

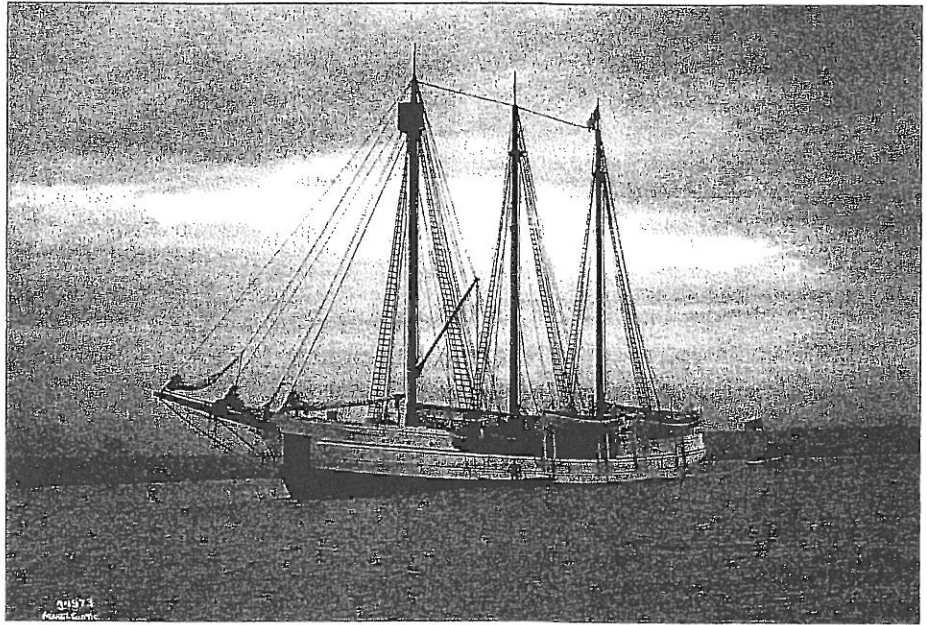
Harsh Ways

Edward W. Heath and the Shipbuilding Trade

PAUL SPITZER

The strength and unsurpassed quality of his wooden vessels earned Edward Heath renown as a Northwest shipbuilder around the turn of the century. Unfortunately, admiration could not keep him afloat in the receding waters of the wood trade. Even before his career began, the best market for wood vessels had already passed. Steel ships dominated the waterways, which struggled to compete domestically with railways and publicly financed roadways. Meanwhile, the scale of American enterprise became uncondusive to a cottage industry such as wood shipbuilding.¹ And finally, although the marriage of wood hulls and steam engines had been a long one, the union was never strong. The steam engine's preferred partner was a hull impervious to vibration. Such conditions forced Heath to head west where the scarcity of good rail connections and roads meant that shipbuilding was not yet suffering the same decline as elsewhere.²

On Puget Sound the mosquito fleet, a flotilla of wooden steamers like those that Heath built, raced between the tide-water communities. Wood tugs pulled rafts of logs to mills; the plentiful lumber schooners carrying timber to market were themselves fashioned of wood. Swarms of fishing boats were needed everywhere locally and in Alaska. Fueled by the large demand, shipbuilding was a growth industry.³ During the decade 1891-1900, the value of Washington State's maritime manufactures had increased almost tenfold. In Seattle, only one yard, Moran Brothers, sent metal vessels down its ways. Here amid the Northwest's abundant tall timber, fi-



The three-masted schooner *Great Bear* was a Heath design with relatively little sail and a diesel engine. Although she has the sturdy appearance of an Arctic trader with outboard lifeboats for whaling, the adornments reveal her other purpose as a yacht. (A. Curtis 34973, Washington State Historical Society, Tacoma)

anywhere, wood should have been able to stand its ground against metal. Indeed, the Northwest was becoming the "principal home of the wood shipbuilding industry,"⁴ thanks in large part to the development of schooners built of Douglas fir. Cheap in their heyday, they carried bulk, low-cost cargoes along the American coasts.⁵

There was competition enough in the wood trade among Washington's 36 yards, 12 of them in Seattle alone.⁶ Moreover, Heath and other wood builders were chasing fewer dollars by 1900.⁷ World War I renewed hopes, but wood production was quickly swamped beneath a huge wave of wartime steel ton-

nage. Metal yards took the big orders and big ships. The state's one steel yard grew to nine by 1919.⁸ In the average local wood yard there were 78 employees; the average metal yard had more than 3,000.⁹ It was impossible not to be aware of disparities this large. Heath knew that he was sailing against the wind.

There was nothing to impede wood's downward course. Wood builders could not stave off the cruel economics of a declining industry. Competition became hungrier, materials more costly, profits smaller, suppliers impatient of payment, workers less loyal, internal organization less efficient, fi-

nancial backers less dependable, and customers more demanding. Because they were distrustful of each other, builders would not join together for their common good.¹⁰ It was an old-fashioned industry kept alive by a surplus of shipbuilders, nostalgia, and loyalty to tradition. "Progress in the art of shipbuilding," it was said, "... has at all times been retarded by an undue respect for established practice."¹¹ Heath was a master of established practice. He turned down opportunities to work on metal ships and on airplanes, too, because they clashed with his sense of craftsmanship. Nor was he interested in producing cheap schooners. As waterfront conditions deteriorated, he repeatedly overbuilt and overspent. His business was never as good as his reputation.

Edward Heath came from a shipbuilding family originally from New Bedford, Massachusetts.¹² Southwestern Michigan became the family home, and Edward was born there in Berrien County, June 11, 1863.¹³ He lived in a prosperous household with five other children and attended school until at least age 17. Starting in 1886, at 23, he became a shipwright, possibly learning the basics from a relative on the Great Lakes.¹⁴ Soon after, he opened a shipyard under his own name in his hometown of Benton Harbor.

The yard "carried on quite an extensive business" and earned Heath a reputation "as an expert craftsman."¹⁵ His first vessel, a tug, was launched in 1889; and his last before leaving Michigan was another tug in 1899. In between he built two to four vessels per year that varied in size from 3 to 337 tons.¹⁶ In illustrated advertisements he described himself as a "General Ship Builder" specializing in tug hulls and welcomed inquiries for yachts, steam barges, and "Upper Cabin Steamers." He boasted of a "permanent set of [launch] Ways" to imply that he was not transitory or ill equipped. And like any shipbuilder he promised prompt estimates.¹⁷ Unfortu-

nately, these would repeatedly fall below his costs.

His Benton Harbor yard was the kind of small firm that commonly employed between 20 and 30 men. Its assets consisted of waterfront real estate, several small buildings, a bandsaw or two, a lumber kiln, and an inventory of tools and materials. But its real value, as was the case at most yards, resided in the skill of the crew head¹⁸—Edward Heath himself. The rest, including much of the manpower, could be easily replaced.

In 1899, his business failing, he weighed anchor for the Northwest. He apparently had not been able to sell the shipyard; there were already too many competitors, most of them also failing as shipping on the Great Lakes converted to steel. Without its chief asset, Heath himself, the yard would not have been a good buy, and the bank took possession.¹⁹ His move west would be the first of several forced relocations.

Having "constructed wooden, iron and steel vessels on the Great Lakes," a newspaper erroneously reported later, "he was brought out from the East to take charge of the Moran shipyards in Seattle."²⁰ Moran did work with materials besides steel, and the firm paid its new superintendent well enough for him to live at a good downtown hotel. Heath ignored the riveting and welding going on through most of the yard while he oversaw the construction of the *Seward*, a well-known 210-foot military transport.²¹ His stay was short before "he decided to go into business for himself."²²

After leaving Moran he built the 169-foot passenger steamer *Majestic* in Everett, for use on Puget Sound. During the last days of merchant sail, he built the long-lived barkentine *Aurora*.²³ Working at the Everett Shipbuilding Company he was the "vice pres. and mngr."²⁴—a valued employee but not an owner or partner.

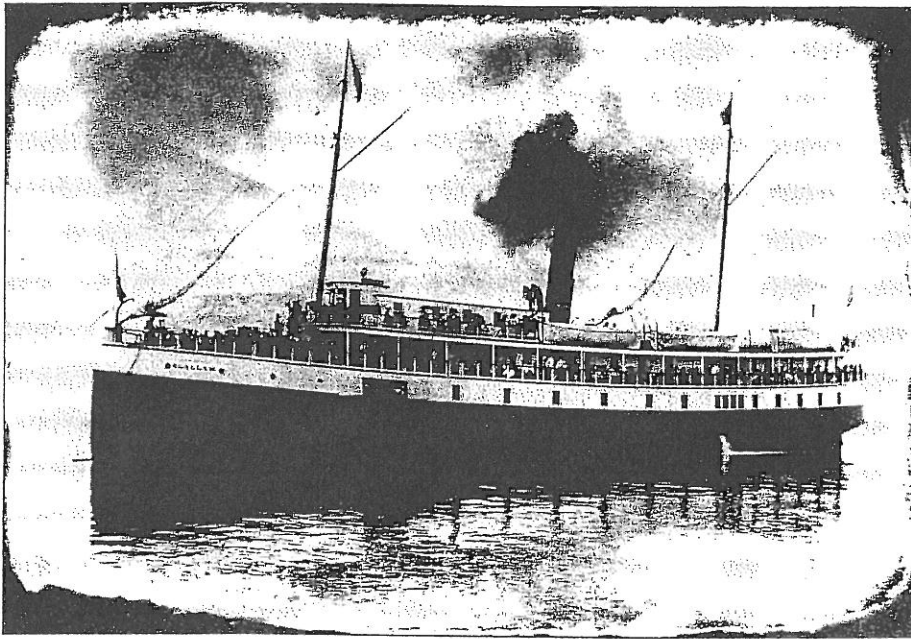
Ownership came in 1903 when he

opened the first yard on the West Coast that would carry the Heath name. For the next seven years he worked for himself, backed by Tacoma investors. Heath strategically chose to locate on the Puyallup River next to a lumber mill that supplied the long clear timbers he wanted. The postal address was apt: Tide Flats, Tacoma. These were halcyon days, days of "big bottoms."

Here he built a 160-foot ferry, the *West Seattle*, acclaimed as one of the largest and best on the coast.²⁵ He also built steamers, several yachts, and small commercial vessels. As it did in other yards, much of the work involved repairs. Repairs were continually needed by the wood fleet, though new construction lagged because of a worldwide glut of tonnage. Relatively better opportunities existed at steel yards, where woodworkers built molds, framing, scaffolding, or ship interiors. Heath must have considered going over, but framing and interiors were not shipbuilding.

Among his Tacoma launchings, the two best known were the passenger steamers *Jefferson* and *Clallam*. The *Jefferson's* slide down the ways in April 1904 was a hasty, but still grand, affair. With summer close at hand and much work still to be done, the launch was none too early. On board, carpenters worked feverishly "putting on final touches," almost until the moment she hit the water.²⁶ She had been started late, but Heath hastened construction by adapting lines from another vessel. A local newspaper praised the speed with which she was built.²⁷ The compliment, intended chiefly to promote Tacoma's business, was one that Heath rarely, if ever, heard again.

A great gala announced the launching of the steamer built to be "the best of her class."²⁸ Alaska Steamship Company, her owners, invited 4,000 guests from around Puget Sound to the christening. The city held a parade to mark the event. But while a few people from the water-



The foundering of the *Clallam* in a storm in 1904 was Puget Sound's worst maritime disaster. All the passengers who abandoned ship in the lifeboats lost their lives, but most who remained aboard were saved. (Museum of History and Industry, Seattle)

front gathered around Heath, he was a largely forgotten figure at the scene. Although the newspaper reported that "there never was a stronger or more perfect specimen of the shipbuilder's art . . . on the Pacific coast," the builder went unnamed. And the comment that this steamer "will do more to add fame to Tacoma as a shipbuilding center than any craft ever turned out here" only showed how easily his achievements could be purloined by others. The *Jefferson* became Tacoma's creation.²⁹

Soon after the attention subsided, the empty vessel went aground on the mud flats and cost several thousand dollars to be pulled off. But she proved a success all the same. Halfway through her career, she had already carried more than a billion pounds of freight and 600,000 passengers.³⁰ During nearly two decades of service she completed 555 round trips through the Inside Passage to Alaska. Her extra-sturdy construction delayed or minimized the effects of age, several scrapes, and even collisions.³¹ She made good revenues for her owners and was probably

Heath's most successful vessel. Following the sinking of the *Titanic* in 1912, the *Jefferson* got more lifeboats, but she would never need them. However, another Heath-built steamer suffered a terrible disaster on Puget Sound.

On January 8, 1904, while Heath was still working on the *Jefferson*, his recently completed *Clallam*, pride of the local steamer fleet, set off on her usual run to Victoria, British Columbia. She sank in a storm while crossing the strait. Immediately following the first-published news came the recriminations. An editorial charged that the *Clallam* was not seaworthy. It claimed that she suffered chronic leaks and that her construction was flimsy and known to be unsafe. The natural implication was that Heath and her owners, Puget Sound Navigation, bore the responsibility for more than 50 deaths.³²

On January 14, the *Tacoma Daily News* ran an interview with Heath, who declared that he welcomed a thorough inquiry. Investigators, he said, should begin with a close examination of his

uncompleted hull for the *Jefferson* so that they could get a good idea of the quality of his work. It would convince them that there was "never a stauncher or more seaworthy vessel on the Sound than the *Clallam*." Although such an inspection would involve a different vessel, he saw the issue as a matter of character; the inspectors would conclude that two vessels from the same infallible hand would be equally safe. Furthermore, Heath expressed confidence that "Captain Roberts did all in his power to save the vessel." The captain was an experienced sailor and one of the line's owners.

Meanwhile the gruesome daily reports of bodies found washed up on shores continued.³³ Tales were soon remembered and retold of bad omens marring the steamer's very brief career. The champagne bottle had not broken at her launching, and the flag had been accidentally raised upside down—as a distress signal. On the day of her fatal voyage, it was said, animals carried as cargo had refused to board the steamer.³⁴

No omens distracted the two U.S. marine inspectors conducting the inquiry, but the supervising inspector for the Pacific Coast disconcertingly wrote that "it appears that the *Clallam* disaster was brought about by the giving way of a deadlight," a porthole backed inside by a storm cover. His comments suggested that fault lay with the ship: "none but the staunchest steam vessels should be employed," he said, implying poor construction.³⁵ Yet the same day that it reported his comment, the *Tacoma Daily News* printed a statement by the regional inspector for the marine underwriters' association. "I certainly pronounced the *Clallam* a seaworthy boat. If she was not I never saw one."

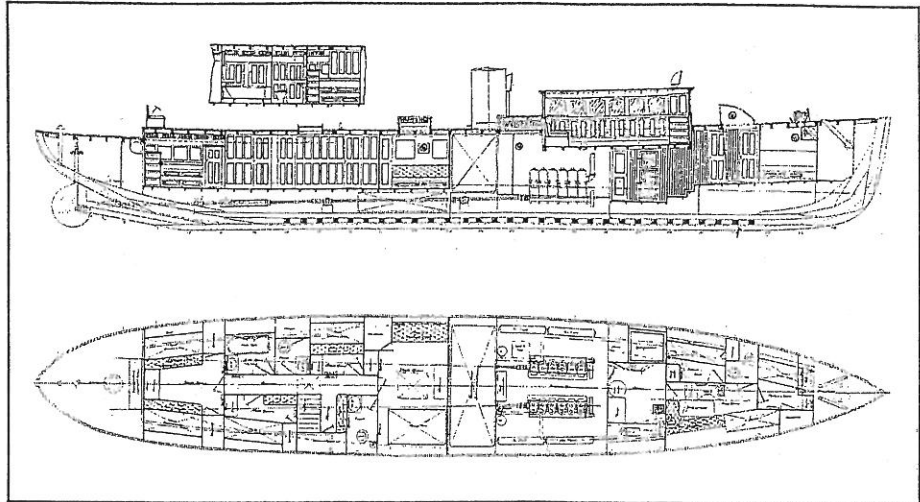
Before the inquiry began, the hearing inspectors did examine the uncompleted *Jefferson*. Without her planking installed, the all-important skeleton of ribs and keel stood visible. "She is one of the strongest built vessels I ever saw,"

said one of the marine inspectors. "It is impossible for me," he said, shifting the focus of blame, "to understand how a vessel built as the *Clallam* was, could have sprung a leak. It's a mystery how she took water in so short a time."³⁶ As a result of the *Jefferson* inspection, Heath ceased being an object of suspicion and became instead an impartial witness. Attention turned to Captain Roberts and the chief engineer, Scott A. DeLauney.

The chief engineer placed the blame on the captain and the vessel. He insisted the water had come in through a broken deadlight. It had so troubled him that he had asked the captain to turn back at Port Townsend. However, the marine inspectors did not believe that a vessel of several hundred tons could sink just from the water sloshing through a deadlight, which everyone else claimed could, even during the worst storms, have been plugged.³⁷

One after another, crew members testified and contradicted each other. The hearing inspectors quickly concluded that the threats posed by the storm had been less dangerous than the confusion and actions of the crew. The *Clallam* had been drowning herself. Seawater was being pumped into the vessel! Sea-cocks, the valves to the outside, had been turned and then turned again by other crew members. DeLauney did not appear to know what the crewmen were doing. Finally the rising water in the engine room had doused the fire and then stopped the pumps. Only later did someone realize that the water inside had stopped rising.³⁸

Heath testified on the second day of the inquiry. He sat with the marine inspectors at a table in the middle of a crowded hearing room. Witnesses appeared without counsel yet were generally free to give their versions. The inspectors' questioning was not always friendly and even became derisive. However, Heath was treated well, and he, as always, was deferential.



Although conventional in appearance, William Boeing's powerful yacht *Taconite* was actually built for luxurious offshore cruising. Heath gave up title to the shipyard to Boeing just one month after he began her construction. (*Pacific Motor Boat*, May 1910)

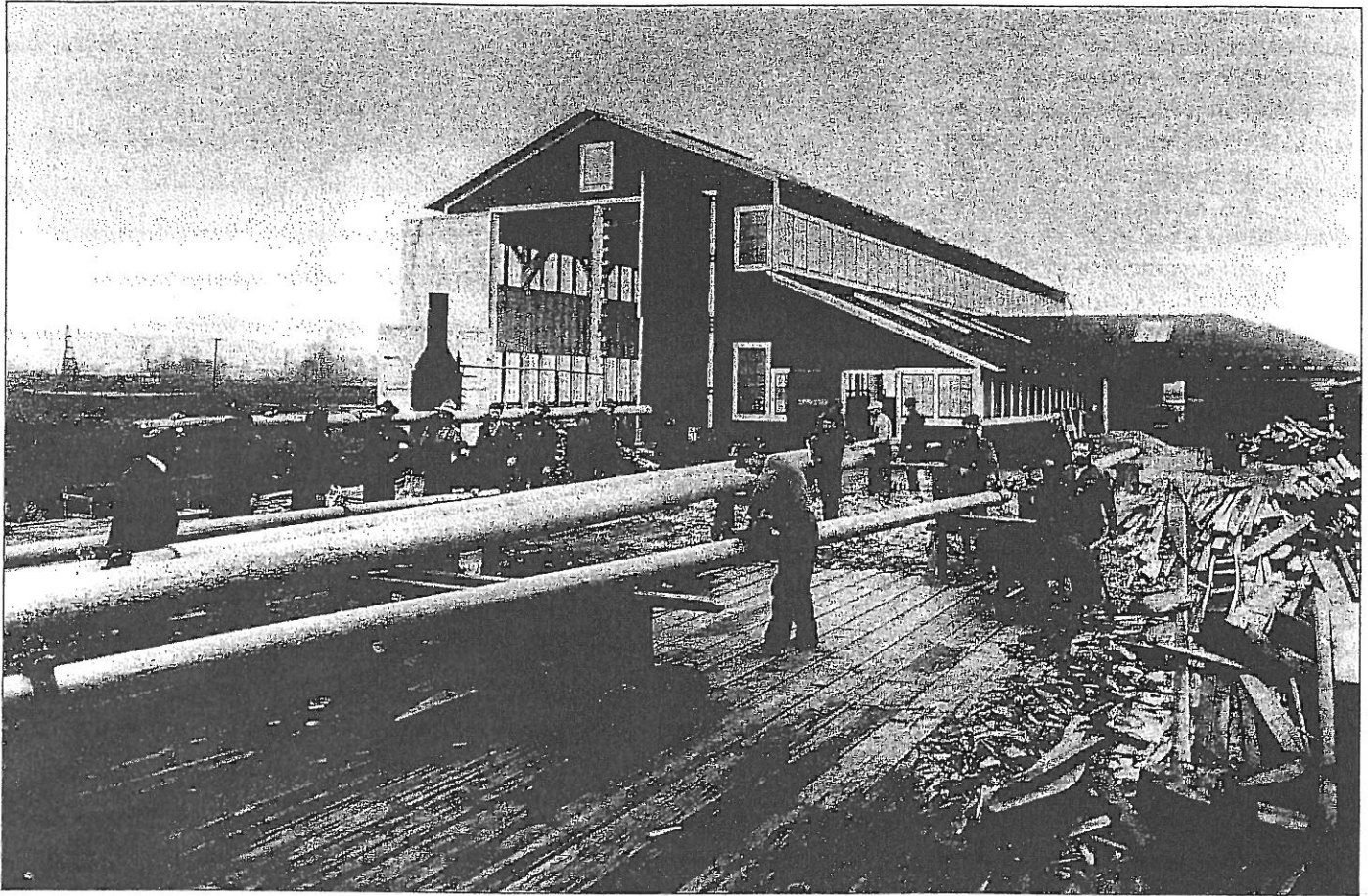
He offered for evidence the voluminous ship specifications, but the document was far too long and the inspectors declined to look. Noting that the *Clallam* was his 50th vessel in a career that went back nearly a quarter century, he "went into a detailed verbal description" of the ship, one newspaper reported, "which, while interesting enough from a builder's standpoint, proved twice as lengthy as the specifications."³⁹ To men for whom character was evident in craft, scarf joints had great meaning, and they listened as he went over construction details for nearly an hour. Materials, for instance, involved choices that revealed the builder's intention and skill. The examiners understood Heath's implications.

One inspector asked if the *Clallam* was well built. The answer was not just a simple yes. Heath again made intention the subject of his answer: "I aimed," he said, "to build an honest boat." Continuing, he declared, "she represented the best workmanship skilled labor could produce."⁴⁰ The builder's words conveyed the notion that hull strength was present in this vessel not as an accident of the material, as in a steel ship, but deliberately put there by hand. Ships were far more than just materials;

while others might talk of physical properties, Heath was concerned with values, reasoning, and intent. The purpose of a shipwright was discernible in his craftsmanship. It was why the inspection of the *Jefferson*, though a different vessel, had been relevant. Something philosophical on the nature of ships had slipped into the hearing room discussion, but it was as out of place as speculations on the meaning of life at a coroner's inquest. Therefore Heath's "teleology" went no further, and the inquiry continued on, never deviating far from practical discourse.

Displaying a drawing of the crucial engine-room section, the builder gave a verbal tour of the hull. It helped answer the inspectors' question about the condition of the seams. There had been suggestions that the bottom could have opened up. Like any wood vessel, the *Clallam* had plenty of seams, but he assured them that he had taken particular care with the caulking. They pressed him on the possibility of faulty work. "Never," he insisted.⁴¹

He gladly gave them the names of marine surveyors who had inspected the ship. The hearing called an independent surveyor, who asserted that the



Spars for the schooner *Polar Bear* were made outside on the wharf by manual labor. The boat's owner, Captain Louis Lane, at far left, directed their installation. (Boeing Company Archives, HS3103)

Clallam's workmanship was "first-class in every respect."⁴² He further testified, "I never saw better work than that on the *Clallam* and *Jefferson*."⁴³ Even Captain Roberts, who might naturally have wanted to shift responsibility to Heath, said the *Clallam* was tight and had shown no signs of weakness by either groaning or racking.⁴⁴

Heath had yet more supporters. The engine maker and installer of the pumps contradicted crew testimony that gaps in the walls and floors of the engine room might have allowed flotsam to clog the pumps. Nor were the deadlights installed any way but solidly. The inspector of hulls in Victoria declared the *Clallam* seaworthy. No leak could have overwhelmed the pumps.⁴⁵ Thus ended the supposition that seams had opened

up or planks had sprung.

The integrity of the ship was established to the examiners' satisfaction. Consequently, when the chief engineer later charged that her pumps differed from those specified on the plans and that the rudder was weak, his assertions went nowhere.⁴⁶ The marine inspectors' final report on the *Clallam* specifically addressed all the alleged failings. Each accusation against Heath was rebutted. He was completely vindicated.⁴⁷

If anyone seemed to be a winner in the affair, it was Heath. Within a few years he was "regarded as one of the foremost builders in the entire country."⁴⁸ The dedicated craftsman had prevailed over materialists who cared only about physical properties. Wood crafted by

skilled hands had limits that were human and not physical. Heath had made the *Clallam's* wood hull as strong as his own iron will. Her strength had come from his strength.

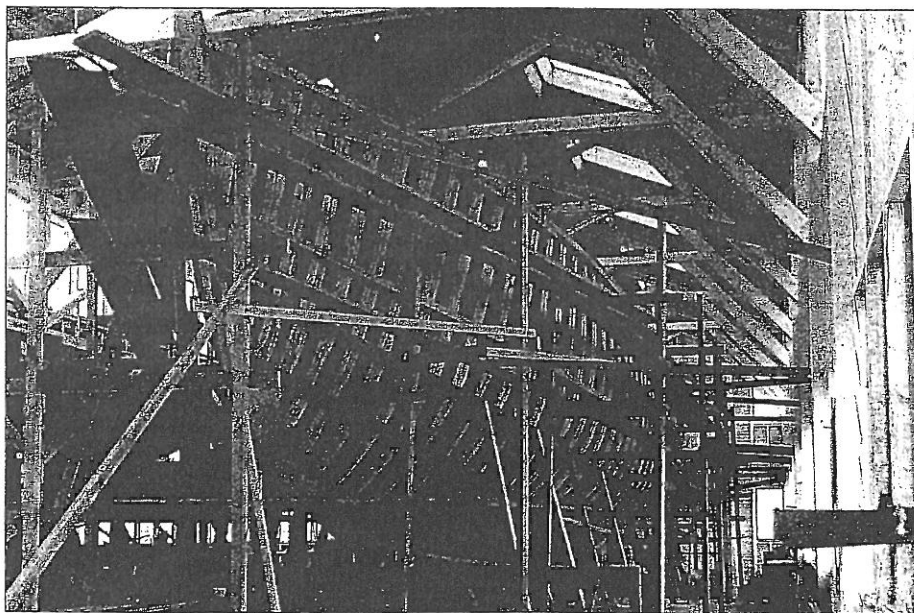
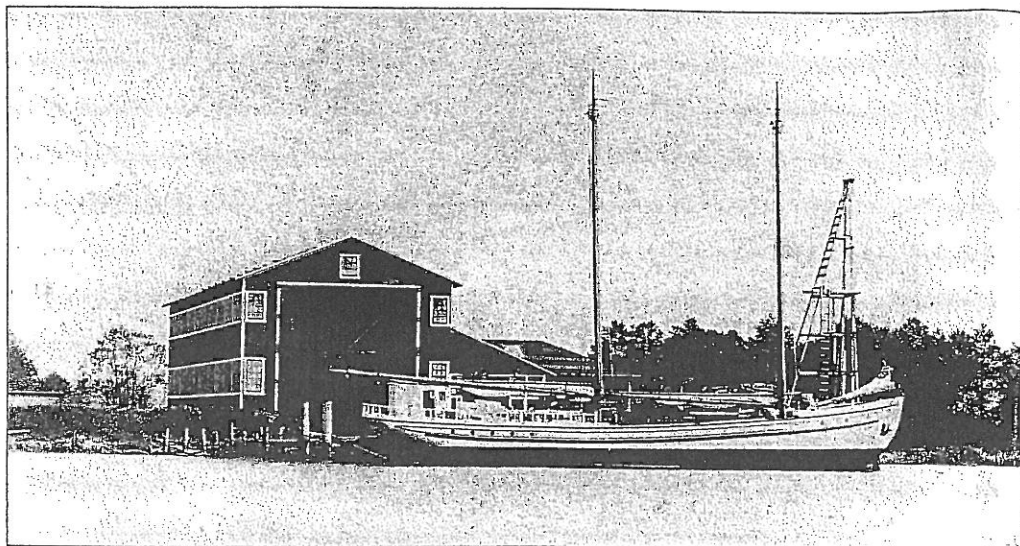
Heath's vessels seemed to prove the point. During a 60-year career, his tug *Vigilant* endured the kind of hard use that vessels rarely received.⁴⁹ His 65-foot *Olympic*, built for a fish-packing company, served as a yacht, a World War I requisition boat, a quarantine vessel, again a yacht, and again a requisition boat in World War II, and after finally returning to civilian service, it carried on for further decades.⁵⁰ But Heath's vindication in the *Clallam* disaster would be only a pyrrhic victory for wood. Tellingly one inspector had observed, "I have examined the *Clal-*

lam. She was as strongly built as any wooden vessel could be."⁵¹ It was true and yet still not good enough. Heath never built another passenger steamer. The *Clallam's* replacement had a riveted hull.⁵²

To its votaries, wood made for a warmer, quieter, and definitely more attractive vessel than steel. It continued in use in yachts for decades to come and remained especially suited to smaller boats. Yet after wood's advantages were all acknowledged, it was clear that strength, vessel speed, safety, and cost favored steel. Steel would take an ever bigger slice of the market.

Five years after the *Clallam* sank, Heath left Tacoma, giving up his yard in 1909 to follow narrowing opportunities. The failed yard was too big for the vessels wanted now. His next enterprise was the first business on Seattle's undeveloped Duwamish River, just upstream from the river mouth. Although nothing more than a pungent expanse of mud, the delta had been strongly boosted by railroad and real estate interests. "The attitude of the railroads toward the project makes the formation of the [industrial] district a certainty," confidently declared the *Seattle Post-Intelligencer*. Its comments were printed below a photograph of Heath's unfinished shed at the top-center of page one.⁵³

But strong political opposition to all industrial schemes curbed Duwamish development.⁵⁴ The shipyard remained isolated on an indolent stream in the midst of a mud wilderness. Heath's five lots, each approximately 60 by 260 feet, comprised far more land than he ever needed. Since he expected the property to appreciate with the railroad-sponsored development of the valley, he wanted plenty of it. He had had a contractor sink some 200 pilings to support his shed and wharf. Afterward, he wrote to the U.S. Army Corps of Engineers informing the corps of his intrusion into a river under its jurisdiction.



Heath's famous 82-foot trading schooner *Polar Bear* was the second boat launched at the Duwamish yard. Her hull took shape inside the shed, where working conditions were primitive, even unsafe, and which provided little more than protection from the weather. Like most vessels, she came down the ways as a bare hull and was completed wharfside in order to allow Heath to work on another hull inside. (Boeing Company Archives, HS3104, HS3101)

Though he had submitted neither an application nor a site plan, he wanted the corps to authorize retroactively the plant he had constructed in a navigable waterway. If the corps refused, he agreed to "remove any portion which you may recommend."⁵⁵ Deferential as his letter was, his method of proceeding was clearly reckless, especially considering the political controversy surrounding

the Duwamish. Fortunately, the corps was in the habit of saying yes and quickly gave its permission.

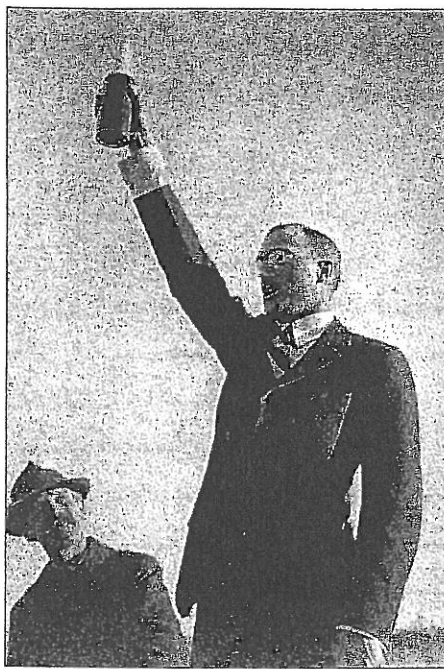
The shipyard was as basic as it could be. The most refined space, the only area even heated, was the front office. Its furnishings were a stove, a "roll top sanitary desk," and five chairs worth a total of \$128.87.⁵⁶ The assembly hall was a

vast, primitive shelter 140 feet long, 60 feet wide, and two stories high, erected over the launchways. It had no interior walls, no heating, no insulation, no sewers, and no lighting. It was also far from being as well equipped as it should have been, and it was too small, Heath knew, to build any more passenger steamers. The yard also had a sizable workshop, a lumber shed, and a tool house, but no loft room for laying out plans. A 104-foot wharf provided more than enough space for finishing boats moored alongside. The layout was typical of small yards with a couple of dozen employees. Heath hired several fine Scandinavian carpenters to do finish work. Other workers were unskilled seamen chosen from among those who crewed the vessels or local boys finding their first job.⁵⁷ It seemed that he knew at least one way of controlling costs.

In fact, he would go bust on the first boat. The *Taconite* was a fast motor yacht for William Boeing, who was then still a lumberman. Boeing, of course, knew of the *Clallam* sinking, but if he had any doubts regarding Heath, it was not apparent. The two men shared a view of craftsmanship. Both were uncompromising perfectionists. Like Heath, the future airplane manufacturer would force employees to redo inferior work. To Heath, building the *Taconite* was desirable work, but he never sought a niche for himself in luxury yachts. Working for Boeing was satisfying because Boeing appreciated excellence.

When the 96-foot *Taconite* slid down the launchways, she was the second-largest yacht on the Pacific Coast. Her furnishings were artistic and costly.⁵⁸ A marine journal observed, "She represents about all that's worthwhile in a comfortable, roomy, seaworthy, ocean-going motor yacht." There was talk of cruising the Pacific Rim, even past Siberia and to the Orient.⁵⁹

Soon after beginning work on the *Taconite*, Heath became insolvent. He had



William Boeing, who the previous month even interrupted the first flight of his first airplane to help with the *Great Bear*, uncharacteristically took center stage to raise a toast at the vessel's June 1916 launching. (Author's collection)

paid creditors only half of the \$17,974.62 he owed.⁶⁰ The property and the buildings he now gave up under terms that were remarkable and a bit mysterious. He turned the yard over to Boeing in March of 1910 for "ten dollars and other valuable considerations."⁶¹ Details of the deal must have involved Boeing paying off the shipyard's mounting debts. There has never been any hint of unfair enrichment from Heath's misfortune.

Boeing had already been bankrolling the business, according to some workers.⁶² With the *Taconite* still under construction, he needed to insulate the yacht from the actions of Heath's other creditors. In buying the yard, Boeing gave the builder what would turn out to be a six-year reprieve from his debts. He became Heath's patron, in effect supporting him and making him the real beneficiary of the \$10 contract. Heath not only remained in the plant but, in

fact, paid no rent. Meanwhile, its timber-baron owner was content to speculate on whether the treeless marsh would ever have any value. It was not until mid-1916 as an airplane manufacturer that Boeing wanted the scruffy plot of delta land for himself.

Heath's second Duwamish launch-
ing was the rugged little 82-foot whaler *Polar Bear*. She was a "trading schooner" intended for bartering, hunting, and adventure in uncharted harbors. It was a "romantic" existence during which she became one of the best-known vessels throughout the North Pacific and Arctic.⁶³ She was, of course, unusually strong. Heath had designed and built her specifically to resist polar ice. By 1910 Arctic whaling was itself all but dead, another good market lost to wood builders; she was the last of her kind built.⁶⁴ Although she carried canvas, she was usually motor-driven, the sails just a vestige from the past.

Her buyer was one of Heath's best customers, Captain Louis L. Lane, a northern trader and adventurer. He was a bigger-than-life waterfront character for whom whaling still meant standing on the prow of an oared boat with a harpoon in his hand. A man of the past, Lane fully appreciated the old saw about how once there had been wooden ships and iron men, but now they had been replaced by iron ships and wooden men. Just the year before, he had lost the schooner *Helen Johnston*, another Heath boat, in a battle with shore ice. Lane and Heath understood each other and ultimately collaborated on three ships.

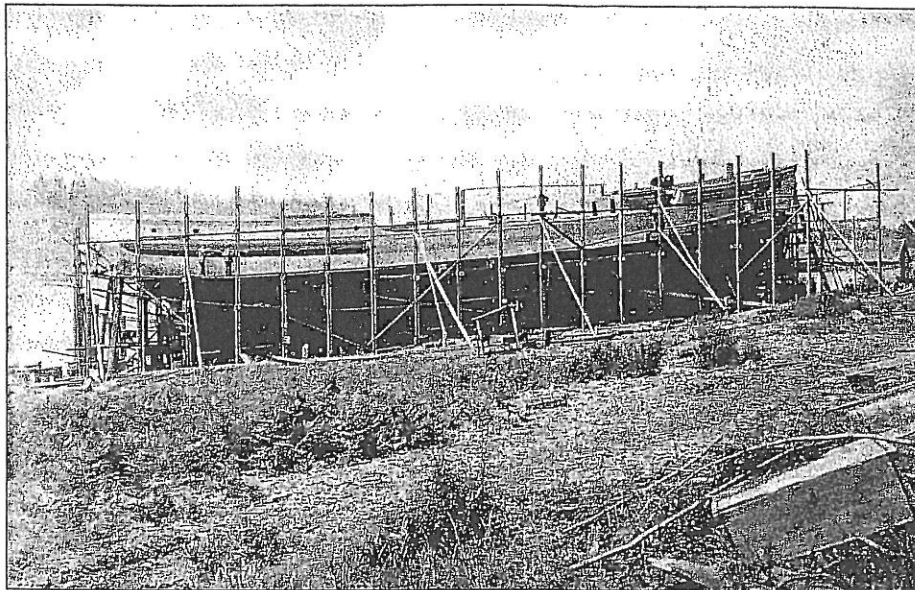
One particularly bad winter the *Polar Bear* survived lying next to shore unscarred while ice sank other ships nearby. She was featured in boating magazines and advertisements that described her as "one of the finest vessels that ever went into the Arctic."⁶⁵ In 1915 Lane sold her to the famous explorer Vilhjalmur Stefansson, who desperately needed a supply boat, extorting

from him far more than she was worth.⁶⁶ With the substantial proceeds, Lane paid another visit to Heath. Boeing, meanwhile, had a millionaire friend from Yale, John Borden, a founder of Yellow Cab and a would-be explorer, who wanted a boat for the Arctic. Borden was planning a polar safari, including a whale hunt. Together he and Lane had Heath design a much larger power schooner along the lines of the *Polar Bear*, but this one was luxurious and even stronger.

The *Great Bear* was the rarest of ships. Her immensely sturdy construction enabled her to do what only few vessels before had done, survive Arctic winters caught in the ice. The 14-inch ribs of her herculean hull were set only an inch apart. On top of the ribs went several inches of planking. And on top of the planking went strips of ironwood and plates of steel that would be worn down scraping through the ice pack. The wood hull appealed for both traditional and romantic reasons; Heath also believed that steel was too brittle for banging through ice.⁶⁷

Newspapers declared the new ark the strongest vessel ever built, stronger even than the explorer Fridtjof Nansen's *Fram*. Years earlier, that vessel, her immensely thick hull locked in ice, had drifted farther north than any ship before. But whereas Nansen was in search of the pole, Borden and Lane were probably seeking the fictional region known as Crockerland—a prize also sought by Stefansson and others. Although the *Fram* had sacrificed space and comfort, the *Great Bear*'s interiors were magnificent. Her white salons and staterooms were as elegant as those on Boeing's yacht. Nothing like the schooner *Great Bear* had been built before, or would be again.⁶⁸

Because she was too large for the shipyard on the Duwamish, Heath built her on Puget Sound. At 137 feet, she was the size of a small steamer. Most of her other features went undocumented: de-



The *Great Bear* was built on an exposed beach in Port Blakely because of her size. The site was inconvenient: during her construction, Heath was overseeing two more crews building longboats and airplane parts in Seattle. (Author's collection)

tails and drawings were never published. That case was not unusual when the designer was also the shipwright, and not a naval architect. Heath built in the traditional manner using a wood half-hull model and some of his own rough sketches. He then transferred proportions from the model and relied on his strong carpentry skills to make everything fit. Generally he started with proven designs, modifying them as he wished. Because the *Great Bear*'s underwater surfaces would be unusual in order to resist the pressure of the ice, Heath designed her largely from scratch, and the vessel itself was the only real set of plans.

The lack of plans had repercussions. Maritime magazines, always on the lookout for interesting vessels, had no drawings to publish. The connection between plans and publication was a problem that Heath never corrected. Without the attention that feature articles provided, the spread of his reputation had to come from owners and those who inspected his vessels. Moreover, word-of-mouth leaves few relics and passes with living memory.

Nonetheless, interest in the remarkable schooner ran high. Newspapers around the country carried the story of the launching. On a fine day in the middle of June 1916, a large, prosperous crowd gathered on the beach at Port Blakely. The ritual breaking of a bottle of champagne over the bow was an imperative that not even Prohibition could prevent. Such flouting of a state law was itself worth mentioning in the press. The forbidden act was performed by Captain Lane's four-year-old daughter; as champagne sprayed down, Heath ordered the lashings cut, and all watched the vessel slip perfectly down the ways.⁶⁹ "My ninety-fourth ship," the exultant builder declared to the reporters. Proudly he added that she had been "not a whit more trouble . . . [than] any of them."⁷⁰ But in fact, the *Great Bear* was seriously behind schedule.

April to June would have been the right time to depart. When she finally left Seattle for the Arctic in late July, it was almost too late. The trip had now become a dash. Rushing north across the Bering Sea on her maiden voyage under both power and sail, hurrying at midnight

through aluminum fog because of the fast-approaching polar winter, and pushing on without a confirmed fix on her location for two whole days in unknown local currents, the *Great Bear* met her end. She smashed straight into the 1,100-foot-high monolith Pinnacle Rock. The great ship had encountered something far stronger than herself.

All the strengths Heath had built into her were there to get the better of ice, but the layers of protection and the specially shaped hull never met their intended adversary. Far below the waterline, the hull had opened up and the sea gushed in. Stanching the flow proved impossible, and before long the engines that ran the pumps were drowned. Heath's beautiful white lifeboats, the last vessels built in the Duwamish yard, were dropped from their special davits into the darkness. As dawn slowly spread a gray light through the fog, a train of little boats made for the safety of tiny, uninhabited St. Matthew Island across several miles of sea.

In Seattle Edward Heath knew that his perfectionism had contributed to the disaster by causing the departure to be so late. He never allowed faults to be reworked—reworking would have permitted the original mistake to remain. Instead, regardless of the time needed, his workmen removed the offending pieces and started over.⁷¹ His love of perfection also meant that he avoided buying off the chandlery shelf. His crew made parts even down to the lifeboat oars.⁷² And naturally, he ran repeated trials to find the right propeller, pulling the ship out of the water after each test. The desire to get everything absolutely right, in the end, had helped put back the departure two months, so late into the summer season that caution was sacrificed for speed.

Still, he had never built a more perfect craft. This time he had been allowed to build almost without regard to cost, and of course, every one of her lines had been his. Of both her unusual strength



The proud shipwright, Edward W. Heath, shown here at age 53 in 1916, during the building of the magnificent *Great Bear*. His attire clearly indicates that he was not a captain of industry but the head of a work crew. (Author's collection)

and refinement he had been justly proud. He was heartbroken at her loss. Although he knew that everyone had survived, his crew at the shipyard observed him weeping when he learned the news.⁷³

While at work on the *Great Bear*, Heath also worked for Bill Boeing, who now wanted the Duwamish facility to build airplanes. Although in 1916 the nation was still trying to decide whether it would enter the European war, Boeing was certain that it would and that it would need airplanes. He took possession of the little red shipyard, leaving the E. W. Heath name still painted across it.

Boeing knew that airplanes, even more than ships, required fine craftsmen, and he asked Heath to stay on. The company's draft operating plan pro-

posed that Heath manage the wood shop. There he would be in charge of making wing ribs, ailerons, fuselage parts, and pontoons. But the plan specified that he needed to become more efficient. A supervisor should "attempt to educate him in labor saving methods and in [the] expedition of work"—"Heath's two weak points."⁷⁴ No one actually did "educate" him, and clearly Heath would have been offended by any attempt. To a master shipwright, the alleged weak points would be better described as the use of trusted methods and the exercise of diligence.

He, nonetheless, gave airplane building a try. Each week in perfect cursive, using an old-fashioned nibbed pen he informed Boeing of how much each member of his crew should be paid.⁷⁵ As always, their exchanges were exact and stiffly correct. Heath and his men built hundreds of wood aircraft parts, small and large, during 1916. The largest were several pontoons for float planes. They "must have cost a fortune the way those mechanics were building them," the test pilot said; Heath's men "wouldn't take any suggestions."⁷⁶

Heath found himself, like other shipwrights who tried airplanes, uncomfortable with the construction standards. Every part needed to be strong, flexible, flawless, and, worst of all, lighter than he thought possible. In the words of shipbuilders the lightweight work could only be called joinery and was even more finicky than cabinetmaking. Flying machines seemed to be made from little more than wood shavings. A breeze through a shop door would blow the thin wood scraps off the workbench. In fact, some of the materials were merely veneer strips. Most shipwrights, Heath among them, chose to return to their declining industry. Open-minded youngsters, George and Richard Pocock, took Heath's place. They gladly used veneer strips glued together crisscross to form lightweight, strong pontoons and flying-boat hulls.⁷⁷

Although the wonder of flight held Boeing in its thrall, the flimsy flying machines meant nothing to Heath. Three-quarters of a year working part-time with shavings and scraps would be his only connection to flying. Proud as he was, he knew that a shipbuilder would never be allowed to lead or hold a position of authority in airplane construction. He would be told what to do every step, and he would have to endure criticism, such as that from the test pilot. He and Boeing parted on good terms.

Since the *Clallam* in 1903, he had built 44 boats by his own count. That came to three a year. As he gathered up his tools late in the summer of 1916, he was pleased to read in a local newspaper that he left behind a record "he can be proud of."⁷⁸ He knew already what life held for him next, having arranged for a better position in Portland, Oregon.

The war, which caused Boeing to try airplane production, had created bold opportunities for Heath, too. An oversupply of ships that existed in 1914 had quickly evaporated. In Europe the belligerent nations stopped building merchant vessels in order to concentrate on warships. Vessel internment and torpedoes removed many commercial craft from service. Shipping fees rose from \$30 per ton to \$150.⁷⁹ Anyone who could find bottoms could make a fortune. Old steel coasters were quickly thrown into ocean service, and older, unseaworthy wood ships took their place along the coast.

American shipyards received a flood of war orders, first from Europe. Their order books grew even larger when the United States entered the conflict. Production went up 169 percent in 1916 over 1914 and would crest at 1,023 percent in 1919.⁸⁰ With existing metal yards booked long into the future, the nation turned again to wood, though many leaders considered the move foolish.⁸¹ The issue became significant

as the government embarked on a great shipbuilding program that gave wood its day.

"Wooden shipbuilding," a marine journalist declared in 1917, "was a lost art which the gods of war decreed must be revived." For 30 months, it seemed that there could not be too many wood ship builders.⁸² In reality, wood was still losing market share. Wood vessels amounted to only 14 percent of the total war tonnage.⁸³ Nonetheless, so long as the gods were propitious, Heath dredged the Willamette River in Portland and drove new pilings. He was again readying a yard to bear his name.

But Heath was not the owner, and he had to settle for being the hired superintendent.⁸⁴ Burdened with three apparent bankruptcies, he must have seemed a poor risk to backers. He now had to defer to a corporate president, a general manager in charge of the day-to-day operations, and a contracting engineer—enough superiors to make sure that he concentrated on the work that earned him his reputation. It was that reputation that would bring in the business. "Heath," a Portland newspaper reported effusively, "is considered to be the most valuable man to be found anywhere in the United States" in the shipbuilding trade.⁸⁵

It was flattering, too, that this was the largest yard he had ever commanded. The yard had four launchways to fulfill the great expectations of its owners. In the next months Portland counted 20 ships under construction, and 6 were Heath's. Soon he had a \$1 million order from Norway for six 270-foot five-masted schooners. Not only was this his largest contract, but also the six ships would be the largest he ever built. Nearly half of the 1,100 shipyard workers in Portland were to report to him.⁸⁶ If the ships had been completed, one of them would have been his 100th vessel. But the following year, despite the favorable wartime business climate, the owners sold the yard and reorganized.⁸⁷

Heath left Portland for a new position on Puget Sound. After the head of the United States Shipping Board had gone around the country making promises of huge imminent contracts, several Tacoma businessmen incorporated a large yard with \$300,000.⁸⁸ The Tacoma Shipbuilding Company was hastily thrown up for the war effort and opened under Heath but not under his name. It was a far cry from the \$25,000 businesses that he had started on his own in former days.

Tacoma Shipbuilding chose Heath, it said, because of his reputation. He arrived to take charge of building four launchways and designing and building the plant's office, restaurant, storeroom, compressor room, and loft space. In these expansive times, even the loft itself was large enough to lay out a small ship full scale.⁸⁹ The first four vessels were 268-foot, 3,500-ton standard-design wood freighters. It was tonnage on a scale unimaginable two years before.

Ship construction, like much emergency war work, tended to become a boondoggle. The government denied Tacoma Shipbuilding one of its major advantages: the company had located next to a lumber mill that could supply long, heavy timber, but bowing to political forces, the government allotted the timber to competitors in the eastern and gulf states. And according to the company's president, the government inspector insisted on examining "every piece of timber and every detail of workmanship." The interruptions of production were extremely costly. Though the freighters were standard government-designed vessels, Heath as the company's expert was to spot deficiencies and was responsible for many of the 500 changes that the firm made. Although contractors could claim compensation for changes, the claims process was difficult and, worse yet, slow. Tacoma Shipbuilding made the changes and faced "a staggering amount of bookkeeping."

After delivering the initial four ships, the firm won another contract for four more. Completion of any vessels was a significant achievement; nationally, most were not ready on time and, in fact, not delivered until after the war ended. But payment was delayed until the Shipping Board could audit the financial ledgers. Because the board experienced a rapid turnover of officers and each new commissioner wanted to start over from the beginning, the process never seemed to end. The company fulfilled the second contract—completing a total of eight ships—and had two larger vessels half-finished on a pair of ways it had optimistically added for 5,000-ton vessels. By the time the government paid, two years later, Tacoma Shipbuilding had liquidated the property, buildings, and site.

No one, not even the government, reaped any rewards. One reason for the debacle was mismanagement of the federal program, but another was that Heath, as he always would, aimed too high. Building superior freighters was a poor decision. Because of the lengthy delay in payment, there was considerable real loss due to inflation, and the firm showed a paper profit over four years of only 1 percent.

Ship construction went far better than billing at Tacoma Shipbuilding. The freighters *Beloit*, *Coloma*, *Fort Wright*, and *Fassett* had been launched in 1918, though it is unlikely that any reached the war zone. Long after the end of hostilities, the *Dione*, *Fort Harrison*, *Fort Jackson*, and *Fort Union* were converted to barges. The contract for the *Dedona* and *Dolon* was canceled and the unfinished vessels were torched.⁹⁰ The company's 80 percent completion rate was nearly double the average for contracting yards of the period.⁹¹

Turning the forest into a fleet proved a failure. Timber took many months to cut, transport, saw, and, most of all, season. As a result, much of the war emergency fleet was built with green lumber.

Jokes circulated about the vessels sprouting. House carpenters swarmed in to get a piece of the business, and inexperience and haste threatened to collapse the whole program.⁹² One Grays Harbor yard built a freighter in 18 days.⁹³ In the frantic, careless war months, a painstaking builder like Heath labored at a big disadvantage. The war turned out to be less of an opportunity than it first appeared.

Heath was gone from Tacoma before war's end and off to still another job. The company's plan to build in steel would have reduced his influence or even eliminated his position. In August 1918 he assumed a post in Olympia with "greater responsibility." Limitations on the authority granted him were not a new issue, of course, and as superintendent at the Sloan Shipyards Corporation he was not in charge. But once more he was lauded; he was "one of the best wood ship builders on the Pacific Coast."⁹⁴ For a while the contracts with the U.S. and Australian governments held great promise for Sloan. However, it too overbuilt; it had 14 launchways.

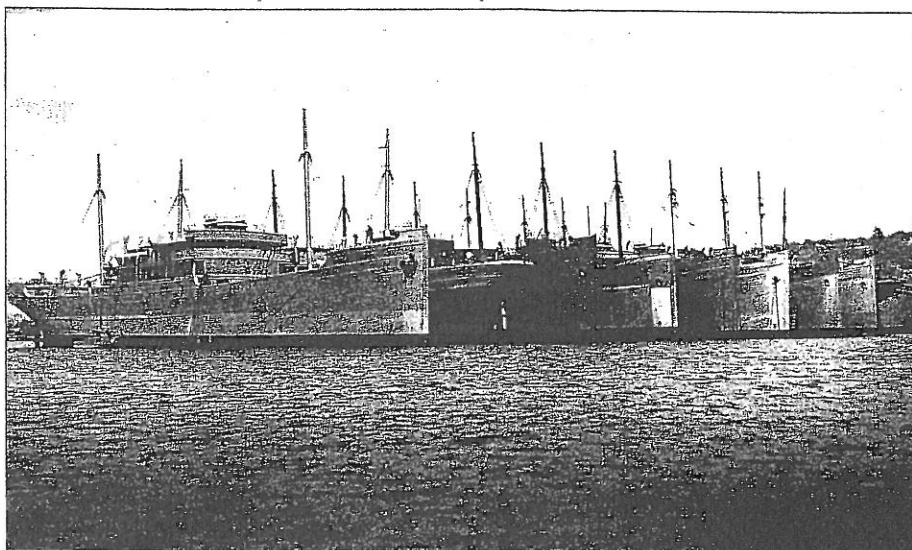
Following the Armistice in November,

"rotten rows" of unwanted vessels rafted together waited in harbors for someone to find a use for them, but the shipping surplus stretched into the early twenties. There were wood shipyard closings, and experienced hands faced new competition from the house carpenters pulled in by the war. Worse still, steel shipyards, now many times their prewar number, built the larger, faster peacetime ships that customers wanted and insurers demanded.⁹⁵ Deserted by the gods of war, wood became just a small fractional adjustment tacked on to the metal tonnage.

It was hardly worthwhile for waterfront journals to write about the market for wood boats. Maritime pages now focused on larger-scale industrial activities. The aging Heath, back in Seattle, built a number of small vessels, but no longer were these featured or even mentioned in the press. The silence was an unmistakable sign that wood, except for yachts, was of negligible interest.

A call then came from California, and Heath headed south to take charge of "the boats and other marine activities of

Among the 50 transports on the "Wilson Wood Row" in postwar Seattle were several built by Heath. Despite the original cost and the enormous amount of lumber in them, and regardless of whether they were well built or shoddy, almost none were used as freighters. (MOHAI, Williamson Collection, 4642-12)



the Don Lee broadcasting enterprise." Don Lee, who owned Cadillac agencies and a string of Mutual Network radio stations, was a household name in the West. About 1927 he bought one of John Borden's former yachts, the massive *Invader*. But whatever work he hired Heath to do soon came to an end. The shipbuilder returned to Seattle to reenter the Northwest shipbuilding business.⁹⁶

His course had stretched from Benton Harbor to Seattle, then to Everett, and on to Tacoma, to Seattle, to Portland, to Tacoma, to Olympia, to Seattle, to California, and finally back to Seattle again. Dragging anchor, as contemporary mariners would have characterized his frequent relocations, testified to a life of hardships. He had, even as owner, lived in the shipyards. During the years at the Duwamish yard, which lacked almost everything, including lighting and toilets, his workmen lived better than he did. His periods as someone else's employee, humbling though they were, were surely Heath's most prosperous.

Late in life, at age 56, he had married for the first time. Harriet V. joined him in Olympia in 1919 and 15 years later placed his remains under a simple ground-level stone. Sadly, but somehow not surprisingly, it now lies completely submerged beneath a sea of grass in Seattle's Lakeview Cemetery. He died March 17, 1934, of a coronary thrombosis, a far poorer man than his father. The last mention of one of the waterfront's "best known and respected men" was his obituary notice.⁹⁷

Heath's successes were small and typical of his declining trade. America already had other interests than the sea

and other heroes than mariners by the time of the First World War. Ford, Bell, and Edison were the sort of industrial figures being venerated by the public in the early 20th century. It was increasingly a consumer society with an ascendant majority of workers and professionals. They chose to bestow honors on the efficient mass producers who satisfied middle-income desires. In large measure, the industrial idols were purveyors of everyday items. Falling outside popular interest, of course, were the craftsmen and artisans serving the wealthy and elite. Regardless of his achievements, a shipbuilder would receive few laurels.

Heath's splendid yachts helped set the wealthy apart, and his commercial vessels earned their owners even more influence and money. Unlike the middle-income consumer, the wealthy still supported rare, costly, beautiful, or idiosyncratic work. These buyers were also some of the last private patrons. William Boeing, for one, provided Heath a subsidized opportunity to continue his work, an arrangement from which Boeing received nothing more than the aesthetic pleasure of watching him build fine wood boats.

For Heath wood was emblematic of hand craft, personal toughness, dedication, aesthetics, and the very salt of the sea. To favor wood put excellence above efficiency. It was not by chance that authors like Jack London wrote of wood boats, nor was it accidental that wood builders never tried to make wood modern. Noble ideals overrode ease, schedule, speed, size, and price. For Heath a life's output was a mere 100-plus vessels, all crafted for the dwindling few seafarers who appreci-

ated how perfectly two planks could fit together.

Unfortunately, in the 20th century, to build wood ships and especially great wood ships, brought meager rewards. Shipwrights who built in steel led easier lives, even though they too struggled. Meanwhile builders of aircraft, from Airbus back to Zeppelin, became legends, as did the renowned Boeing with whom Heath passed up his chance. Not because airplanes lacked wood did he make that choice, but because they lacked so many of the traditional ideals of the wood craftsman.

His ideals were his undoing. He missed reward in the 20th century because he aimed for success in the 19th. Luckily for Heath, boom times now and then helped him out. However, even if good times had prevailed in his declining industry, it is doubtful that he would have enjoyed a prosperous, stable life. His financial woes also sprang from a penchant to build boats that were "too good."⁹⁸ Even his employees knew it. "Heath," one said, "always put more into a ship than he got out."⁹⁹ The consequences were inevitable.

Wood lost its battle with steel; the sea ceded half its territory to the sky; and perfection laid down its arms before efficiency. The shipwright Edward Heath was one of many ruined in the unceasing assault of the new upon the old.

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1. A strong trend toward corporate ownership replaced individuals even in wood yards. Heath's yards were small compared to those owned by corporations.
2. Roy Wilmarth Kelly and Frederick J. Allen, *The Shipbuilding Industry* (Boston,

1918), 43-45.

3. Between 1890 and 1900, ship construction increased 112 percent. U.S. Dept. of Commerce, *Twelfth Census of the United States Taken in the Year 1900, Manufactures*, Vol. 7, Part 1 (Washington, D.C., 1902), cliii-cliv.

4. John G. B. Hutchins, "History and Development of the Shipbuilding Industry in the United States," in Frederick G. Fassett, *The Shipbuilding Business in the United States of America* (New York, 1948), 40; and William J. Williams, *The Wilson Administration and the Shipbuilding Crisis*

- of 1917: *Steel Ships and Wooden Steamers* (Lewiston, N.Y., 1992), 8.
5. Hutchins, 38-40.
 6. *Twelfth Census, Manufactures*, Vol. 10, Part 4, pp. 215, 224. The figure 36 is likely to be a low estimate for wood shipyards in Washington.
 7. *Ibid.*, 215, 217, 222, 224.
 8. U.S. Dept. of Commerce, *Fourteenth Census of the United States Taken in the Year 1920, Manufactures*, Vol. 10 (Washington, D.C., 1923), 1023.
 9. *Ibid.*, 1024.
 10. Hutchins, 38-40. For example, wood builders opposed establishing a "standard" ship during the war, though standardization would have benefited their industry.
 11. A. Campbell Holmes, *Practical Shipbuilding: A Treatise on the Structural Design and Building of Modern Steel Vessels* (New York, 1917), v.
 12. Myron Huckle memoir (n.d.), n. pag., Boeing Company Archives.
 13. See Scott M. Peters, "Edward W. Heath: 'General Shipbuilder'" (typescript, ca. 1992), n. pag., Michigan Historical Museum, Lansing; and records at Lakeview Cemetery, Seattle.
 14. Peters; *Oregon Journal* (Portland), Aug. 16, 1916.
 15. Orville W. Coolidge, *A Twentieth Century History of Berrien County, Michigan* (Chicago, 1906), 236.
 16. "Ship Builder List," Institute for Great Lakes Research, Canal Park Visitor Center, Duluth, Minn.
 17. R. L. Polk and Co., *Michigan State Gazetteer and Business Directory, 1891-92* (Detroit, 1892), 31.
 18. Kelly and Allen, 222.
 19. Heath signed estate documents in Michigan in June 1898 for his father—Berrien Co. Probate Court Deceased File No. 2657, Berrien County Historical Association, Berrien Springs, Mich.—and launched the *Seward* in Seattle in 1899. Peters.
 20. *Seattle Post-Intelligencer*, April 3, 1904 (hereafter cited as *P-I* with appropriate date). There is no evidence that Heath worked in metal or that Moran brought him west.
 21. Not long after her construction, "malicious reports" in Tacoma and San Francisco claiming that the *Seward* was unseaworthy were repudiated in the *P-I*, Nov. 21, 1900.
 22. *Ibid.*, April 3, 1904.
 23. Gordon Newell, ed., *The H. W. McCurdy Marine History of the Pacific Northwest* (Seattle, 1966), 342 and 418. The *Aurora* sailed from 1901 to 1932.
 24. R. L. Polk and Co.'s *Everett City Directory and Snohomish County Directory* (Seattle, 1901).
 25. Newell, 140-41. She was an old-fashioned side-wheel steamer, although built for new-fangled horseless carriages.
 26. *Tacoma Daily News*, April 2, 1904. *Railway and Marine News*, November 1916, p. 37. Heath had adapted the *Jefferson* from the steamer *James Dollar*.
 27. *Ibid.*, April 1, 1904.
 28. *Ibid.* Also see Lloyd M. Stadum, "The Alaska Lines," *Sea Chest: Journal of the Puget Sound Maritime Society*, Vol. 16 (September 1982), 35-41; and Lucile McDonald, *Alaska Steam: A Pictorial History of the Alaska Steamship Line* (Anchorage, 1984).
 29. *News*, April 4, 1904; *P-I*, April 3, 1904. Excessive praise and questionable judgment were common in the era's newspapers.
 30. *Railway and Marine News*, November 1916, p. 37.
 31. Stadum, 36.
 32. The accusing editorial has proven elusive. According to the *Tacoma News*, Jan. 12, 1904, it appeared in the *Seattle Times*. A "pioneer steamboat man" declared that "it is almost a certainty that the *Clallam* sprung a leak," *Seattle Times*, Jan. 13, 1904.
 33. See, for example, *P-I*, Jan. 20, 1904.
 34. *Tacoma Daily Ledger*, April 16, 1903; and Gordon Newell, *Ships of the Inland Sea: The Story of Puget Sound Steamboats* (Portland, Oreg., 1951), 137.
 35. *Tacoma News*, Jan. 13, 1904.
 36. *Ibid.*, Jan. 16, 1904.
 37. *P-I*, Jan. 20, 1904.
 38. *Victoria Daily Colonist*, Feb. 16, 1904; *P-I*, Jan. 19, 1904.
 39. *P-I*, Jan. 20, 1904.
 40. *Ledger*, Jan. 20, 1904.
 41. *Seattle Times*, Jan. 19, 1904.
 42. *Ledger*, Jan. 20, 1904.
 43. *P-I*, Jan. 20, 1904.
 44. *Ibid.*, Jan. 19, 1904. Other crew members also testified that the hull was tight.
 45. *Times*, Jan. 19, 1904. Many of these witnesses had business connections that might have influenced their testimony. The crew members divided over who was responsible. *P-I*, Jan. 22, 1904.
 46. *Times*, Jan. 20, 1904.
 47. *Colonist*, Feb. 16, 1904. Heath's vindication was also Puget Sound Navigation Company's. Primary blame was placed on DeLauney and secondary blame on Captain Roberts. In following days the paper printed criticism of the conclusion.
 48. *Pacific Motor Boat*, January 1909, p. 25.
 49. Newell, *McCurdy*, 423. Michael Skalley, *Foss: Ninety Years of Towboating* (Seattle, 1981), 90-92.
 50. As the *Moby Dick*, she belonged to Horace McCurdy, an important maritime industrialist best known for publishing the widely used *H. W. McCurdy Marine History of the Pacific Northwest*.
 51. *Tacoma News*, Jan. 14, 1904.
 52. Puget Sound Navigation replaced the *Clallam* with the 180-foot steel *Indianapolis* built in the East; Gordon Newell, *Pacific Steamboats* (Seattle, 1958), 85.
 53. *P-I*, Jan. 6, 1910. The building in the seventies became part of the Museum of Flight in Seattle and was moved to Boeing Field. Although it is presently called the Red Barn, the name was neither Heath's nor Boeing's. Red paint was cheap, widely used on barns, and probably used by Heath as well.
 54. Suzanne B. Larson chronicles the controversies in "Dig the Ditch!" *The History of the Lake Washington Ship Canal* (Boulder, Colo., 1976). Local government was reluctant to invest in services.
 55. See Edward Heath records dated Feb. 3, 1913, and Sept. 29, 1909, Boeing Company Archives.
 56. 1910 audit of "Heath Yard Plant," *ibid.*
 57. Author's conversation with families of the crew; construction photographs.
 58. Newell, *McCurdy*, 190; *P-I*, June 7, 1911.
 59. Henry J. Gielow, "A New Seattle Deep Sea Cruiser," *Pacific Motor Boat*, May 1910, p. 25. Gielow was the New York naval architect who designed the *Taconite*.
 60. Undated Heath records relating to Plant One from 1910, Boeing Company Archives.
 61. Bill of Sale, March 23, 1910, *ibid.*; some authors, in suggesting that money was the major compensation, leave readers to conclude that \$10 was either astonishingly cheap or the quaintly negligible value of the property in 1910.
 62. Huckle memoir.
 63. Standard Gas Engine Co., "Frisco Standard" *Book of Boats* (San Francisco, 1917), 9.
 64. John Bockstoce, *Steam Whaling in the Western Arctic* (New Bedford, Mass., 1977), 14. Although Arctic whaling ended, shore whaling continued along the Pacific coast and elsewhere.
 65. Standard Gas Engine Co., 11.
 66. Because Stefansson paid so exorbitant a price, he was later forced onto the defensive and declared the *Polar Bear* the ideal ship for his work.
 67. The view that steel was too brittle was widely held, and brittle metal plate has recently been identified as a contributing factor in the sinking of the *Titanic* after a relatively minor brush with ice.
 68. *Seattle Times*, July 26, 1916. Exploration of the Arctic by ship halted with the explorer Roald Amundsen's failed postwar attempts. By the middle of the 1920s, Amundsen took exploration aloft, and it was quickly completed.
 69. *P-I*, June 15, 1916; *Times*, June 15, 1916.
 70. *P-I*, June 15, 1916.
 71. Author's interview with Robert Kilian, son of the assistant engineer, Bernhard Kilian, Jan. 22, 1997.
 72. Weiss family photo collection.
 73. Huckle memoir.
 74. Draft organization chart (ca. 1916), Boeing Company Archives. Also see Claude Hill interview, ca. 1955, *ibid.*
 75. Heath to Boeing, March 8, 1916, *ibid.*
 76. Herbert Munter interview, ca. 1955, *ibid.*
 77. Using methods similar to those employed in airplane construction, the Pooocks later went on to national distinction building crew racing shells.
 78. *Duwamish Valley News* (Seattle), Aug. 25, 1916.