be outfitted for barge handling and equipped with smaller winches. Foss initially said the trio would join the fleet by 2021, although the precise schedule remains unclear given disruptions caused by the coronavirus outbreak. •

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HERCULES | Brusco Tug & Barge/Crowley Maritime, Jacksonville, Fla.

Crowley upgrades LA fleet with first US RApport 2500 tugboat

Story by Casey Conley | Photos by Kurt Redd

The RApport 2400-series tugboats developed by Robert Allan Ltd. have earned their keep around the world. Now, Crowley Maritime has put the first U.S.-built RApport 2500-series vessel to work in Los Angeles and Long Beach, the busiest container ports in the United States.

Crowley chartered the 6,008-hp tug from Brusco Tug & Barge of Longview, Wash. Diversified Marine of Portland, Ore., built the vessel, originally named *Noydena*. It left the shipyard around April 1, 2020, before making its way to Los Angeles later in the spring. Crowley renamed it *Hercules* to honor an oceangoing Red Stack Fleet tugboat acquired in the early 1900s. The newbuild is the company's first ship-assist tug equipped

with Tier 4 propulsion.

The 82-by-40-foot *Hercules* has Caterpillar engines paired with Cat z-drives. The electric Markey hawser winch on the bow facilitates efficient ship handling, while the towing bitt on the stern provides some additional flexibility as work arises around the port.

"It is fuel efficient, while also being able to handle the big tankers coming in, given it pulled 88 tons ahead and 86 astern," said Porter Sesnon, general manager of ship assist and escort for Crowley Maritime. "It's nimble and small enough to maneuver the container ships around both harbors."

The RApport 2500 design evolved from Robert Allan Ltd.'s time-tested RApport series dating back almost a generation. The

Above, Hercules, in its former Brusco Tug & Barge livery, shows off in the Columbia River. Below, the wheelhouse is designed for excellent all-around visibility.

2400-series tugs — themselves based on Cates-series tugs designed for C.H. Cates and Sons of North Vancouver, British Columbia, between the 1960s and 1980s — were among the first ASD tugs operating in North America. The vessels have a flush deck and small house, and are known for being



★ First U.S. RApport 2500-series design ★ Crowley's first Tier 4 ship-assist tug ★ Chartered from Brusco Tug & Barge

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The 2500 series, named for its 25-meter length, builds on these strengths. The new design adds more than 3 feet of length and nearly 10 feet of breadth to accommodate more powerful engines and deliver greater bollard pull. *Hercules* has a skeg under the keel that's big enough for effective escorts but small enough not to hinder quick moves along the hull when docking ships.

The wider, longer RAport 2500 series can accommodate more powerful engines than its predecessors.



Jim Hyslop, manager of project development for Robert Allan Ltd., said the RAport 2500 series is meant to be highly maneuverable, powerful and offer good visibility, just like its predecessors. But its larger envelope acknowledges industry demands for more bollard pull as ships — and the tugboats that work with them — keep getting bigger.

“What we did with that (2400 series) design is we kept increasing bollard pull, and it got to the point where it became too much for that boat,” Hyslop said. “The new design is a little bigger, a little more powerful, with a little more beam and a little more length. Basically, it is just a more capable package.”

“It is fairly simple, clean and basic, but at the same time it is a very high-performance harbor tug,” he added.

Diversified Marine built seven RAport 2400 tugs for Brusco between 2001 and 2017. Brusco kept some for its work in smaller West Coast ports and chartered

others to different operators. The most recent in the 2400 series, the 4,750-hp *Teresa Brusco*, left Diversified in late 2017 and went to work in San Francisco Bay under charter to AmNav Maritime.

Crowley signed a seven-year charter with Brusco to operate *Hercules*. Changes happening elsewhere in Crowley's West Coast harbor tugboat fleet influenced the decision, as charters on other vessels were winding down, Sesnon said. *Hercules'* size, power and its availability at the right time made it an enticing opportunity, he said.

Crowley's Los Angeles-Long Beach fleet consists of four tugs, three of which are 105-foot Harbor-class tugboats with 4,800 hp and Voith Schneider cycloidal propulsion. *Hercules* replaced *Veteran*, a Valor-class workhorse that Crowley moved to San Francisco Bay where it joined its sister tugboat, the namesake *Valor*.

There is plenty of work to go around in Southern California, particularly with the massive containerhips calling on Los Angeles and Long Beach on a regular basis. The Port of Los Angeles moved more than 9.3 million TEU in 2019, and the neighboring Port of Long Beach isn't far behind, with more than 7.5 million TEU for each of the past three years.

Despite those volumes, which have fallen somewhat in 2020 due to trade challenges and the coronavirus outbreak, both ports are relatively confined. They also have heavy traffic, making a nimbler tugboat appealing. “That Robert Allan design is one of the most prolific throughout the world, and it's proven over and over again to provide a lot of performance in a small package,” Sesnon said.

That small package got quite a bit bigger, and more powerful, with the 2500 series. *Hercules* is powered by two Tier 4 3,004-hp Cat 3516 engines turning Cat MTA 627 z-drives through carbon-fiber shafts. Two Cat C7.1 gensets pro-

ducing 118 kW each are installed along the centerline between the two mains. *Hercules* is equipped with a Duramax DuraCooler and DuraCooler SuprStak keel coolers.

Teresa Brusco, by comparison, shares the Cat engine room but with smaller 2,375-hp Cat 3512-series Tier 3 engines and Rolls-Royce z-drives. Bollard pull is 67 tons.

As with most Tier 4 tugs, *Hercules'* engine room required some rethinking to accommodate the selective catalytic reduction (SCR) units installed above the main engines. Hyslop said the exercise wasn't particularly challenging, in part because the vessel itself has sufficient space to accommodate the equipment. Two 1,250-gallon tanks supply diesel exhaust fluid (DEF) that's injected into the exhaust stream to sharply reduce nitrogen oxides (NOx) and particulate matter in compliance with Tier 4 standards.

There are notable changes to the deckhouse as well. The RAport 2400 tugs have traditionally operated as day boats, with limited amenities and perhaps a couple of bunks for crew to use between jobs. The beamier *Hercules* has a comfortable galley and mess, along with laundry and a head on the main deck. Three double cabins are below deck for a vessel that will typically have four or fewer crew.

The wheelhouse is roomier than its predecessors and is loaded with top-shelf navigation electronics. The operators can look to Furuno FR-8125 radars, a Furuno satellite compass and a Transas navigation system while underway. Closed-circuit cameras show what is happening below deck in machinery spaces.

The Markey DEPC-52 electric hawser winch and staple are the centerpiece of *Hercules'* bow. The proven winch is loaded with features, including Render/Recover to maintain constant line tension.



Its single drum can hold 750 feet of 3.25-inch line, with a line speed of up to 360 feet per minute and a brake capacity of 600,000 pounds.

The FM-200 fire suppression system for the engine room is stored in a locker on the main deck rather than in the engine compartment. The vessel's off-ship fire-fighting system consists of a single 2,000-gpm Elkhart Brass Spit-Fire monitor with a Carver pump driven by a 150-hp Baldor electric motor.

Hercules is just the latest

Hercules has an all-Caterpillar engine room and Cat MTA 627 z-drives.

HERCULES

SPECIFICATIONS

OWNER/OPERATOR: Brusco Tug & Barge/Crowley Maritime

BUILDER: Diversified Marine

DESIGNER: Robert Allan Ltd.

DIMENSIONS: 82' x 40' x 14'

MISSION: Ship escort, docking and assist

CREW SIZE: 4

PROPULSION:

◆ Engines: (2) Caterpillar

3516E, 3,004 hp

◆ Ballast pull: 88 tons

ahead

◆ Vessel speed: 12 knots

◆ Z-drives: (2) Cat MTA

627

◆ Auxiliary generators: (2)

118-kW Cat C7.1

◆ Keel coolers: Duramax

DuraCooler; DuraCooler

SuprStak

◆ Fendering: Schuyler

Companies

◆ Monitors: (1) Elkhart

Brass Spit-Fire, 2,000

gpm

◆ Pumps: (1) Carver Pump

driven by 150-hp Baldor

electric motor

◆ Onboard fire suppression

systems: FM-200

◆ Fuel: 22,000 gallons

◆ DEF: 2,500 gallons

◆ Water: 3,500 gallons

◆ Lube oil: 450 gallons

◆ Firefighting:

◆ Monitors: (1) Elkhart

Brass Spit-Fire, 2,000

gpm

◆ Pumps: (1) Carver Pump

driven by 150-hp Baldor

electric motor

◆ Onboard fire suppression

systems: FM-200

◆ Bow winch: Markey

DEPC-52 electric, 75 hp

◆ Deck equipment:

◆ Bow winch: Markey

DEPC-52 electric, 75 hp

◆ Deck equipment:

◆ Bow winch: Markey

DEPC-52 electric, 75 hp

◆ Deck equipment:

◆ Bow winch: Markey

DEPC-52 electric, 75 hp

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◆ Bow winch: Markey

DEPC-52 electric, 75 hp

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◆ Bow winch: Markey

DEPC-52 electric, 75 hp

◆ Deck equipment:

◆ Bow winch: Markey

DEPC-52 electric, 75 hp

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◆ Bow winch: Markey

DEPC-52 electric, 75 hp

◆ Deck equipment:

◆ Bow winch: Markey

DEPC-52 electric, 75 hp

◆ Deck equipment:

◆ Bow winch: Markey

DEPC-52 electric, 75 hp

◆ Deck equipment:

◆ Bow winch: Markey

DEPC-52 electric, 75 hp

◆ Deck equipment:

◆ Bow winch: Markey

DEPC-52 electric, 75 hp

tugboat *Diversified Marine* has delivered to Brusco over the past 30 years. Kurt Redd, *Diversified's* owner, recalled how its first ASD

tugboat, *Wynema Spirit*, left the yard for Brusco in 1999. Since then, it has built seven RAport 2400 tugs for the company, which is based about 50 miles to the north via the Columbia River.

Changes from the 2400 series to the more modern 2500 also included enhancements to meet Coast Guard Subchapter M standards. Redd said the yard's crews took those changes in stride. "We like Robert Allan designs, and we have been building these long enough that we are good enough at getting everything in where it needs to go," he said.

Diversified has already begun construction on a sister tug for Brusco in the new 2500 series, and Redd said there are discussions about adding a third. "Brusco keeps building and innovating," Redd said. "They are a great group to work with."



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ANDREW S. | Bisso Towboat Co., Luling, La.

Bisso Towboat adds new muscle on the Lower Mississippi

Story and photos by Brian Gauvin

In 1999, Bisso Towboat of Luling, La., introduced the first tractor tug on the Mississippi River with the delivery of *Cecilia B. Slatten*.

With the delivery of *Andrew S.* in November 2019, Bisso has introduced the first Tier 4 tractor tug on the mighty river. At 6,008 hp, it's also the most powerful.

Main Iron Works in Houma, La., the towing company's go-to-boatyard for nearly 30 years, built *Andrew S.* Bisso's 13-boat fleet now includes eight z-drive tugs, boasting the largest tractor tug fleet on the inland waterways.

"The company is committed to z-drives," Bisso Towboat President Scott Slatten said. "They have proven admirably suited to ship-assist work in tight spots and in the river's difficult currents. They're also not as vulnerable to river debris as once thought."

According to Slatten, shipping

Andrew S., above, is the most powerful azimuthing stern drive tugboat operating on the Lower Mississippi River. Right, Capt. Michael Hilton steers *Andrew S.* on its way to a job on the Mississippi.

companies and ship pilots are driving the demand for ASD tractor tugs. Bisso's eight ASD tugs give the company something of a competitive advantage, especially with

Bisso acquired the design after the construction of *Cecilia B. Slatten* more than two decades ago.

The hull form has proven itself with each successive tugboat. Bisso

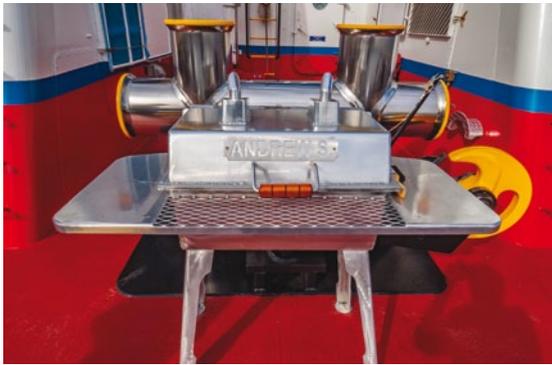


quality ship owners and operators.

Andrew S. is based on a proven 100-by-38-foot design developed by naval architect Greg Castleman.

and Main Iron Works have modified the design tug by tug, arriving at what is essentially an enhanced version of *Alma S.*, built in 2006.

★ First Tier 4 tractor tug working Lower Mississippi ★ Most powerful ASD tugboat on the river ★ Eighth z-drive in Bisso fleet



Incremental improvements over the years include switching to Caterpillar engines, starting with *Michael S.* in 2010, and making connections for hoses, fuel, water and other fluids accessible outside the engine room. Keel-cooled air conditioning became standard in 2012 with delivery of *William S.*

"It's extremely efficient," said Capt. Jon Davis, Bisso's vice president of training. "The forced air is constantly being cooled by the river

Above, the custom-built grill installed on the aft deck is a Main Iron Works tradition. Right, Bisso installed a JonRie Series 240 escort winch on the bow.

water." The system also reduces maintenance costs.

Delivery of *Becky S.* in 2015 heralded an exciting upgrade from the crew's point of view: A second head, located in a mudroom between the stacks. The change, now standard, allowed the engine room door to be moved from the galley to the mudroom, greatly



reducing noise in crew quarters.

Andrew S., with twin 3,004-hp engines, has substantially more power than its most recent predecessor, the 4,480-hp *Liz Healy* built in late 2017. It also has 84 tons of bollard pull compared to *Liz Healy's* 60 tons.

The new tug's power train consists of two Caterpillar 3516E Tier 4 mains driving Kongsberg/Rolls-Royce z-drives. The ice-class drives have four-blade, 98.4-inch stainless-steel props in stainless-steel nozzles.

"The boat has really good power," said Kevin Beudreaux, the chief engineer.

The tug's electrical service is provided by two 99-kW Marathon generators powered by John Deere 4045AFM85 engines. Soundproof insulation sharply reduces noise throughout the vessel, including its four bunkrooms.

Two 1,500-gallon, shipyard-built stainless-steel tanks feed



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Chief engineer Kevin Beudreaux stands alongside one of two Caterpillar 3516E Tier 4 engines, above and right. The Cat engines are paired with Kongsberg/Rolls-Royce z-drives, below.

diesel exhaust fluid (DEF) into the Caterpillar SCR system on *Andrew S.* The tanks are located inside the ballast tanks, keeping the product at a constant cool temperature to prevent degradation. Their location also saves space in the engine room.

The SCR system reduces NOx in engine exhaust emissions to meet EPA Tier 4 regulations. The dosing module mixes compressed air and DEF, sending it to the catalytic converter where it is injected into the exhaust stream. The water evaporates and the DEF is converted into ammonia.

“All of us are really impressed with how little smoke comes out of the stacks,” said Beudreaux. “It’s a super clean system.”

Bisso has fitted its tugs with JonRie bow winches since 2015. The JonRie Series 240 hydraulic auto-tensioning hawser winch on *Andrew S.* is wound with 500 feet of 3-inch Samson Saturn-12 line with 749,000 pounds of breaking strength. The winch is equipped



with pedals at the helmsman’s feet, freeing the helmsman’s hands to concentrate on steering and propulsion controls. The line speed is up to 150 feet per minute.

A stainless-steel H-bitt and staple on the bow stem are standard on Bisso tugs, with a Washington Chain & Supply RSRH-100 quick-release pelican hook and a stainless-steel H-bitt on the stern. Main Iron Works also fabricated a stylish aluminum cooking grill for the crew.

The shoulder and quarter bitts are stainless steel and slanted



inboard, as are the bulwarks, to tuck more easily under a ship’s counters.

Other changes to the vessel

ANDREW S.

SPECIFICATIONS

OWNER / OPERATOR: Bisso Towboat Co.

BUILDER: Main Iron Works

DESIGNER: Bisso Towboat Co./Main Iron Works

DIMENSIONS: 100' x 38' x 13.5'

MISSION: Escort and ship assist

CREW SIZE: 4

PROPULSION:

- ◆ Engines: (2) Tier 4 Caterpillar 3516E, 3,004 hp
- ◆ Bollard pull: 84 tons (est.)
- ◆ Thrusters: (2) Kongsberg/Rolls-Royce US 255 FP z-drives
- ◆ Propellers: (2) 98.4" four-blade stainless-steel props in nozzles
- ◆ Auxiliary generators: (2) 99-kW Marathon generators powered by (2) John Deere 4045AFM85 engines

- ◆ Fendering: M&M Bumper Service

NAVIGATION GEAR:

- ◆ Radar: Simrad Halo-4 Pulse Compression Radar
- ◆ Compass: Simrad HS80A GNSS compass
- ◆ AIS: Simrad V5035 Class A receiver
- ◆ Autopilot: Simrad AP70 Mk2

CAPACITIES:

- ◆ Fuel: 30,162 gallons
- ◆ Water: 11,000 gallons
- ◆ Lube oil: 1,825 gallons
- ◆ DEF: 3,000 gallons

DECK EQUIPMENT:

- ◆ Winches: JonRie InterTech Series 240 escort winch
- ◆ Cordage: 500' of 3" Samson Saturn-12 line

CLASSIFICATIONS:

- ◆ Subchapter M; ABS International Load Line; USCG COI

are less noticeable. Capt. Michael Hilton pointed to a few while idling *Andrew S.* at Poverty Point, waiting to meet the articulated tug-barge *OSG Vision*.

“We did away with the table bitt at the bow for taking the emergency towline, and fitted an emergency towline hook at the forward foot of the winch,” he said. In conjunction with the bow staple, the system allows for the employment of a full 80-ton bollard pull on an emergency tow.

Also at the bow, the bulwarks are canted inward 18 inches for one frame length to allow for more clearance under the sheer of a ship.

“The boat feels heavier than the other boats, and handles a little differently,” Hilton said. “I think it handles better on a ship because the stern, with the big wheels and larger drives, rides lower in the water and the bow higher.”

Where other vessels have one radar, *Andrew S.* has a compound radar system with two scanners and four radars. Two radar monitors bookend the chartplotter mounted to the ceiling above the helm console. Simrad supplied the electronics suite in the wheelhouse.

Hilton said the pace of acceleration from zero to 50 tons of pull is roughly the same as sister tugs, but there is slower acceleration from half-power to full-ahead. With slower acceleration at the top end, high bollard pull spikes are less likely.

“So we get a smoother pull,” he said. “You don’t want spikes in tension when you’re over 50 tons. So, inadvertently, that’s an advantage.”

Building *Andrew S.* to Tier 4 standards, along with more powerful engines, a larger winch and ice-class drives, added about 35 percent to the total construction cost. But Slatten and his crews are pleased with the finished product.

“Provided business stays positive,” he said, “we hope to start building another tug, similar to the *Andrew S.*, later this year.”

TRACTOR TUGS IN NORTH AMERICA

Operator Tugboat	Year	Length	Builder	HP	Propulsion/Company	Engine
Amak Towing, Ketchikan, Alaska						
Brian T (ex-Escort Eagle)	1995	109 ft	Nichols Brothers	3,100	z-drive aft/Aqua	Cat
Anna T (ex-Pacific Explorer)	1998	105 ft	Marco Shipyard	4,400	z-drive aft/Aqua	Cat
AmNav Maritime Services, San Francisco (Foss Marine Holdings)						
Liberty (ex-Peter Foss)	1999	97 ft	Main Iron Works	4,000	z-drive aft/Ulstein	Cat
Revolution	2006	78 ft	Foss/Rainier	5,080	z-drive aft/Rolls-Royce	Cat
Independence	2007	78 ft	Foss/Rainier	5,080	z-drive aft/Rolls-Royce	Cat
Sandra Hugh	2008	78 ft	Foss/Rainier	5,080	z-drive aft/Rolls-Royce	Cat
Patricia Ann	2008	78 ft	Foss/Rainier	5,080	z-drive aft/Rolls-Royce	Cat
Freedom	2009	90 ft	Honolulu Marine	4,400	z-drive/Rolls-Royce	Cat
Sarah	2015	78 ft	Diversified Marine	4,750	z-drive/Rolls-Royce	Cat
AmNav Tractor (MS)	2015	80 ft	Diversified Marine	5,350	z-drive aft/Rolls-Royce	Cat
AmNav Tractor (DHK)	2017	80 ft	Diversified Marine	5,350	z-drive aft/Cat	Cat
AmNav Tractor (RP)	2017	80 ft	Diversified Marine	5,350	z-drive aft/Cat	Cat
Teresa Brusco	2017	78 ft	Diversified Marine	4,750	z-drive/Rolls-Royce	Cat
ArceLorMittal Mines Canada, Port Cartier, Quebec						
Brochu	1973	100 ft	Star Shipyard	3,600	cycloidal/Voith	Alco
Vachon	1973	100 ft	Star Shipyard	3,600	cycloidal/Voith	Alco
Atlantic Towing Ltd., Saint John, New Brunswick, Canada						
Atlantic Spruce	1997	101 ft	East Isle Shipyard	4,004	z-drive aft/Aqua	Cat
Atlantic Hemlock	1996	95 ft	East Isle Shipyard	4,004	z-drive aft/Aqua	Cat
Atlantic Willow	1998	95 ft	East Isle Shipyard	4,004	z-drive aft/Aqua	Cat
Atlantic Larch	2000	101 ft	East Isle Shipyard	4,004	z-drive aft/Aqua	Cat
Atlantic Oak	2004	101 ft	East Isle Shipyard	5,000	z-drive aft/Aqua	Cat
Atlantic Fir	2005	101 ft	East Isle Shipyard	5,000	z-drive aft/Rolls-Royce	Cat
Atlantic Cedar	2005	101 ft	East Isle Shipyard	5,000	z-drive aft/Aqua	Cat
Atlantic Beaver, Atlantic Bear	2008	101 ft	East Isle Shipyard	5,800	z-drive aft/Aqua	Cat
Spilfire III	2008	101 ft	East Isle Shipyard	5,800	z-drive aft/Aqua	Cat
Atlantic Legacy, Guapo Warrior	2014	94 ft	Damen Shipyard	5,000	z-drive aft	Cat
Kairi, Manatee	2014	94 ft	Damen Shipyard	5,000	z-drive aft	Cat
Baydelta Maritime, San Francisco						
Delta Billie	2009	100 ft	Nichols Brothers	6,850	z-drive aft/Rolls-Royce	Cat
Delta Cathryn	2009	100 ft	Nichols Brothers	6,850	z-drive aft/Rolls-Royce	Cat
Delta Teresa	2019	100 ft	Nichols Brothers	5,300	z-drive aft/Rolls-Royce	Cat
Bay-Houston Towing, Houston						
William M	1989	102 ft	North American Shipbuilding	4,000	z-draft fwd/Ulstein	EMD
Matthew K	2000	100 ft	Main Iron Works	4,300	z-drive aft/Ulstein	EMD
Wesley A	2007	98 ft	Main Iron Works	6,300	z-drive aft/Schottel	Cat
Rosemary	2008	96 ft	Eastern Shipbuilding	6,000	z-drive aft/Schottel	EMD
Lexie M, Hunter M	2008/9	98 ft	Orange Shipbuilding	6,300	z-drive aft/Schottel	Cat
Chloe K	2013	80 ft	Leevac	5,150	z-drive aft/Schottel	Cat
Zyana K	2016	80 ft	Eastern Shipbuilding	5,150	z-drive aft/Schottel	Cat
David B	2016	80 ft	Eastern Shipbuilding	5,150	z-drive aft/Schottel	Cat
Laura B	2016	80 ft	Eastern Shipbuilding	5,150	z-drive aft/Schottel	Cat
H. Douglas M	2016	80 ft	Eastern Shipbuilding	5,150	z-drive aft/Schottel	Cat
Mark E. Kuebler	2018	98.5 ft	Gulf Island Shipyard	6,772	z-drive aft/Schottel	Cat
Conolly M	2019	98.5 ft	Gulf Island Shipyard	6,772	z-drive aft/Schottel	Cat
Bisso Towboat, New Orleans						
Cecilia B. Slatten	1999	100 ft	Main Iron Works	4,300	z-drive aft/Aqua	EMD
Alma S	2006	100 ft	Main Iron Works	4,300	z-drive aft/Rolls-Royce	EMD
Michael S	2009	100 ft	Main Iron Works	4,000	z-drive aft/Rolls-Royce	Cat
William S	2012	100 ft	Main Iron Works	4,000	z-drive aft/Rolls-Royce	Cat
Becky S	2015	100 ft	Main Iron Works	4,480	z-drive aft/Rolls-Royce	Cat
Mr. Ruben	2016	100 ft	Main Iron Works	4,480	z-drive/Rolls-Royce	Cat
Liz Healy	2017	100 ft	Main Iron Works	4,480	z-drive/Rolls-Royce	Cat
*Andrew S.	2019	100 ft	Main Iron Works	6,008	z-drive/Kongsberg-RR	Cat
Boston Towing & Transportation, Boston (Unit of Reinauer Transportation)						
Freedom, Liberty	2003	87 ft	Washburn & Doughty	4,400	z-drive aft/Rolls-Royce	Cat
Independence	2009	128 ft	Derektor Shipyard	5,400	z-drive aft, CP props	MTU
Justice	2009	98 ft	Martinac Shipbuilding	5,400	z-drive aft, CP props	MTU
Brusco Tug & Barge, Longview, Wash.						
Wynema Spirit	2001	78 ft	Diversified Marine	3,600	z-drive aft/Ulstein	MTU
Lulapin	2005	78 ft	Diversified Marine	4,000	z-drive aft/Rolls-Royce	Cat
Simone Brusco	2013	78 ft	Diversified Marine	4,400	z-drive/Rolls-Royce	Cat
Peter J Brix	2014	78 ft	Diversified Marine	4,400	z-drive/Rolls-Royce	Cat
Bo Brusco	2014	78 ft	Diversified Marine	4,750	z-drive/Rolls-Royce	Cat
Canadian Navy (Glen series of Voith-Schneider tugs)						
Glendale, Glendyne	1975	92.5 ft	Yarrow Shipyard	1,800	Cycloidal/Voith-Schneider	Ruston
Glenbrook, Glenevis	1976	92.5 ft	Georgetown Shipyard	1,800	Cycloidal/Voith-Schneider	Ruston
Glenside	1977	92.5 ft	Georgetown Shipyard	1,800	Cycloidal/Voith-Schneider	Ruston
Cook Inlet Tug & Barge, Anchorage, Alaska (unit of Foss Maritime)						
Stellar Wind	1993	85 ft	Tri-Star Marine	3,500	z-drive aft/Ulstein	Cat
Glacier Wind	1997	65 ft	Tri-Star Marine	2,450	z-drive aft/Ulstein	Cummins
Bering Wind (ex-Campbell Foss)	2005/11	78 ft	Foss/Rainier	5,080	z-drive aft/Rolls-Royce	Cat
Crescent Towing, New Orleans (Unit of Cooper T. Smith)						
Point Clear	1999	104 ft	Thoma-Sea	5,200	z-drive aft/Ulstein	GE
Savannah	2002	96 ft	Bollinger Shipyards	4,000	z-drive aft/Ulstein	Cat
Bulldog	2005	98 ft	Washburn & Doughty	6,700	z-drive aft/Rolls-Royce	GE
Lisa Cooper	2010	92 ft	C&G Boat Works	5,225	z-drive aft/Rolls-Royce	GE
J.K. McLean	2011	92 ft	C&G Boat Works	5,225	z-drive aft/Rolls-Royce	GE
David J. Cooper	2012	92 ft	C&G Boat Works	5,225	z-drive aft/Rolls-Royce	GE
Mardi Gras	2016	92 ft	Steiner Shipyard	5,500	z-drive aft/Rolls-Royce	GE
Arkansas, South Carolina	2017	92 ft	Steiner Shipyard	5,500	z-drive aft/Rolls-Royce	GE
Crowley Marine Services, Seattle						
Tioga	1994	85 ft	Tri-Star Marine	4,500	z-drive aft/Ulstein	Cat
Protector, Guard	1996/7	120 ft	Nichols Brothers	5,500	cycloidal/Voith	Cat
Master, Admiral, Guide	1998	105 ft	Nichols Brothers	4,800	cycloidal/Voith	Cat
Leader, Scout, Chief	1999	105 ft	Nichols Brothers	4,800	cycloidal/Voith	Cat
Nanuq, Tan'erliq	1999	153 ft	Dakota Creek	10,192	cycloidal/Voith	Cat
Alert, Aware, Attentive	1999	140 ft	Dakota Creek	10,192	z-drive aft/Ulstein	Cat
Response	2003	129 ft	Marco Shipyard	7,260	cycloidal/Voith	Cat
Valor, Vigilant, Veteran	2007/8	100 ft	Nichols Brothers	6,800	z-drive aft/Rolls-Royce	Cat

Editor's note: This chart has been updated to include our 2020 Top Tugs, marked with an asterisk. The remainder of the table was accurate as of June 1, 2019. Efforts to revise the chart starting in early 2020 were hindered by the COVID-19 pandemic.

TRACTOR TUGS IN NORTH AMERICA

Operator Tugboat	Year	Length	Builder	HP	Propulsion/Company	Engine
Hawaii	2013	120 ft	JT Marine Inc.	5,358	z-drive/Schottel	GE
*Hercules	2020	82 ft	Diversified Marine	6,008	z-drive/Cat	Cat
Dunlap Towing, Everett, Wash.						
James Dunlap	1995	101 ft	Hansen Boat	4,300	z-drive aft/Ulstein	EMD
Gretchen Dunlap	2015	101 ft	Hansen Boat	6,800	z-drive/Rolls-Royce	Cat
E.N. Bisso & Son, New Orleans						
Josephine Anne	2007	96 ft	Eastern Shipbuilding	4,000	z-drive aft/Rolls-Royce	Cat
Beverly B	2010	96 ft	Eastern Shipbuilding	4,000	z-drive aft/Rolls-Royce	Cat
Elizabeth B	2010	96 ft	Eastern Shipbuilding	4,000	z-drive aft/Rolls-Royce	Cat
Aura	2013	87 ft	Great Lakes Shipbuilding	4,600	z-drive/Rolls-Royce	Cat
Archie T. Higgins	2015	96 ft	Eastern Shipbuilding	4,000	z-drive/Rolls-Royce	Cat
Gladys B	2016	80 ft	Eastern Shipbuilding & Repair	5,300	z-drive/Rolls-Royce	MTU
*C.D. White	2020	80 ft	Signet Shipbuilding	5,100	z-drive/Kongsberg-RR	Cat
Edison Chouest Offshore, Galliano, La.						
LOOP Responder	1992	155 ft	North American Shipbuilding	7,300	cycloidal/Voith	Cat
C-Tractor 2 - 5	1989-93	102 ft	North American Shipbuilding	4,200	z-drive aft/Ulstein	EMD
C-Tractor 6	1994	82.8 ft	North American Shipbuilding	4,800	z-drive aft/Ulstein	Cat
C-Tractor 7 - 10	1994	90 ft	North American Shipbuilding	2,400	z-drive aft/Ulstein	Cat
C-Tractor 11	1994	82.8 ft	North American Shipbuilding	4,800	z-drive aft/Ulstein	Cat
C-Tractor 12 - 14	1996/9	105 ft	North American Shipbuilding	4,000	z-drive fwd/Ulstein	Cat
C-Tractor 19-22	2009	110 ft	Gulf Ship	5,500	z-drive fwd	Cat
Erlington, Latouche	2018	102.5 ft	North American Shipbuilding	6,008	z-drive/Rolls-Royce	Cat
Bainbridge, Ingot	2018	102.5 ft	North American Shipbuilding	6,008	z-drive/Rolls-Royce	Cat
Commander, Courageous, Champion	2018	140 ft	North American Shipbuilding	12,336	z-drive/Rolls-Royce	Cat
Foss Maritime, Seattle (Foss Marine Holdings)						
Brynn Foss	1982/07	100 ft	Tacoma Boatbuilding	4,700	z-drive/Voith	EMD
Andrew Foss	1982	106.7 ft	Tacoma Boatbuilding	4,000	cycloidal/Voith	EMD
Arthur Foss	1982	107 ft	Tacoma Boatbuilding	4,000	cycloidal/Voith	EMD
P.J. Brix	1982	87 ft	Marine Industries	2,560	z-drive aft/Niigata	Cat
Henry Foss, Wedell Foss	1982/05	100 ft	Tacoma Boatbuilding	5,000	z-drive/Voith	EMD
Lindsey Foss	1993	155 ft	Trinity Marine	8,000	cycloidal/Voith	EMD
Garth Foss	1994	155 ft	Trinity Marine	8,000	cycloidal/Voith	EMD
Daniel Foss	1998	95.2 ft	Conversion	3,300	z-drive aft/Ulstein	Cat
Marshall Foss, Lynn Marie	2001	98 ft	Halter Marine	6,250	z-drive aft/Ulstein	MTU
Pacific Star	2008	98 ft	J.M. Martinac	6,610	z-drive aft/Niigata	MTU
Alta June	2008	78 ft	Foss/Rainier	5,080	z-drive aft/Rolls-Royce	Cat
Carolyn Dorothy (hybrid)	2008	78 ft	Foss/Rainier	5,000	z-drive aft/Rolls-Royce	Cummins
Freedom	2009	86 ft	Honolulu Marine Company	4,400	z-drive/Thrustmaster	Cat
Kalama	2009	86 ft	Kewalo Shipyard	4,400	z-drive aft/HRP	Cat
Delta Lindsey	2010	100 ft	Nichols Brothers	6,850	z-drive aft/Rolls-Royce	Cat
Caden Foss	2017	110 ft	JT Marine Inc.	6,772	z-drive/Rolls-Royce	Cat
*Jamie Ann	2020	100 ft	Nichols Brothers	6,866	z-drive/Kongsberg-RR	MTU
Foss Maritime, Hawaii Region (Foss Marine Holdings)						
Eleu	1989	73 ft	J.M. Martinac	2,800	z-drive aft/Niigata	Cat
Mamo	1996	78 ft	Trinity Marine	3,300	z-drive aft/Ulstein	Cat
Mikiala II	1977/01	100 ft	Main Iron Works/Foss	3,300	z-drive aft/Ulstein	Cat
Mikioi	2004	78 ft	Foss Rainier shipyard	4,700	z-drive aft/Rolls-Royce	Cat
Pi'ilani	2005	78 ft	Foss Rainier shipyard	5,080	z-drive aft/Rolls-Royce	Cat
Moana	2007	100.2 ft	Foss Rainier shipyard	3,000	z-drive aft/Voith	Cat
Fournier Tugs Inc., Belfast, Maine						
Fournier Tractor	1984	85 ft	Main Iron Works	3,500	z-drive aft/Ulstein	EMD
Harbor Docking and Towing, Lake Charles, La.						
Ted, George	2008/9	105 ft	Main Iron Works	6,140	z-drive aft/Rolls-Royce	EMD
Carl	2012	96 ft	Main Iron Works	6,300	z-drive/Rolls-Royce	Cat
Pat	2013	96 ft	Main Iron Works	6,300	z-drive/Rolls-Royce	Cat
Sam (ex-Goliath)	1997/2017	105 ft	Marco Shipyard	5,150	z-drive/Rolls-Royce	Cat
Ralph	2019	93 ft	Washburn & Doughty	6,770	z-drive/Cat hybrid	Cat
Capt. Robb	2019	93 ft	Washburn & Doughty	6,770	z-drive/Cat hybrid	Cat
Centerline Logistics, Seattle						
Gyrfalcon	1995	100.5 ft	Marco Shipyard	4,264	z-drive aft/Ulstein	Cat
Z-3, Z-4, Z-5	1999	94 ft	Marco Shipyard	4,000	z-drive aft/Ulstein	Cat
Millennium Falcon	2000	105 ft	Marco Shipyard	4,400	z-drive aft/Ulstein	Cat
Millennium Star	2000	105 ft	Marco Shipyard	4,400	z-drive aft/Ulstein	Cat
Millennium Dawn	2002	105 ft	Marco Shipyard	4,400	z-drive aft/Ulstein	Cat
Millennium Maverick	1996	100 ft	Marco Shipyard	4,300	z-drive aft/Aqua	EMD
Tim Quigg	2004	76.3 ft	Diversified Marine	4,500	z-drive aft/Rolls-Royce	Cat
John Quigg	2004	78.8 ft	Diversified Marine	4,800	z-drive aft/Rolls-Royce	Cat
Bob Franco	2013	111.5 ft	Diversified Marine	5,360	z-drive aft/Schottel	Cat
Robert Franco	2013	93 ft	Nichols Brothers	6,850	z-drive aft/Rolls-Royce	Cat
Ahbra Franco	2013	103.9 ft	Nichols Brothers	6,890	z-drive aft/Rolls-Royce	Cat
Marine Towing of Tampa, Tampa, Fla.						
Endeavor	2000	80 ft	Halter Marine	4,200	z-drive inline/Ulstein	Wärtsilä
Freedom	2005	92 ft	Washburn & Doughty	5,000	z-drive aft/Rolls-Royce	Cat
Liberty	2007	92 ft	Washburn & Doughty	5,000	z-drive aft/Rolls-Royce	Cat
Patriot	2013	93 ft	Washburn & Doughty	5,000	z-drive aft/Rolls-Royce	Cat
Independent	2017	93 ft	Washburn & Doughty	5,000	z-drive aft/Rolls-Royce	Cat
McAllister Towing & Transportation Co., Inc.						
Steven McAllister	1963/07	109 ft	Southern Shipbuilding	4,000	z-drive aft/Schottel	Cat
Ellen McAllister	1966/07	109 ft	Marinette Marine	4,000	z-drive aft/Schottel	Cat
Dorothy McAllister	1971/06	109 ft	Marinette Marine	4,000	z-drive aft/Schottel	Cat
Stacy McAllister	1970/05	95.5 ft	Peterson Builders	4,000	z-drive aft/Schottel	Cat
Robert E. McAllister	1970/05	109 ft	Peterson Builders	4,000	z-drive aft/Schottel	Cat
Donal G. McAllister	1970/02	109 ft	Marinette Marine	3,000	z-drive aft/Schottel	EMD
Kaleen M. McAllister	1970/02	109 ft	Southern Shipbuilding	3,300	z-drive aft/Schottel	EMD
Timothy McAllister	1970/06	109 ft	Marinette Marine	4,000	z-drive aft/Schottel	Cat
Margaret McAllister	1970/06	109 ft	Marinette Marine	4,000	z-drive aft/Schottel	Cat
Patrick M. McAllister	1974/02	102 ft	Marinette Marine	5,150	z-drive aft/Ulstein	EMD
Beth M. McAllister	1974/03	109 ft	Peterson Builders	3,000	z-drive aft/Schottel	Cat
Matthew McAllister (ex-Orion)	1982	95 ft	Mid-Coast Marine	3,000	cycloidal/Voith	EMD
Alex McAllister	1985	95 ft	Eastern Shipbuilding	4,000	z-drive aft/Ulstein	EMD
Brooklyn McAllister	1986	115 ft	Offshore Shipbuilding	4,000	z-drive aft/Schottel	EMD
Erin McAllister	1996/01	95.5 ft	Trinity Marine	5,100	z-drive aft/Ulstein	Cat
Beverly R. McAllister	1999	99 ft	Marco Shipyard	4,400	z-drive aft/Ulstein	Cat
Vicki M. McAllister	2001	96 ft	Eastern Shipbuilding	4,650	z-drive aft/Schottel	EMD
Janet M. McAllister	2001	96 ft	Eastern Shipbuilding	4,650	z-drive aft/Schottel	EMD
Emily Anne McAllister	2003	98 ft	Eastern Shipbuilding	4,650	z-drive aft/Schottel	EMD
A.J. McAllister	2003	98 ft	Eastern Shipbuilding	5,150	z-drive aft/Schottel	EMD
Moira McAllister (ex-Independent)	2003	92 ft	Washburn & Doughty	5,000	z-drive aft/Rolls-Royce	Cat

TRACTOR TUGS IN NORTH AMERICA

Operator Tugboat	Year	Length	Builder	HP	Propulsion/Company	Engine
Rainbow	2004	92 ft	Washburn & Doughty	5,000	z-drive/ Rolls-Royce	Cat
Andrew McAllister	2008	98 ft	Eastern Shipbuilding	6,000	z-drive aft/Schottel	EMD
Gregg McAllister	2008	82 ft	Eastern Shipbuilding	4,000	z-drive aft/ Schottel	Cat
Reid McAllister	2008	82 ft	Eastern Shipbuilding	4,000	z-drive aft/ Schottel	Cat
Bridget McAllister (ex-Leo)	2006	78 ft	Foss Shipyard	5,080	z-drive aft/Rolls-Royce	Cat
Buckley McAllister	2014	96 ft	Senesco Marine	5,150	z-drive/Schottel	Cat
Eric McAllister	2014	96 ft	Senesco Marine	5,150	z-drive/Schottel	Cat
Tate McAllister	2014	93 ft	Washburn & Doughty	6,000	z-drive/Schottel	EMD
Jeffrey McAllister	2017	96 ft	Eastern Shipbuilding	5,000	z-drive aft/Schottel	EMD
Capt. Brian A. McAllister	2017	100 ft	Horizon Shipbuilding	6,772	z-drive aft/Schottel	Cat
Rosemary McAllister	2018	100 ft	Eastern Shipbuilding	6,772	z-drive aft/Schottel	Cat
Ava M. McAllister	2019	100 ft	Eastern Shipbuilding	6,772	z-drive aft/Schottel	Cat
*Capt. Jim McAllister	2019	100 ft	Eastern Shipbuilding	6,772	z-drive aft/Schottel	Cat
*Eileen McAllister	2020	93 ft	Washburn & Doughty	6,772	z-drive aft/Schottel	Cat
Moran Towing, New Canaan, Conn.						
Patricia Moran	1962/99	80 ft	Jakobson Shipyard	4,200	z-drive aft/Rolls-Royce	EMD
Sewells Point	1977/95	100 ft	Jakobson Shipyard	3,005	z-drive fwd/Mortrac	DD/EMD
Harriett Moran	1978/96	100.5 ft	Jakobson Shipyard	3,005	z-drive fwd/Mortrac	DD/EMD
Town Point	1978/98	100 ft	Jakobson Shipyard	3,005	z-drive fwd/Mortrac	DD/EMD
Drum Point	1986/97	100 ft	Jakobson Shipyard	3,005	z-drive fwd/Mortrac	DD/EMD
Z-One	1996	87.7 ft	Halter Marine	4,000	z-drive aft/Ulstein	BTA
Fort Bragg	1998	92 ft	Washburn & Doughty	4,400	z-drive aft/Ulstein	Cat
Elizabeth Turecamo	1998	110 ft	Eastern Shipbuilding	6,140	z-drive aft/Aqua	EMD
Marci Moran	1999	92 ft	Washburn & Doughty	4,200	z-drive aft/Rolls-Royce	EMD
Karen Moran	1999	92 ft	Washburn & Doughty	4,200	z-drive aft/Rolls-Royce	EMD
Kerry Moran	1999	100 ft	Jakobson Shipyard	4,200	z-drive aft/Ulstein	EMD
Susan Moran	1999	92 ft	Washburn & Doughty	4,200	z-drive aft/Rolls-Royce	EMD
Tracy Moran	2000	92 ft	Washburn & Doughty	4,200	z-drive aft/Rolls-Royce	EMD
Surrie Moran	2000	92 ft	Washburn & Doughty	4,200	z-drive aft/Ulstein	EMD
Wendy Moran	2000	92 ft	Washburn & Doughty	4,200	z-drive aft/Rolls-Royce	EMD
Diane Moran	2001	92 ft	Washburn & Doughty	5,100	z-drive aft/Ulstein	EMD
Gramma Lee T. Moran	2002	92 ft	Washburn & Doughty	5,100	z-drive aft/Ulstein	EMD
Kaye E. Moran	2003	92 ft	Washburn & Doughty	5,100	z-drive aft/Ulstein	EMD
James R. Moran	2004	92 ft	Washburn & Doughty	5,100	z-drive aft/Ulstein	EMD
Lynne Moran	2005	92 ft	Washburn & Doughty	5,100	z-drive aft/Ulstein	EMD
Edward J. Moran	2006	98 ft	Washburn & Doughty	6,500	z-drive aft/Rolls-Royce	EMD
April Moran	2006	92 ft	Washburn & Doughty	5,100	z-drive aft/Schottel	EMD
Eleanor F. Moran	2007	92 ft	Washburn & Doughty	5,100	z-drive aft/Schottel	EMD
Laura K. Moran	2008	92 ft	Washburn & Doughty	5,100	z-drive aft/Schottel	MTU
Capt. Jimmy T. Moran	2008	86 ft	C&G Boat Works	5,100	z-drive aft/Schottel	MTU
Shiney V. Moran	2009	86 ft	C&G Boat Works	5,100	z-drive aft/Schottel	MTU
Catherine C. Moran	2009	98 ft	Washburn & Doughty	6,000	z-drive aft/Rolls-Royce	EMD
Loretta B. Moran	2010	98 ft	Washburn & Doughty	6,000	z-drive aft/Rolls-Royce	EMD
Lizzy B. Moran	2010	92 ft	Washburn & Doughty	5,100	z-drive aft/Schottel	MTU
James A. Moran	2011	93 ft	Washburn & Doughty	6,000	z-drive aft/Schottel	MTU
Mark Moran	2012	86 ft	Washburn & Doughty	5,100	z-drive aft/Schottel	MTU
Katie T. Moran	2012	86 ft	Washburn & Doughty	5,100	z-drive aft/Schottel	MTU
Annabelle Dorothy Moran	2012	86 ft	Washburn & Doughty	5,100	z-drive aft/Schottel	MTU
Hayley Moran	2014	93 ft	Washburn & Doughty	6,000	z-drive/Schottel	EMD
George T. Moran	2014	93 ft	Washburn & Doughty	6,000	z-drive/Schottel	EMD
Payton Grace Moran	2015	93 ft	Washburn & Doughty	6,000	z-drive/Schottel	EMD
Kirby Moran	2015	93 ft	Washburn & Doughty	6,000	z-drive/Schottel	EMD
JRT Moran	2015	93 ft	Washburn & Doughty	6,000	z-drive/Schottel	EMD
James D. Moran	2015	93 ft	Washburn & Doughty	6,000	z-drive/Schottel	EMD
Cooper Moran	2016	93 ft	Washburn & Doughty	6,000	z-drive/Schottel	EMD
Jonathan C. Moran	2016	93 ft	Washburn & Doughty	6,000	z-drive/Schottel	EMD
Maxwell Paul Moran	2016	93 ft	Washburn & Doughty	6,000	z-drive/Schottel	EMD
Jack T. Moran	2016	93 ft	Washburn & Doughty	6,000	z-drive/Schottel	EMD
Clayton W. Moran	2016	93 ft	Washburn & Doughty	6,000	z-drive/Schottel	EMD
Benson George Moran	2017	93 ft	Washburn & Doughty	6,772	z-drive/Rolls-Royce	Cat
Judy Moran	2018	93 ft	Washburn & Doughty	6,772	z-drive/Schottel	Cat
Ocean Group, Quebec City, Canada						
Escorte	1967	84.5 ft	Jakobson Shipyard	1,300	z-drive aft/Voith Schneider	GM
Ocean A. Simard	1980	92 ft	Georgetown Shipyards	3,340	z-drive aft/Voith Schneider	Alco
Ocean Intrepide	1997	82 ft	Ocean Industries	4,000	double z-drive/Niigata	Mitsub.
Ocean Jupiter	1998	82 ft	Ocean Industries	4,000	z-drive aft/Niigata	Mitsub.
Ocean Stevns	2003	108 ft	Ocean Industries	5,000	double z-drive/Rolls/CP	MaK
Ocean Arctique	2005	101 ft	Ocean Industries	5,000	double z-drive/Rolls/CP	MaK
Ocean K. Rusby	2005	98 ft	East Isle Shipyard	5,000	double z-drive/Rolls/CP	Cat
Ocean Raymond Lemay	2006	98 ft	East Isle Shipyard	5,000	double z-drive/Rolls/CP	Cat
Ocean Henry Bain	2006	98 ft	East Isle Shipyard	5,000	double z-drive/Rolls/CP	Cat
Ocean Cartier	2007	90 ft	Shanghai Shipyards	5,220	z-drive aft/Voith Schneider	Yanmar
Ocean Bertrand Jeansonne	2008	98 ft	East Isle Shipyard	5,000	double z-drive/Rolls/CP	Cat
Ocean Georgie Bain	2009	82 ft	Ocean Industries	4,000	double z-drive/Niigata	Cat
Ocean Raynald T.	2009	98 ft	East Isle Shipyard	5,000	double z-drive/Rolls/CP	Cat
Ocean Clovis T.	2009	98 ft	East Isle Shipyard	5,000	double z-drive/Rolls/CP	Cat
Ocean Serge Genois	2010	82 ft	Ocean Industries	4,000	double z-drive/Niigata	Cat
Ocean Yvan Desgagnes	2010	98 ft	East Isle Shipyard	5,000	double z-drive/Rolls/CP	Cat
Ocean Ross Gaudreault	2011	98 ft	East Isle Shipyard	5,000	double z-drive/Rolls/CP	Cat
Ocean Pierre Julien	2013	82 ft	Ocean Industries	4,000	double z-drive/Niigata	Cat
Ocean Tundra	2013	118 ft	Ocean Industries	8,160	double z-drive/Rolls/CP	MaK
Ocean Kingston Pride	2015	80 ft	Sanmar Denizcilik Makine	6,303	double z-drive/Rolls/CP	Cat
Ocean Taiga	2016	118 ft	Ocean Industries	8,160	double z-drive/Rolls/CP	MaK
Otto Candies, Des Allemands, La.						
Devin Candies	2000	150 ft	Bender Shipbuilding	9,300	z-drive aft/Rolls-Royce	EMD
Polaris Materials, Vancouver						
Numas Warrior	2008	58 ft	Sylte Shipyard	2,100	z-drive aft/HRP	MTU
Saam Smit Towage, Vancouver, B.C.						
Smit Hunter	1989	50 ft	John Manly Shipyard	1,300	z-drive aft/Aqua	DD
Smit Spirit	1996	52 ft	Pacific Shipyard	3,000	z-drive aft/Aqua	MTU/DD
Smit Pride	1997	52 ft	Pacific Shipyard	3,000	z-drive aft/Aqua	MTU/DD
Smit Mississippi	1998	102 ft	Damen Shipyard	4,900	z-drive	Wärtsilä 6L26
SST Tiger Sun	1999	72 ft	Sylte Shipyard	5,000	z-drive/Ulstein	MTU/DD
Smit Humber	2000	100 ft	Damen Shipyard	4,900	z-drive	Wärtsilä 6L26
Smit Clyde	2000	100 ft	Damen Shipyards	4,900	z-drive aft/Schottel	Wärtsilä 6L26
SST Orleans (ex-TP 3)	2009	100 ft	Nichols Brothers	6,850	z-drive aft/Niigata	Cat
Smit Venta	2009	94 ft	Damen Shipyard	4,900	z-drive aft/Rolls-Royce	Cat
Smit Saba	2009	94 ft	Damen Shipyard	4,900	z-drive aft/Rolls-Royce	Cat
SST Salish, SST Capilano	2016	71 ft	ABD Boats	5,364	z-drive/Rolls-Royce	MTU
Samson Tug Boats Inc., Delta, British Columbia (Canada)						
Shuswap	2011	58 ft	Sylte Shipyard	3,200	z-drive aft	MTU

TRACTOR TUGS IN NORTH AMERICA

Operator Tugboat	Year	Length	Builder	HP	Propulsion/Company	Engine
Kootenay	2012	64.3 ft	ABD Boats	5,000	z-drive aft	MTU
Sause Brothers, Coos Bay, Ore. (Hawaii)						
Tira Lani	1999	79 ft	Sause Brothers	4,000	z-drive aft/Ulstein	Cat
Seabulk Towing, Port Everglades, Fla.						
Eagle	1988	92 ft	Tampa Shipyards	3,200	z-drive fwd/Niigata	B&W
Florida	1990	80 ft	Main Iron Works	3,000	z-drive/Rolls-Royce	EMD
Broward	1995	100 ft	Atlantic Marine	5,100	z-drive fwd/Aqua	EMD
Hawk	1995	110 ft	Trinity/Halter	6,700	z-drive aft/Aqua	Wärtsilä
Condor	1996	110 ft	Halter Marine	6,700	z-drive aft/Aqua	Wärtsilä
SDM Escambia, SDM New River, SDM St. Johns	1997/98	90 ft	Halter Marine	4,000	z-drive inline/Ulstein	Cat
SDM Suwannee River	2000	90 ft	Halter Marine	4,200	z-drive inline/Ulstein	Wärtsilä
Gasparilla	2007	96 ft	Eastern Shipbuilding	5,000	z-drive aft/Schottel	Cat
Energy Hercules	2007	96 ft	Eastern Shipbuilding	5,000	z-drive aft/Schottel	Cat
Energy Zeus	2007	96 ft	Eastern Shipbuilding	5,000	z-drive aft/Schottel	Cat
Buccaneer	2007	96 ft	Eastern Shipbuilding	5,000	z-drive aft/Schottel	Cat
Sabine	2007	96 ft	Eastern Shipbuilding	5,000	z-drive aft/Schottel	Cat
Apollo, Athena	2013	93 ft	Washburn & Doughty	5,300	z-drive/Schottel	Cat
Atlas	2013	92 ft	Great Lakes Shipyard	4,640	z-drive/Rolls-Royce	Cat
Trident	2017	98.5 ft	Master Boat Builders	5,733	triple z-drive/Schottel	Cat
Trinity	2018	98.5 ft	Master Boat Builders	5,733	triple z-drive/Schottel	Cat
Triton	2018	98.5 ft	Master Boat Builders	4,947	triple z-drive/Veth	Cat
Seaspan Marine, North Vancouver (Division of Washington Marine Group)						
Charles H. Cates I	1983	78 ft	Allied Shipbuilders	2,400	Niigata Z-Peller	DD
Charles H. Cates III	1986	78 ft	John Manly Shipyard	2,400	Niigata Z-Peller	DD
Charles H. Cates X	1990	60 ft	Allied Shipbuilders	1,300	Niigata Z-Peller	Cat
Seaspan Hawk, Falcon	1993	80 ft	Vancouver Shipyards	3,100	z-drive aft/Niigata	DD
Seaspan Resolution	2009	98 ft	Martinac Shipbuilding	6,000	z-drive aft/Niigata	EMD
Seaspan Raven, Eagle	2010	92 ft	Sanmar Denizcilik	5,000	z-drive aft/Rolls/CP	Cat
Seaspan Kestrel, Osprey	2011	92 ft	Sanmar Denizcilik	6,300	z-drive aft/Rolls/CP	Cat
Shaver Transportation, Portland, Ore.						
Portland	1981	107 ft	Nichols Brothers	4,000	z-drive aft	MTU
Washington (ex-Falcon)	1990	92 ft	Tampa Shipyards	3,200	z-drive fwd/Niigata	B&W
Vancouver	1993	76 ft	J.M. Martinac	3,600	z-drive aft/Niigata	MTU
Deschutes	1997	91 ft	J.M. Martinac	3,600	z-drive aft/Aqua	MTU DD
Willamette	1999	91 ft	J.M. Martinac	3,600	z-drive aft/Aqua	MTU DD
Sommer S	2012	77 ft	Diversified Marine	5,360	z-drive aft/Schottel	MTU
Samantha S	2019	112 ft	Diversified Marine	8,432	z-drive/Rolls-Royce	GE
Signet Maritime, Houston						
Signet Valiant	1994	81.5 ft	Signet Shipbuilding & Repair	3,000	z-drive aft/Ulstein	EMD
Signet Enterprise	1999	105 ft	Marco Shipbuilding	4,400	z-drive aft/Ulstein	Cat
Signet Intrepid	1999	105 ft	Marco Shipbuilding	4,400	z-drive aft/Ulstein	Cat
Signet Volunteer	2001	70 ft	Horizon Shipyard	1,200	z-drive aft/Rolls-Royce	Cummins
Signet Victory	2001	81.5 ft	Signet Shipbuilding & Repair	3,000	z-drive aft/Aqua	EMD
Signet Challenger	2003	104 ft	Thoma-Sea	4,200	z-drive aft/Rolls-Royce	Cummins
Signet Reliance	2007	98 ft	Signet Shipbuilding & Repair	5,000	z-drive aft/Rolls-Royce	Cat
Pacific Star	2008	98 ft	J.M. Martinac	6,610	z-drive aft/Niigata	MTU
Signet America	2008	98 ft	J.M. Martinac	6,610	z-drive aft/Niigata	MTU
Signet Weatherly	2012	105 ft	Signet Shipbuilding & Repair	4,720	z-drive aft/Niigata	MTU
Signet Constellation	2012	100 ft	Trinity Offshore	6,834	z-drive aft/Rolls-Royce	Cat
Signet Stars & Stripes	2012	100 ft	Trinity Offshore	6,834	z-drive aft/Rolls-Royce	Cat
Signet Magic	2013	80 ft	Signet Shipbuilding & Repair	5,150	z-drive aft/Rolls-Royce	Cat
Signet Arcturus, Signet Polaris	2014	105 ft	Pati Marine	6,834	z-drive aft/Rolls-Royce	Cat
Signet Vigilant	2014	72 ft	Signet Shipbuilding & Repair	2,460	z-drive aft/Rolls-Royce	MTU
Standard Towing Ltd., Port McNeill, B.C.						
Point Valiant	1998	80 ft	Ocean Industries	3,300	z-drive/Niigata	Mitsub.
Numas Warrior	2008	58 ft	Sylte Shipyard	2,320	z-drive aft/HRP	MTU
Renegade	2012	63 ft	ABD Shipyard	1,650	z-drive aft/ZF	Cummins
Suderman & Young Towing Co., Houston						
Jess Newton	2001	100 ft	Main Iron Works	4,300	z-drive aft/Ulstein	EMD
Denia	2004	96 ft	Eastern Shipbuilding	5,150	z-drive aft/Schottel	EMD
Thor	2007	98 ft	Main Iron Works	6,300	z-drive aft/Schottel	Cat
Evelena, Lamar	2008/9	98 ft	Orange Shipbuilding	6,300	z-drive aft/Schottel	Cat
Zeus	2013	80 ft	Leevac	5,150	z-drive aft/Schottel	Cat
Triton	2015	80 ft	Eastern Shipbuilding	5,150	z-drive aft/Schottel	Cat
Neptune, Oceanus, Poseidon	2016	80 ft	Eastern Shipbuilding	5,150	z-drive aft/Schottel	Cat
Ted C. Litton	2019	98.5 ft	Gulf Island Shipyard	6,772	z-drive aft/Schottel	Cat
Apollo	2019	98.5 ft	Gulf Island Shipyard	6,772	z-drive aft/Schottel	Cat
*Mazu	2019	98.5 ft	Gulf Island Shipyard	6,772	z-drive aft/Schottel	Cat
Svitzer Canada Ltd., Halifax, Nova Scotia						
Point Chebucto	1992	110 ft	Halifax-Dartmouth	4,000	z-drive aft/Aqua	Cat
Svitzer Bedford	2005	105 ft	Asenav, Chile	5,000	z-drive aft/Schottel	Cat
Svitzer Montreal	2004	100 ft	Irving East Isle Shipyard	5,000	z-drive aft	Cat
U.S. Navy, Seattle, Wash.						
YT 802	2006	90 ft	Converted YTBs	3,600	z-drive aft/Schottel	Cat
YT 803 - YT 806	2009/11	90 ft	J.M. Martinac	3,600	z-drive aft/Schottel	Cat
YT 807	2012	90 ft	J.M. Martinac	3,600	z-drive aft/Schottel	Cat
Western Towboat, Seattle						
Westrac	1987	72 ft	Western Towboat	2,500	z-drive aft/Ulstein	Cat
West Point	1992	60 ft	Western Towboat	1,200	z-drive aft/Ulstein	Cat
Westrac II	1995	79 ft	Western Towboat	2,400	z-drive aft/Ulstein	Cat
Western Titan	1997	108 ft	Western Towboat	4,500	z-drive aft/Rolls-Royce	Cat
Pacific Titan	2000	108 ft	Western Towboat	4,500	z-drive aft/Rolls-Royce	Cat
Gulf Titan	2001	120 ft	Western Towboat	4,500	z-drive aft/Rolls-Royce	Cat
Ocean Titan	2004	120 ft	Western Towboat	5,000	z-drive aft/Rolls-Royce	Cat
Alaska Titan	2008	120 ft	Western Towboat	5,000	z-drive aft/Schottel	Cat
Arctic Titan	2012	120 ft	Western Towboat	5,000	z-drive aft/Schottel	Cat
Bering Titan	2015	120 ft	Western Towboat	5,000	z-drive aft/Schottel	Cat
*Marner	2020	80 ft	Western Towboat	3,940	z-drive/Schottel	Cat
Wilmington Tug, Wilmington, Del.						
Tina	1977	65 ft	Gladding-Hearn	1,800	z-drive aft/HRP	Lugger
Sally	1987	70 ft	Gladding-Hearn	2,400	z-drive aft/HRP	MTU
Lindsey	1989	70 ft	Gladding-Hearn	2,600	z-drive aft/Rolls-Royce	Cummins
Capt. Harry	2002	80 ft	Washburn & Doughty	4,200	z-drive aft/Ulstein	MTU
Sonie	2007	80 ft	Washburn & Doughty	4,800	z-drive aft/Rolls-Royce	MTU
Madeline	2008	80 ft	Gladding-Hearn	4,800	z-drive aft/Rolls-Royce	MTU



Gemini Marine

Gemini Warrior builds on tradition of B.C. coastal tugs

Gemini Warrior, above, tows barges loaded with feed for coastal fish farms in British Columbia, among other work.

In British Columbia, most tugboats built within the last decade were designed by A.G. McIlwain Ltd. Noted for their broad beam-to-length ratio, these versatile tugs perform ship docking, ship assist, log towing and barge handling.

In October 2019, the latest iteration of a McIlwain tug left Sylte Shipyard on the Fraser River for Gemini Marine Services of Bowen Island. The tug will primarily tow barges carrying feed and other supplies for coastal salmon farms.

McIlwain designed the powerful log-towing tug *Inlet Crusader* a few years ago. Soon after, another customer ordered a tug built to the same hull dimensions with an added top house for improved visibility. This evolution of the proven design caught Gemini Marine's attention.

The company does general marine transport with a variety of barges. In an ever-changing business environment, flexibility is important.

The addition of the 60-by-26-foot McIlwain-designed *Gemini Warrior* will help the firm stay ahead of emerging coastal towing needs.

Like other boats designed to Canadian regulations that require all accommodations to be above the waterline, *Gemini Warrior* has the distinctive raised forecastle. The floor of the four individual staterooms is above the waterline and nearly the same level as the after deck. The head, shower and laundry rooms are forward in the main cabin. Aft in the main deck house, the galley is set to the port side with a mess to starboard.

Gemini Marine installed Caterpillar C32 main engines, each generating 750 hp at 1,800 rpm. These turn 72-inch propellers in Kort-type nozzles through Twin Disc MGX-5321 gears. Sylte manufactured the nozzles at its yard.

The engine room is a celebration of redundancy. In addition to the C32s, there are four 125-hp Cat engines.

The two port-side engines power 93.25-kW generators, each of which can meet the vessel's electric needs on its own. The two on the starboard side provide hydraulic power, with either one capable of meeting nearly 100 percent of the hydraulic draw of the 26-inch bow thruster and the towing winch at the same time. Pumps on the main engines provide power to the hydraulic steering. There are four rudders behind the two nozzled props, all four of which can be run by the steering pump on a single engine.

Gemini Warrior's aft deck is well equipped for towing barges. A single-drum Bracewell Marine Group towing winch is set aft of the cabin with a good reach to the stern transom. The winch drum is loaded with 2,400 feet of 1.5-inch-diameter wire rope. Towing pins manufactured by Western Machine Works of North Vancouver are mounted in the aft bulwarks.

Alan Haig-Brown

Kapena Bob Purdy

Young Brothers has completed an \$80 million upgrade to its fleet of oceangoing tugboats that haul cargo barges between the Hawaiian Islands.

Kapena Bob Purdy, delivered in mid-June 2019, is the fourth and final Kapena-class tug. The four vessels share the same 123-by-36.5-foot Damen design. Conrad Shipyard of Louisiana built the tugs. *Kapena Bob Purdy* is the lone tug in the series equipped with an oily water separator to facilitate longer-distance rescue tows.

The propulsion package consists of twin 3,017-hp GE 8L250 MDC Tier 4 engines turning four-blade 126-inch props in nozzles through Reintjes WAF 3455 reduction gears. Three Caterpillar



Conrad Shipyard

Kapena Bob Purdy, delivered last summer, is the fourth and final Kapena-class tugboat built for Young Brothers.

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Towing equipment aboard *Kapena Bob Purdy* consists of a Markey double-drum TESD-34 winch on the stern and Markey WESD-16-16-26 winch at the bow. Smith Berger Marine supplied the

comes from two 1,000-hp MTU 8V 4000 Tier 3 engines turning 71-inch Kaplan-style props in nozzles through Twin Disc MGX-5321 reduction gears. Bollard pull is 30 short tons.

The Logan Clutch diesel-electric propulsion package

engine room is equipped with an Anslu Sapphire FM-200 system.

Pennsylvania has been assigned to the Port of Toledo. The fifth tug in the series, *Wisconsin*, will be launched in June and enter service later this year.

is paired with the 50,000-bbl DS-504. Lyon Shipyard in Norfolk, Va., modified the existing decade-old barges for ATB work. Both units operate in the Northeast.

“The success of our ATB retrofit program has afforded us the ability to improve the operational performance of our existing fleet of Elizabeth Anne-class tugs and 50,000-barrel barges,” said Capt. Rick Iulucci, Vane’s vice president for operations. “The recent addition of these tug-barge combinations has been well received by our customers, crews and regulators.”

Propulsion comes from twin 2,100-hp Caterpillar 3516C engines turning 105-inch Hung Shen props through Reintjes WAF 873 reduction gears at a 7:1 ratio. Electrical power comes from twin John Deere 4045 engines driving 99-kW gensets. M&M Bumper Service supplied fendering.

Capt. Jim Demske, Vane’s port captain, said the project modifications to *Jacksonville* and *Charleston* primarily involved the elimination of the aft double-drum towing winch, tow span and deck sheaves in favor of a Beacon Finland coupler.

“The vessels are fitted with an innovative Beacon Finland JAK-400 Hydralok coupling system that allows each ATB tug to be securely paired with a modified 500-series barge,” Demske said. “The Vane crews are loving the way the tugs handle the barges.”

Vane Brothers’ fleet of 130 vessels now has seven ATBs, including three 4,400-hp Assateague-class tugs pushing 80,000-bbl barges, and two 6,000-hp Brandywine-class tugs paired with 144,000-bbl barges.



Charleston is the eighth Elizabeth Anne-class tugboat delivered by St. Johns Ship Building, and the second converted into an ATB pusher tug.

Clayton Bagnato

towing pins and shark jaws, while Schuyler Companies provided the fenders.

Pennsylvania

Great Lakes Shipyard in Cleveland put the finishing touches this spring on *Pennsylvania*, the fourth in a series of Subchapter M-compliant tugboats built for The Great Lakes Towing Co.

The 64-foot 2,000-hp tugboat is a sister vessel to *Cleveland, Ohio* and *Michigan*, all delivered within the last three years from the company’s shipyard on the Cuyahoga River. Propulsion

on *Pennsylvania* relies on two 99-kW John Deere/Marathon diesel gensets to produce electrical power for motors installed on the Twin Disc reduction gears. These motors turn the gears, which in turn spin the shaft.

The system adds about 200 more horsepower when maximum output is needed. It also allows the vessel to transit to or from jobs without the main engines, thereby reducing fuel consumption, engine wear, noise and vibration.

Pennsylvania has Furuno and Simrad navigation electronics, Schuyler Cos. fendering and a 15-hp capstan. The

Charleston

Baltimore-based Vane Brothers has completed two milestones with the November 2019 delivery of the articulated tug-barge tug *Charleston* from St. Johns Ship Building.

Charleston is the eighth and final Elizabeth Anne-class model-bow tugboat built for Vane by the Palatka, Fla., shipbuilder. The tugs are based on plans from Entech Designs. It is also the second of two tugs within that class modified as ATB pusher tugs after *Jacksonville*, which left the shipyard in 2018.

The 4,200-hp *Charleston* is paired with the 50,000-bbl barge DS-506, while *Jacksonville*

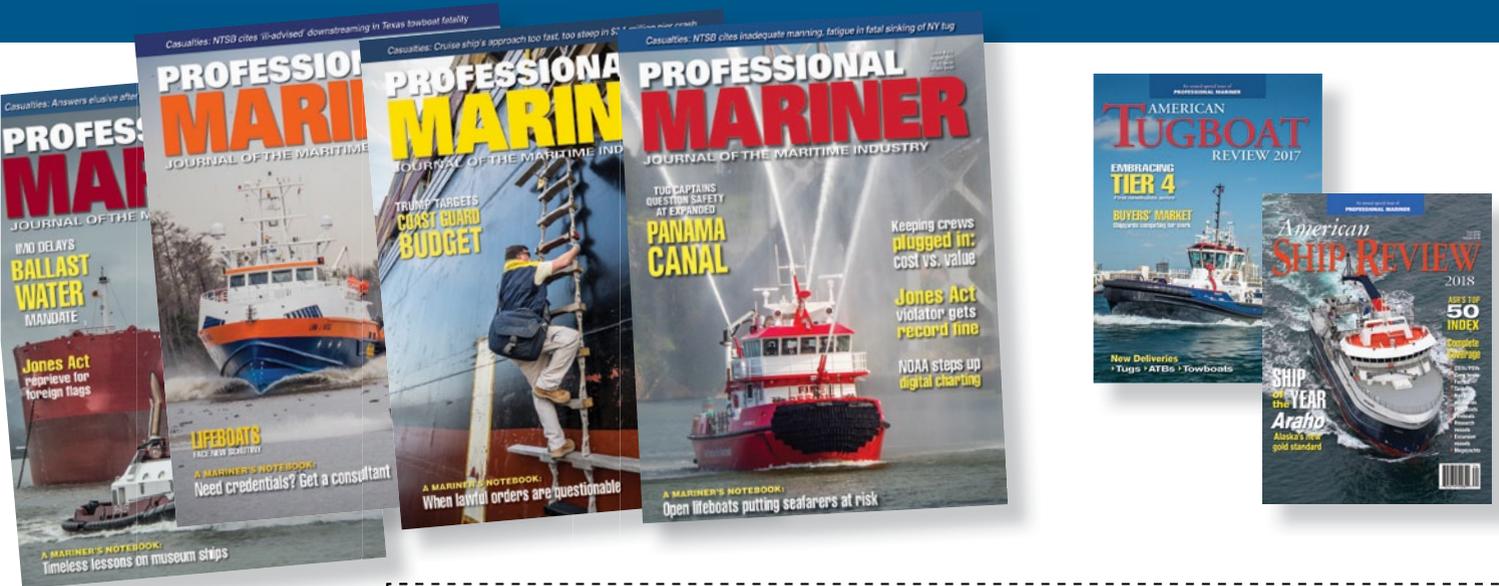
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Conrad Shipyard

Canal Barge signals inland push into Tier 4

The forward house on *H. Merritt 'Heavy' Lane Jr.* sits atop dozens of airbags to improve crew comfort.

The brownwater industry, for a number of reasons, has been slow to embrace EPA Tier 4 propulsion. Canal Barge Co. is a notable exception.

The New Orleans-based operator took delivery this spring of the 6,000-hp *H. Merritt 'Heavy' Lane Jr.*, built by Conrad Shipyard. Louisiana-based MiNO Marine designed the 166-by-49-foot vessel now considered the flagship of Canal's fleet.

The towboat is named for the late Harry Merritt Lane Jr., a former Canal Barge executive and director. His sons, David and Merritt Lane, also work for the company.

Propulsion consists of twin 3,000-hp EMD Tier 4 engines turning 110-inch Sound propellers through Reintjes reduction gears.

The package is designed to push 30 or more barges along the Mississippi River system and maintain a 10-knot running speed. The vessel also has Becker high-lift steering rudders.

"We are excited to bring online this new state-of-the-art towing vessel, which is the first 6,000-hp EMD of its kind on the inland waterways," H. Merritt Lane, III, president and CEO of Canal Barge Co., said in a statement.

The design for *H. Merritt 'Heavy' Lane Jr.* was inspired by the legendary Super Hydrodyne hull developed years ago by St. Louis Ship. Towboats built to this design were known for being efficient and maneuverable, and featured unique curvature in the hull form.

David Bourg, managing partner at MiNO Marine,

said the company developed an entirely new design optimized through a detailed analysis. MiNO's design brings consistent water to the props in all conditions, reducing vibration caused by unsteady water flow.

"We tried to refine the hull to something we thought would be more efficient and get water efficiently to the propellers, especially in shallow water," Bourg said in an interview this spring.

The superstructure atop the hull is divided into two sections: The forward section with crew living spaces sits atop Trelleborg Marine airbags that reduce engine noise and vibration; the aft section close to the engine spaces is fixed to the hull.

"It is kind of like an inflatable bladder," Bourg said of the Trelleborg system. "I think we have 48 of them

under the forward house with the accommodations spaces and the bridge. The pressures can be tuned up to help dampen or isolate vibration from things like the engines or the props.”

“The floating house, along with strict attention to detail related to the installation of the joiner system, has resulted in a vessel that is extremely quiet and comfortable for the crew during all operating ranges,” Mike Stone, Canal Barge manager of vessel engineering, said in a statement.

H. Merritt ‘Heavy’ Lane Jr. has tankage for 130,000 gallons of marine diesel fuel. It also can hold 15,000 gallons of diesel exhaust fluid in two tanks for the EMD engines.



Randy Mauer is the fifth 6,600-hp triple z-drive towboat in a series built for Marquette Transportation.

C&C Marine

Randy Mauer
Marquette Transportation took delivery this spring of a 6,600-hp triple z-drive towboat built by C&C Marine

and Repair of Belle Chasse, La. *Randy Mauer* is the fifth in a series of 160-by-50-foot vessels designed by CT Marine of Portland, Maine.

The towboat shares the same characteristics as its four predecessors, starting with lead boat *Cindy L. Erickson*, delivered in early

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TOWBOAT ROUNDUP

2018. Propulsion comes from three Cummins QSK60-M main engines paired with Steerprop SP25D azimuthing drives. The drives also operate at lower engine loads for better fuel economy.

Vessels in this series have a superstructure set on a bed of springs to reduce noise and vibration within the crew spaces, which also feature a soft-core joiner system. There are nine cabins on board with berthing for 13 people.

Paula M. Sperry

Centerline Logistics chartered the 84-by-34-foot *Paula M. Sperry*, built by C&C Marine and Repair of Belle Chasse, La. The vessel is the lead boat in a 15-vessel order from Maritime Partners based on

plans developed by Entech Designs.

Propulsion aboard the 2,600-hp *Paula M. Sperry* comes from twin Cummins QSK38-M1 Tier 3 main engines paired with Reintjes WAF 665 reduction gears. There are two Patterson 40-ton winches on the deck,

as well as Nabrico 12-inch roller-button chocks. The vessel has accommodations for six people.

Seattle-based Centerline, formerly Harley Marine Services, has assigned *Paula M. Sperry* to New Orleans, where the company is launching a bunkering opera-

tion starting June 1. It will typically operate with a four-person crew.

Raymond Butler

Maritime Partners took delivery of another 2,600-hp pushboat, *Raymond Butler*, from John Bludworth Shipyard in Corpus Christi,

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Centerline Logistics chartered Paula M. Sperry from Maritime Partners. C&C Marine

Texas. Centerline Logistics has also chartered this vessel to provide bunkering services to vessels calling in Corpus Christi.

The 84-by-32-foot *Raymond Butler* has a 34-foot height of eye and a 10.5-foot maximum draft. Propulsion comes from twin 1,300-hp Cummins QSK38-M Tier 3 engines turning 82-by-62-inch four-blade Sound propellers through Reintjes WAF 665 reduction gears. Two 99-kW Cummins QSB7-DM gensets provide electrical power.

Raymond Butler has two Patterson 40-ton winches and two Quincy 325 air compressors on deck, along with laminated rubber fenders supplied by M&M Bumper Service. The vessel can carry 38,000 gallons of fuel, 14,000 gallons of water and 600 gallons of lube and machinery oils.

Darrell Hiatt

Steiner Construction of Bayou La Batre, Ala., delivered the 2,520-hp *Darrell Hiatt* to Maritime Partners in spring 2020. The vessel will supply bunkers in Galveston, Texas, while under charter by Centerline Logistics.

Farrell & Norton Naval Architects, with offices in Maine and Massachusetts, designed the 88-by-34-foot vessel. Propulsion comes from twin Mitsubishi Tier 3 engines turning Sound propellers through Twin Disc reduction gears.

Schuyler Cos. supplied the maritime fendering, and the 40-ton deck winches are from Wintech. Two 99-kW John Deere gensets provide ship service power.

Mendota

Upper River Services of St. Paul, Minn., took delivery last summer of the triple-screw towboat *Mendota* built by C&C Marine and Repair.

CT Marine of Portland, Maine, designed *Mendota* to operate in shallow waterways and narrow stretches of the Upper Mississippi River between Red Wing, Minn., and Minneapolis, and the Minnesota River as far west as Savage, Minn. It is the first newbuild vessel of Upper River Services, which was founded in 1984.

Propulsion on the 76-by-30-foot towboat comes from three Caterpillar C18

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TOWBOAT ROUNDUP



CT Marine of Portland, Maine, designed Mendota.

ACERT engines, while two John Deere 4045 PowerTech diesel generators provide ship service power. *Mendota* is equipped with a Novec 1230 “clean agent” fire suppression system.

Annapolis

Vane Brothers took delivery of the 3,000-hp pushboat *Annapolis* in early 2020. Chesapeake Shipbuilding of Salisbury, Md. — a longtime Vane Brothers partner — designed and built the 94-by-34-foot vessel.

Annapolis is the second tug in a four-boat series, following last year’s delivery of lead boat *Salisbury*, built to operate on inland waterways. The

four vessels in the series are constructed to Coast Guard Subchapter M standards.

“*Annapolis*, like *Salisbury* before her, is an extremely robust inland pusher,” said Vane Port Capt. Jim Demske. “With a solid and sturdy design that delivers unsurpassed performance and safety, Vane Brothers’ crew-friendly *Salisbury*-class tugs can work efficiently and handle well in both shallow-draft areas and open-water environments.”

Propulsion comes from twin Cat 3512 Tier 3 engines delivering 1,500 hp each. Simrad and Furuno navigation electronics populate the wheelhouse, which is also



Annapolis is the second of four new Vane Brothers push-boats.

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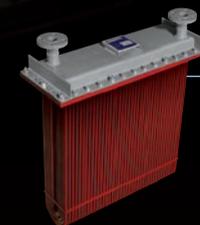
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TOWBOAT ROUNDUP

equipped with dual Rose Point electronic charting systems. Demske described the vessels as quiet and spacious, with independent heating and cooling systems that operate independently throughout the vessels.

Stephanie Pasentine

Florida Marine Transporters

took delivery this spring of the 120-foot *Stephanie Pasentine*, which joins more than a dozen sister vessels built at multiple shipyards around the Gulf. This one, however, is the first built at Metal Shark Alabama, which took over the former Horizon Shipbuilding yard after its bankruptcy in late 2017.

Gilbert Associates of Boston designed the vessel, which features a developed propeller tunnel that Gilbert believes provides superior performance by ensuring consistent water flow to the propellers.

“We have had quite a lot of success with it, as evidenced by all of the sister

vessels,” naval architect John Gilbert said in a recent interview. “The performance is there.”

The propulsion package consists of two 2,011-hp Caterpillar 3512 Tier 3 engines turning 100-by-69-inch stainless-steel propellers through Twin Disc MGX-5600DR reduction gears at a 6.56:1 ratio. Electrical power comes from two John Deere 6090 gensets each producing 175 kW.

Stephanie Pasentine has accommodations for nine people and is certified under Coast Guard Subchapter M. It can hold 75,000 gallons of fuel, 14,750 gallons of fresh water and 1,500 gallons of lube oil.



Stephanie Pasentine is the first new towboat built by Metal Shark Alabama.



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ARTICULATED TUG-BARGE UNITS IN SERVICE IN NORTH AMERICA

Following is a list of articulated tug-barge units (ATBs) in service in U.S. and Canadian waters. This list has been updated to include our 2020 Top Tugs, marked with an asterisk. The remainder of the list was accurate as of June 1, 2019. Efforts to revise the list starting in early 2020 were hindered by the COVID-19 pandemic.

Karen Andrie, owned and operated by **Andrie Inc.**, Muskegon, Mich.; 120 ft; 4,000 hp; built 1965, repowered 2008; converted to JAK coupler system 2009; matched with 50,000-bbl heated asphalt barge *Endeavour*, 2009, constructed at Jeffboat Inc.

Buster Bouchard, operated by **Bouchard Transportation Co.**; 127 ft.; built 1979; 6,140 hp; Intercon coupler system.

Marion C. Bouchard, operated by **Bouchard Transportation Co.**; 127 ft.; built 1979; 6,140 hp; Intercon coupler system; matched with 468-ft, 158,128-bbl barge *B. No. 265* carrying black oil in Jones Act petroleum service.

Capt. Fred Bouchard, operated by **Bouchard Transportation Co.**; 127 ft.; built 1982; 5,750 hp; Intercon coupler system.

Ellen S. Bouchard, operated by **Bouchard Transportation Co.**; 122 ft.; built 1982; 3,900 hp; Intercon coupler system; matched with 399-ft, 80,000-bbl barge *B. No. 280* carrying clean oil in Jones Act petroleum service.

Rhea I. Bouchard, operated by **Bouchard Transportation Co.**; 112 ft.; built 1982; 5,100 hp; Intercon coupler system; matched with 399-ft, 80,000-bbl barge *B. No. 284* carrying clean oil in Jones Act petroleum service.

Ralph E. Bouchard, operated by **Bouchard Transportation Co.**; 127 ft.; built 1987; 6,140 hp; Intercon coupler system; matched with 467-ft, 138,000-bbl barge *B. No. 230* carrying black oil in Jones Act petroleum service.

Bouchard Girls, operated by **Bouchard Transportation Co.**; 127 ft.; built 1989; 6,140 hp; Intercon coupler system; matched with 468-ft, 158,128-bbl barge *B. No. 295* carrying black oil in Jones Act petroleum service.

Barbara E. Bouchard, operated by **Bouchard Transportation Co.**; 127 ft.; built 1992; 6,140 hp; Intercon coupler system; matched with 467-ft, 138,000-bbl barge *B. No. 240* carrying clean oil in Jones Act petroleum service.

Robert J. Bouchard, operated by **Bouchard Transportation Co.**; 127 ft.; built 1994; 6,140 hp; Intercon coupler system; matched with 468-ft, 158,128-bbl barge *B. No. 285* carrying black oil in Jones Act petroleum service.

J. George Betz, operated by **Bouchard Transportation Co.**; 127 ft.; built 1995; 6,140 hp; Intercon coupler system; matched with 483-ft, 138,000-bbl barge *B. No. 235* carrying asphalt and black oil in Jones Act petroleum service.

Danielle M. Bouchard, operated by **Bouchard Transportation Co.**; 150 ft.; built 1997; 10,000 hp; Intercon coupler system; matched with 580-ft, 252,000-bbl barge *B. No. 245* carrying clean oil in Jones Act petroleum service.

Brendan J. Bouchard, operated by **Bouchard Transportation Co.**; 130 ft.; built 1999; 6,140 hp; Intercon coupler system; matched with 424-ft, 110,000-bbl barge *B. No. 215* carrying asphalt and black oil in Jones Act petroleum service.

Jane A. Bouchard, operated by **Bouchard Transportation Co.**; 130 ft.; built 2003; 6,140 hp; Intercon coupler system; matched with 430-ft, 110,000-bbl barge *B. No. 225* carrying clean oil in Jones Act petroleum service.

Morton S. Bouchard IV, operated by **Bouchard Transportation Co.**; 130 ft.; built 2004; 6,140 hp; Intercon coupler system; matched with 467-ft, 138,000-bbl barge *B. No. 242* carrying black oil in Jones Act petroleum service.

Linda Lee Bouchard, operated by **Bouchard Transportation Co.**; 130 ft.; built 2006; 6,140 hp; Intercon coupler system; matched with 430-ft, 110,000-bbl barge *B. No. 205* carrying asphalt and black oil in Jones Act petroleum service.

Evening Star, operated by **Bouchard Transportation Co.**; 112 ft.; built 2012; 4,000 hp; Intercon coupler system; matched with 317-ft 59,000-bbl barge *B. No. 250* carrying clean oil in Jones Act petroleum service.

Denise A. Bouchard, operated by **Bouchard Transportation Co.**; 112 ft.; built 2014; 4,000 hp; Intercon coupler system; matched with 399-ft, 80,000-bbl barge *B. No. 282* carrying clean oil in Jones Act petroleum service.

Kim M. Bouchard, operated by **Bouchard Transportation Co.**; 150 ft.; built 2015; 10,000 hp; Intercon coupler system; matched with 628-ft, 260,000-bbl barge *B. No. 270* carrying black oil in Jones Act petroleum service.

Danna J. Bouchard, operated by **Bouchard Transportation Co.**; 150 ft.; built 2016; 10,000 hp; Intercon coupler system; matched with 628-ft, 260,000-bbl barge *B. No. 272* carrying clean oil in Jones Act petroleum service.

Frederick E. Bouchard, operated by **Bouchard Transportation Co.**; 130 ft.; built 2016; 6,000 hp; Intercon coupler system; matched with 404-ft, 110,000-bbl barge *B. No. 220* carrying clean oil in Jones Act petroleum service.

Morton S. Bouchard Jr., operated by **Bouchard Transportation Co.**; 130 ft.; built 2016; 6,000 hp; Intercon coupler system; matched with 420-ft, 110,000-bbl barge *B. No. 210* carrying clean oil in Jones Act petroleum service.

Evening Breeze, operated by **Bouchard Transportation Co.**; 112 ft.; built 2019; 6,000 hp; Intercon coupler system; matched with 317-ft, 59,000-bbl barge *B. No. 252* carrying clean oil in Jones Act petroleum service.

Sea Reliance, Ocean Reliance, Sound Reliance & Coastal Reliance, operated by **Crowley Maritime**; 9,280 hp; 126 ft; new 2002-2003; barges 550-1 through 550-4 carry refined oil products; U.S. West Coast; Intercon coupler systems; 155,000 bbls.

Pacific Reliance & Gulf Reliance, operated by **Crowley Maritime**; 9,280 hp; 127 ft; introduced 2006; operating with tank barges 650-1 & 650-2, 587 ft, 178,000 bbls.

Resolve, Integrity, Courage & Commitment, operated by **Crowley Maritime**; new 2007-2009; 9,280 hp; 135 ft; heavy fuel burners; Intercon coupler systems; with barges 650-3, 650-4, 650-5, 650-6; all 178,000-bbl capacity; petroleum products.

Pride, Achievement, Innovation & Vision, operated by **Crowley Maritime**; deliveries 2009-2011; 10,500 hp; 135 ft; heavy fuel burners; Intercon coupler systems; with barges 650-7, 650-8, 650-9, 650-10; all 185,000 bbl capacity; petroleum and chemical products.

Legacy, Legend, & Liberty, operated by **Crowley Maritime**; 148 ft; 16,320 hp; Intercon coupler systems; paired with

barges 750-1, 750-2, 750-3; all 327,000-bbl capacity; petroleum and chemical products.

***Aveoqan**, operated by **Crowley Maritime**; 128 ft; built 2020; 6,768 hp; Intercon coupler system; paired with 400-ft 100,000-bbl *Oliver Leavitt* for service with Crowley Fuels Alaska.

Baltimore, operated by **Express Marine**; 125 ft; 3,600 hp; converted to JAK pin system 2008; matched with 470-ft dry bulk barge *EMI 1850*, transports coal.

Freedom, operated by **Express Marine**; 115 ft; 6,000 hp with Steerprop ASD propulsion system; matched with 480-ft coal barge *EMI 2400*, both built 2010; JAK coupler system, transports coal.

Honor, operated by **Express Marine**; 106 ft; 4,000 hp; converted to JAK pin system 2015; matched with 470-ft dry bulk barge *EMI 2100*, transports rock.

Douglas B. Mackie, operated by **Great Lakes Dredge & Dock Co.**, Oak Brook, Ill.; 15,442 hp, 158.4 ft; built 2017; Articouple FRC 80; matched with 433-foot hopper dredge barge *Ellis Island*, 14,788 cubic yard capacity

Emery Zidell, operated by **Centerline Logistics**, Seattle, Wash.; 4,492 hp, 116 ft; built 2014; Taisei Engineering Articouple FRC 55; matched with 80,000-bbl oil barge *Dr. Robert Beall*; West Coast service.

Jake Shearer, operated by **Centerline Logistics**, Seattle, Wash.; 4,492 hp, 116 ft; built 2014; Taisei Engineering Articouple FRC 55; matched with 80,000-bbl barge *OneDream*.

Barry Silverton, operated by **Centerline Logistics**, Seattle, Wash.; 4,492 hp, 116 ft; built 2014; Taisei Engineering Articouple FRC 55; matched with 83,000-bbl oil barge *Fight A.L.S.*

Dale R Lindsey, operated by **Centerline Logistics**, Seattle, Wash.; 3,000 hp, 116 ft; built 2015; Taisei Engineering Articouple FRC 43M; matched with 28,450-bbl oil barge *Petro Mariner*.

Bill Gobel, operated by **Centerline Logistics**, Seattle, Wash.; 4,522 hp, 116 ft; built 2017; Articouple FRC 55; matched with 80,000-bbl barge *All Aboard for a Cure*.

Min Zidell, operated by **Centerline Logistics**, Seattle, Wash.; 4,522 hp, 116 ft; built 2017; Articouple FRC 55; matched with 83,000-bbl barge *FFA*.

OneCURE, operated by **Centerline Logistics**, Seattle, Wash.; 4,650 hp, 116 ft; built 2017; Articouple FRC 55; matched with 82,000-bbl barge *Zidell Marine 277*.

Todd Prophet, operated by **Centerline Logistics**, Seattle, Wash.; 4,650 hp, 116 ft; built 2017; Articouple FRC 55; matched with 83,000-bbl barge *Edward Itha*.

Island Raider, operated by **Island Tug and Barge**; 1,700 hp; 82 ft; built 2018; z-drive propulsion; paired with 25,000-bbl petroleum barge *ITB Resolution*.

Adriatic Sea, Beaufort Sea, Java Sea, Kara Sea, Tasman Sea & Norwegian Sea, operated by **Kirby Corp.**; 3,300 to 4,800 hp; converted to JAK 400 coupler systems; converted or new double-hull oil barges; deliver petroleum or liquid-bulk products; U.S. East & Gulf Coasts.

Lincoln Sea, operated by **Kirby Corp.**; New York; 7,000 hp; 124 ft; built 1999 by J.M. Martinac Tacoma, Wash.; Intercon coupler system; double-hull petroleum products; barge *DBL 140*, 140,000 bbls; 504 ft.

Davis Sea, operated by **Kirby Corp.**; approx. 2,000 hp; converted to JAK coupler system 2005; with barges *DBL-105*, *DBL-28* and *DBL-27*.

Labrador Sea, operated by **Kirby Corp.**; 2,400 hp; converted 2008 to JAK coupler system; matched with 30,000-bbl bunker barge.

Irish Sea, Rebel & Viking, operated by **Kirby Corp.**; 5,700 hp, 7,200 hp and 4,300 hp respectively; converted 2007 to JAK coupler system; matched with double-hull petroleum barges.

Bismarck Sea, operated by **Kirby Corp.**; 1976; 5,700 hp; matched with tank barge *DBL-106*, 100,000 bbls; JAK coupler system.

Dublin Sea, operated by **Kirby Corp.**; 10,000 hp; built 2009; Intercon coupler system; matched with 185,000-bbl petroleum barge, *DBL-185*; attached to K-Sea West Coast division.

William J. Moore (Canadian), operated by **Kirby Corp.**; 4,400 hp; 135 ft; Bludworth connection system; barge *McCleary's Spirit* carries refined petroleum products on Saint Lawrence River & Lake Ontario; 95,000 bbls.

Sea Eagle, operated by **Kirby Corp.**; 5,600 hp; 125 ft; built 1998; Bludworth coupler system; barge *TMI 17* carries chemical & petroleum products; 17,000 dwt.

Sea Raven, operated by **Kirby Corp.**; 7,200 hp; 120 ft; built 1978; Bludworth coupler system; barge *ATC 23* carries chemical & petroleum products coastwise U.S.; 19,946 dwt; 490 ft.

Sea Hawk, operated by **Kirby Corp.**; 8,000 hp; 124 ft; built 2002; Intercon connection system; barge *ATC 21* carries chemical product Gulf Coast & Eastern Seaboard; 129,000 bbls; 450 ft.

Osprey, operated by **Kirby Corp.**; 5,800-hp single screw with CP prop; with barge *ATC 25*, converted to double hull; 170,000-bbl petroleum/chemical products.

Jason E. Duttinger, operated by **Kirby Corp.**; 6,000 hp; 125 ft; built 2013; matched with barge *Winna Wilson*, Articouple connection system.

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Articulated Tug Barges

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Captain Donald Lowe Sr., operated by **Kirby Corp.**; 6,000 hp; 125 ft; built 2013; matched with barge *Margo Dale*; Articouple connection system.

Heath Wood operated by **Kirby Corp.**; 6,000 hp; 125 ft; built 2016; matched with 155,000-bbl barge *Kirby 155-01* outfitted for hauling petroleum and chemical products.

Paul McLernan operated by **Kirby Corp.**; 6,000 hp; 123 ft; built 2017; matched with 155,000-bbl barge *Kirby 155-02* outfitted for hauling petroleum and chemical products.

La Force, operated by **Martin Midstream Partners**; 116.5 ft; built 1974; 5,100 hp; matched with 334-ft, 58,821-bbl tank barge *M 6000* carrying diesel fuel.

Texan, operated by **Martin Midstream Partners**; 96 ft; built 1979; 7,130 hp; matched with 369.6-ft, 52,169-bbl tank barge *Ponacina* carrying liquefied petroleum gas and liquefied flammable gas.

Martin Explorer, operated by **Martin Midstream Partners**; 115.8 ft; built 1996; 7,130 hp; matched with 432-ft, 37,369-bbl tank barge *Margaret Sue* carrying bulk liquids and sulfur.

Everlast (Canadian), operated by **McAsphalt Marine Transportation**, Hamilton, Ontario; 6,000 hp; built in Japan; Articouple connection system; barge *Norman McLeod* carries heated asphalt products on Great Lakes & Saint Lawrence River; 70,000 bbls; 379 ft.

Leo A. McArthur (Canadian), operated by **McAsphalt Marine Transportation**, Hamilton, Ontario; 5,300 hp; built in China 2009; matched with 70,000-bbl product barge *John J. Carrick*, built in China, 2009; Articouple connection system, heated asphalt cargoes on Great Lakes.

Paul T. Moran, operated by **Moran Towing Corp.**, New York; 7,200 hp; 150 ft; Blutworth articulation system converted 1999; repowered 2010; with barge *Massachusetts*; 1982; double-hulled 2005; delivers petroleum products on Gulf Coast and Eastern Seaboard; 430 ft; 140,000 bbls.

Barney Turecamo, operated by **Moran Towing Corp.**, New York; 5,100 hp; 121 ft; converted 2005 to Intercon connection system; barge *Georgia*; 2005; carries petroleum products on Gulf Coast and Eastern Seaboard; 118,000 bbls; 425 ft.

Scott Turecamo, operated by **Moran Towing Corp.**, New York; 5,100 hp; 121 ft; converted 2004 to Intercon connection system; barge *New Hampshire*; 2004; carries petroleum products on Gulf Coast and Eastern Seaboard; 118,000 bbls; 425 ft.

Pati R. Moran and Linda Moran, operated by **Moran Towing Corp.**, New York; 5,100 hp; Intercon coupler system; new 2007 and 2008; matched with 118,000-bbl oil barges *Charleston* and *Houston*.

Lois Ann L. Moran, operated by **Moran Towing Corp.**, New York; built 2008; 121 ft; 5,100 hp; Intercon coupler system; barge *Philadelphia*; 2008; carries petroleum products on Gulf Coast and Eastern Seaboard; 118,000 bbls; 425 ft.

Mary Ann Moran, operated by **Moran Towing Corp.**; 121 ft; 5,100 hp; new 2010; coupled with converted dry bulk barge *Virginia*; built 1982; Intercon connection system; carrying grain cargoes between New Orleans and Puerto Rico.

Mariya Moran, operated by **Moran Towing Corp.**, New York; built 2015; 121 ft; 6,000 hp; Intercon connection system; barge *Texas*; 495 ft; 160,000-bbl; carries petroleum products on Gulf Coast and Eastern Seaboard.

Leigh Ann Moran, operated by **Moran Towing Corp.**, New York; built 2015; 121 ft; 6,000 hp; Intercon connection system; barge *Mississippi*; 495 ft; 160,000-bbl; carries petroleum products on Gulf Coast and Eastern Seaboard.

Barbara Carol Ann Moran, operated by **Moran Towing Corp.**, New York; built 2016; 121 ft; 6,000 hp; Intercon connection system; barge *Louisiana*; 468 ft; 122,000-bbl; carries chemicals and petroleum products on Gulf Coast and Eastern Seaboard.

OSG Honour & OSG Enterprise, operated by **OSG Ship Management**; 5,600 hp; converted to Blutworth connection systems; barges *OSG-209 & OSG-214* carry petroleum products on East and Gulf Coasts.

OSG Navigator & OSG Intrepid, operated by **OSG Ship Management**; 5,600 hp; 136 ft; refits 1993 & 1986; Intercon coupler system; barges *OSG 252 & OSG 254*; carry petroleum products East & Gulf Coasts.

OSG Independence & OSG Columbia operated by **OSG Ship Management**; 125 ft; 1980 and 1981; 5,600 hp and 6,140 hp; assigned to oil barges *OSG 243 & OSG 242* with Blutworth connection systems; carry clean products on East and Gulf Coasts.

OSG Vision, OSG Horizon, operated by **OSG Ship Management**; 12,000-hp heavy fuel burners with CP props; matched with 342,000-bbl petroleum barges *OSG 350* and *OSG 351*; Intercon coupler systems; primarily carry crude in the Delaware Bay and River.

OSG Courageous, operated by **OSG Ship Management**; 8,000 hp; 139 ft; built 2011; Intercon coupler system; barge *OSG 244* carries petroleum products East & Gulf Coasts.

OSG Endurance, operated by **OSG Ship Management**; 8,000 hp; 139 ft; built 2011; Intercon coupler system; barge *OSG 192* carries dirty products on Gulf Coast.

Amberjack — converted to conventional tug, operated by **Penn Maritime**; 3,900 hp; 116 ft; built 1981; converted to Blutworth articulation system 1998; barge *Biscayne* (ex-*Morania 450*); carries heated oil products; 70,000 bbls; 405 ft; built 1981; conversion 1998.

Eliza & Lucia, operated by **Penn Maritime**; 7,000 hp; 127 ft; built 1995; Intercon coupler system; barges *Atlantic & Caribbean* carry asphalt; East & Gulf coasts; 18,000 dwt; 460 ft.

Teresa & Julie, operated by **Penn Maritime**; 7,000 hp; 127 ft; new 1997-98; Intercon coupler system; barges *Acadia & Yucatan* carry heated oil products; East Coast, Gulf Coast & offshore; 160,000 bbls; 490 ft.

Valiant, operated by **Penn Maritime**; 8,000 hp; acquired in 1998; converted to Blutworth connection system; barge *Everglades* carries heated petroleum products; 180,000 bbls.

Capt. Hagen, operated by **Penn Maritime**; 6,000 hp; 123 ft; built 2004; Intercon coupler system; barge *Key West*; 140,000 bbls; built 2004; carries petroleum products; Gulf of Mexico.

Tarpon & Dolphin, operated by **Penn Maritime**; 4,300 hp; converted to JAK coupler systems 2006; with barges *Potomac* and *Penn 410*; both 80,000 bbls; carrying heated oil and asphalt cargoes.

Skippiack & Coho, operated by **Penn Maritime**; 4,000 hp; 116 ft; JAK coupler system; new 2008/2009; matched with 90,000-bbl heated oil barges.

Yellowfin, Bluefin & Mako, operated by **Penn Maritime**, new 2009-2011; 4,000 hp; JAK coupler system, matched with 90,000-bbl heated asphalt barges.

Prentiss Brown, operated by **Port City Marine Services**, Muskegon, Mich.; 118 ft, 4,300 hp, built 1967; converted to Blutworth connection system 2008; matched with self-unloading 505-foot cement barge, *St. Mary's Challenger* (ex-*Medusa Challenger*, converted former steamer 2014, in Great Lakes service.

Bradshaw McKee, operated by **Port City Marine Services**, Muskegon, Mich.; 118 ft, 4,300 hp, built 1977; converted to Blutworth connection system 2008; matched with self-unloading 437-foot cement barge, *St. Mary's Conquest* (ex-*Southdown Conquest*, converted former steamer, in Great Lakes service.

Dace Reinauer, Joanne Reinauer, Lucy Reinauer, operated by **Reinauer Transportation**; conversions 2007-08; JAK coupler systems; with petroleum transport barges; East Coast.

Timothy L. Reinauer, Craig Eric Reinauer, Morgan Reinauer, Austin Reinauer, operated by **Reinauer Transportation**; repowered and converted to Intercon C coupler system 2004-2009; with interchangeable 100,000-bbl barges; petroleum products on East Coast.

Stephen Reinauer, operated by **Reinauer Transportation**, New York; 108 ft; 3,000 hp; converted to ATB in 2007; with new oil barge; 80,000 bbls; JAK system; carries petroleum products Eastern Seaboard.

Nicole Leigh Reinauer, Christian Reinauer & Meredith Reinauer operated by **Reinauer Transportation**, New York; 7,200 hp; 124 ft; built 1999, 2001 & 2003 by Atlantic Marine, Jacksonville, Fla., & Mobile Ala.; Intercon coupler systems; barges *RTC 135, RTC 145 & RTC 150* carry clean petroleum products on Eastern Seaboard; 135,000 to 150,000 bbls.

Ruth M. Reinauer, Laurie Ann Reinauer, operated by **Reinauer Transportation**, built Senesco Shipyard 2009-10; 4,000 hp; Intercon coupler systems, matched with new 80,000 to 100,000-bbl barges, also from Senesco Shipyard.

Reinauer Twins, operated by **Reinauer Transportation**; built Senesco Shipyard 2011; Intercon C coupler system; matched with new 100,000-bbl oil barge, also from Senesco Shipyard.

B. Franklin Reinauer and Curtis Reinauer, operated by **Reinauer Transportation**; built Senesco Shipyard 2012; with oil barges; 80,000 bbls, JAK system; carries petroleum products Eastern Seaboard.

Dean Reinauer, operated by **Reinauer Transportation**; built Senesco Marine 2013; with oil barge *RTC 106*; 100,000 bbls; Intercon coupler system.

Haggerty Girls, operated by **Reinauer Transportation**; 4,700 hp; built 2013; JAK coupler system.

Dylan Cooper, operated by **Reinauer Transportation**; built Senesco Marine 2015; Intercon coupler system; paired with 100,000-bbl fuel barge *RTC 108*.

Grace M. Reinauer, operated by **Reinauer Transportation**; built Senesco Marine 2016; Intercon Series C coupler system; paired with 100,000-bbl barge *RTC 109*.

Bert Reinauer, operated by **Reinauer Transportation**; built Senesco Marine 2018; 8,400 hp; Intercon coupler system; paired with 523-foot 160,000-bbl *RTC 165* carrying chemicals and clean oil products.

Josephine and Kristy Ann operated by **Reinauer Transportation**; built Senesco Marine 2018; 2,200 hp; JAK coupler system; paired with 100,000-bbl and 80,000-bbl barges.

Seaspan Challenger (Canadian), operated by **Seaspan Marine Corp.**, Vancouver; 3,600 hp; 131 ft; single screw; built 1970; converted to JAK coupler system 2002; barge *Coastal Spirit* deck cargoes servicing Vancouver Island.

Arctic Taglu & Arctic Hooper (Canadian), operated by **Seaspan Marine Corp.**, Vancouver; 2,250 hp; 110 ft; Sea Link articulation systems; ro-ro trailer barges *Georgia Link & Fraser Link*; servicing Vancouver & western Canada.

Assateague, operated by **Vane Brothers** of Baltimore; 110 ft; 4,400 hp; built 2018; Beacon Finland coupler system; matched with barge *DS-802*, 403 ft, 80,000 bbls.

Chincoteague, operated by **Vane Brothers** of Baltimore; 110 ft; 4,400 hp; built 2018; Beacon Finland coupler system; matched with barge *DS-801*, 403 ft, 80,000 bbls.

Wachapeague, operated by **Vane Brothers** of Baltimore; 110 ft; 4,400 hp; built 2019; Beacon Finland coupler system; matched with barge *DS-803*, 403 ft, 80,000 bbls, additional heating capability for asphalt transfer.

Jacksonville, operated by **Vane Brothers** of Baltimore; 95 ft; 4,200 hp; built 2018; Beacon Finland JAK-400 Hydraulok coupling system; paired with 50,000-bbl barge *DS-504*.

Charleston, operated by **Vane Brothers** of Baltimore; 95 ft; 4,200 hp; built 2019; Beacon Finland JAK-400 Hydraulok coupling system; paired with 50,000-bbl barge *DS-506*.

Cavek, operated by **Vitus Marine**, Anchorage, Alaska, for the Alaskan Village Electric Coop; 76 ft, 1,800 hp; built 2011; coupler, Taisei Engineering Articouple FRC-35; matched with 208-ft, 10,000-bbl oil barge that also carries deck cargo; serves Western Alaskan communities.

Nania, operated by **Vitus Marine**, Anchorage, Alaska, for the Alaskan Village Electric Coop; 76 ft, 1,800 hp; built 2011; Taisei Engineering Articouple FRC-35; matched with 183-ft, 8,000-bbl oil barge that also carries deck cargo; serves Western Alaskan communities.



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