THE HISTORY OF THE PORT OF COOS BAY

1852-1952

by

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A Thesis

Presented to the Faculty of the Graduate School of

Pan American University

In Partial Fulfillment

of the Requirements

for the Degree

Master of Arts

Pan American University

Edinburg, Texas

August 1983

THE HISTORY OF THE PORT OF COOS BAY

1852-1952

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DATE: October 20, 1983

PREFACE

This is a study of commercial growth in the Coos Bay, Oregon region and of the physical improvements to the Port of Coos Bay which accompanied that growth during the one hundred years following modern settlement. The history of industrial development at Coos Bay has been shaped by the abundant natural resources found there and by the geographical isolation of the area. The Port of Coos Bay has been the primary means by which that isolation has been relieved and through which those resources have been marketed. Although a considerable body of literature about Coos Bay exists, no previous work deals solely with the economic development of the region as it relates to the improvements to the port. This study attempts to show not only the chronology of events during the period, but also the relationship between the commercial growth of the region and the governmental improvements to the port which followed and paralleled that growth.

At least two masters' theses deal with Coos Bay: John Rudolph Feichtinger's "A Geographic Study of the City of Coos Bay and Its Hinterland" (University of Oregon, 1950), and Robert E. Johnson's "Schooners Out of Coos Bay" (University of Oregon, 1953). Johnson's work is a specialized study of the shipbuilding industry at Coos Bay, while Feichtinger's is a more general study of the physical and cultural geography of the area. A background history of the cargo-mill

trade, in which Coos Bay figured prominently, has been presented by Thomas R. Cox in Mills and Markets: A History of the Pacific Coast Lumber Industry to 1900 (Seattle, 1974). In addition there are two excellent modern works which deal specifically with the general history of Coos Bay: Stephen Dow Beckham's Coos Bay: The Pioneer Period, 1851-1890 (Coos Bay, Oregon, 1973), and Nathan Douthit's The Coos Bay Region: Life on a Coastal Frontier (Coos Bay, Oregon, 1981).

Primary source material for this study came from the annual reports of the Chief of Engineers, United States Army. Those reports provided both the chronological narrative of the official improvements to the port and the commercial statistics of traffic through the port. Additional information was taken from other government documents, especially the Congressional publications of the War Department and Department of Defense surveys of the harbor upon which appropriations were based. More than a dozen newspapers have been published at Coos Bay since the establishment of the first towns on the bay, and much of the information about sawmills, coal mines, railroads, and routine shipping came from those sources. The North Bend, Oregon Coos Bay Harbor provided especially good coverage of area commercial development for the period from 1910 to 1940.

I wish to acknowledge the aid given to me in the research and preparation of this study by the following agencies and individuals: the library staff of the University of Oregon at Eugene; the Government Documents Librarian at the University of Washington, Seattle; the staff of the National Archives and Records Service, Region 10, Seattle; the staff of the Oregon Historical Society, Portland; the staff of the library at Southern Oregon State College, Ashland; the staff of the

library at Southwestern Oregon Community College at Coos Bay; the staff of the Coos County Cooperative Library Service; the staff of the Coos Bay Public Library; the staff of the North Bend Public Library; the staff and office of the Coos County Clerk at Coquille; Hazel Standeven and Doug Borgard, Curators of the Coos County Historical Society Museum at North Bend; the staff of the Oregon Institute of Marine Biology at Charleston; the personnel of the Port of Coos Bay; and the many individuals of the Coos Bay area who have expressed their interest in and support of this study. With the help of Ward Robertson I was able to see Coos Bay and the surrounding area from the air; an experience of great value in visualizing the geography of Coos Bay. The late Harold G. Savage of Coos Bay aided in this study by pointing out some of the forces which influenced the history of the port during the period from 1910 to 1950. My special thanks to my major advisor at Pan American University, Porter A. Stratton, for his unending patience and editorial guidance. Finally, I extend my love and gratitude to my wife, Elaine Galstad Case, who has aided me throughout the time which has gone into this study with her critical readings of the manuscript and her unflagging interest and support.

Coos Bay, Oregon

September, 1983

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Coos Bay is a modern deep-water harbor located on the Oregon Coast mid-way between Puget Sound and San Francisco Bay. It is isolated from the interior by the low, rugged mountains of the Coast Range. Permanent modern settlement occurred at Coos Bay in 1853, and exploitation of the region's coal and timber resources followed. The lumber and mining industries which developed at Coos Bay depended almost entirely on ocean transportation for the delivery of their products to market. Major engineering improvements to the entrance and harbor were undertaken by the United States Army Corps of Engineers, beginning about twenty-five years after the first White settlement. An experimental training jetty was started inside the harbor in 1880, but abandoned after several years' work. A successful single external jetty was built on the north side of the entrance between 1890 and 1901. The first dredging of the inner harbor was carried out in 1899 and inner channel work and deepening took place on a regular basis thereafter. A special dredge was developed by the Corps of Engineers

for use at Coos Bay. The old jetty at the entrance was completely rebuilt in the 1920's, and a companion jetty at the south side of the the entrance was constructed at the same time. Channel deepening through rock ledges in the outer harbor took place during the 1920's and early 1930's, and the jetties were rebuilt again just prior to the Second World War.

The coal mining went into a decline after the discovery of oil in California early in the twentieth century, but the lumber industry grew at Coos Bay, despite market fluctuations and intense competition from other mills in the Pacific Northwest. In 1907-08 one of the largest sawmills in the country was built at Coos Bay, and that mill brought area capacity to almost one million board feet of lumber a day. The Coos Bay mills were all cargo mills; located at the water's edge so that their output could be loaded directly into ships. Their dependence on water transportation was lessened somewhat in 1916, when the bay was linked to the outside by railroad. That railroad and the bridge and highway building of the 1920's and 1930's also allowed timber to be brought in from the more distant reaches of the Coast Range for processing and shipment at Coos Bay.

Local interests lobbied for government aid in improving the harbor, but after the formation of the Port of Coos Bay as a municipal corporation in 1909 over one million dollars in local taxes were also spent in works at the port. Federal and local improvements through the years allowed increasingly large shipments from the port, despite setbacks during both the First and Second World Wars. The beginnings of an important export trade with the Orient dates from 1921, and trade with Japan helped to alleviate the economic Depression of the 1930's.

The impact of the Depression was also blunted somewhat by the establishment of veneer plants at Coos Bay. Those plants specialized in the manufacture of labor-intensive products such as battery separators and venetian blind slats, although those industries added little to the tonnage shipped from the port. The productive capacity of Coos Bay's sawmills only became fully utilized following the end of the Second World War, when declining timber reserves in other sections of the Northwest brought the standing timber of the isolated Coos Bay region into heavy demand. In 1983 Coos Bay is the most important port between San Francisco and the Columbia River.

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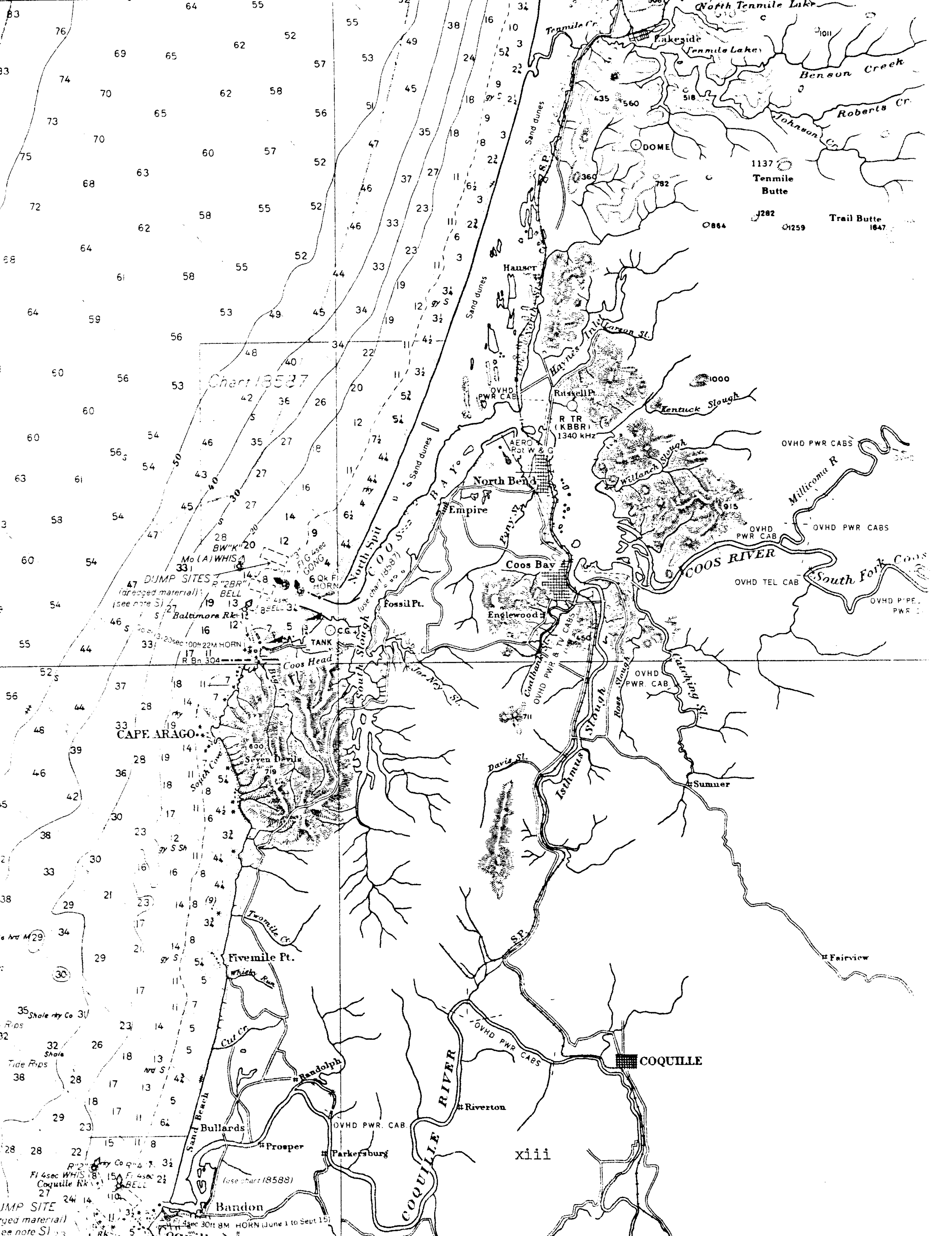
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Tenmile Cr.
Lakeside
Tenmile Lake
Benson Creek
Roberts Cr.
Johnson Cr.
DOME
Tenmile Butte
Trail Butte
Sand dunes
Hauser
Haynes Inlet
Larson Sl.
Chart 18587
OVHD PWR CAB
Russell Pt.
R TR (KBBR) 1340 kHz
Kentuck Slough
AERO
OVHD PWR CABS
Willanch Slough
Millicoma R
North Bend
Empire
North Spit
COOS BAY
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COOS RIVER
South Fork Coos
OVHD TEL CAB
OVHD PWR CABS
Coos Bay
Mo (A) WHIS
DUMP SITES (dredged material) (see note S)
Baltimore Rk
Fossil Pt.
Englewood
TANK
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Joe Ney Sl.
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Catching Sl.
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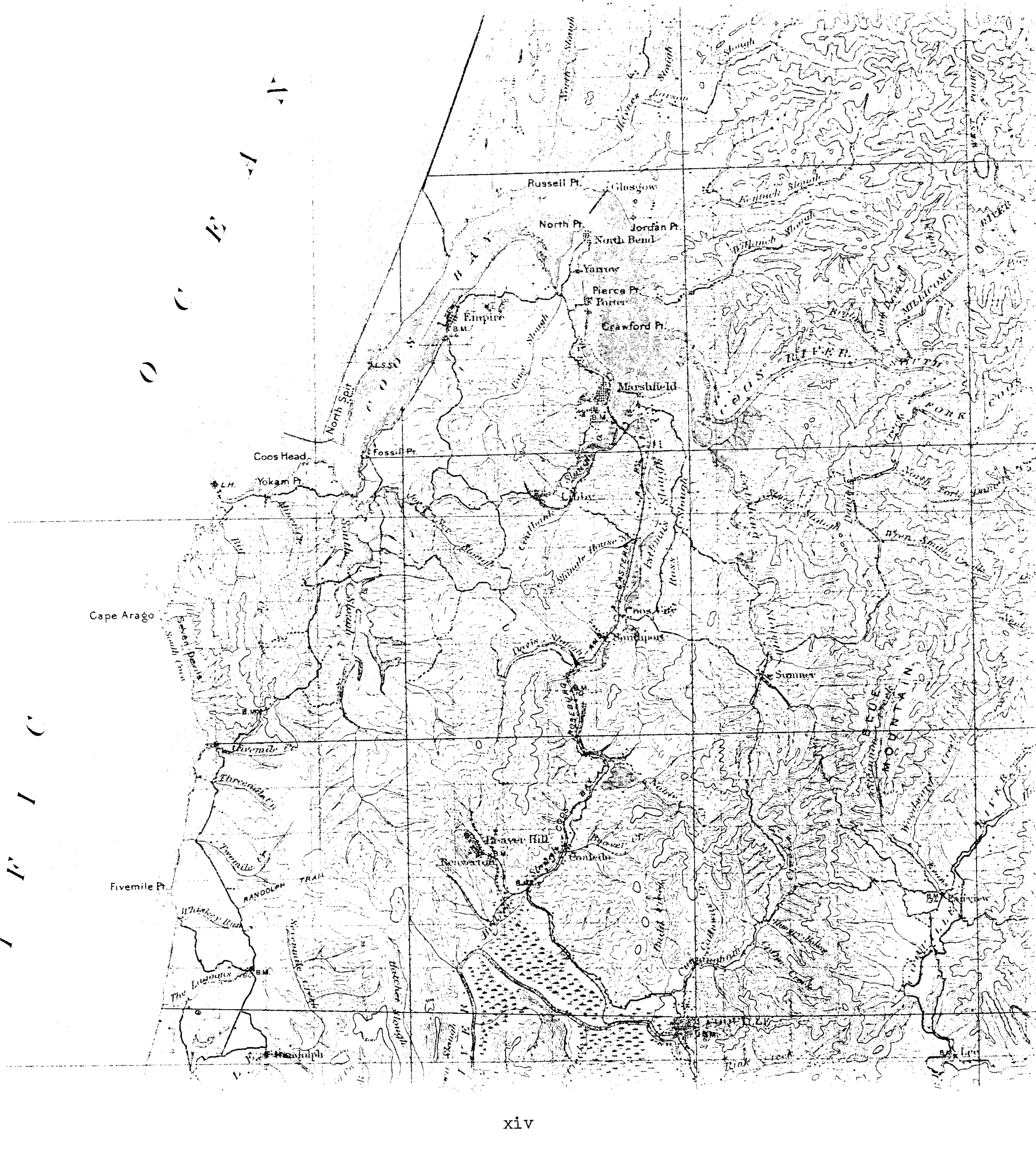
COQUILLE
Randolph
Riverton
COQUILLE RIVER
Sand Beach
Bullards
Prosper
Parkersburg
OVHD PWR. CAB
Coquille Rk
(use chart 18588)
Bandon
DUMP SITE (dredged material) (see note S)
HORN (June 1 to Sept 15)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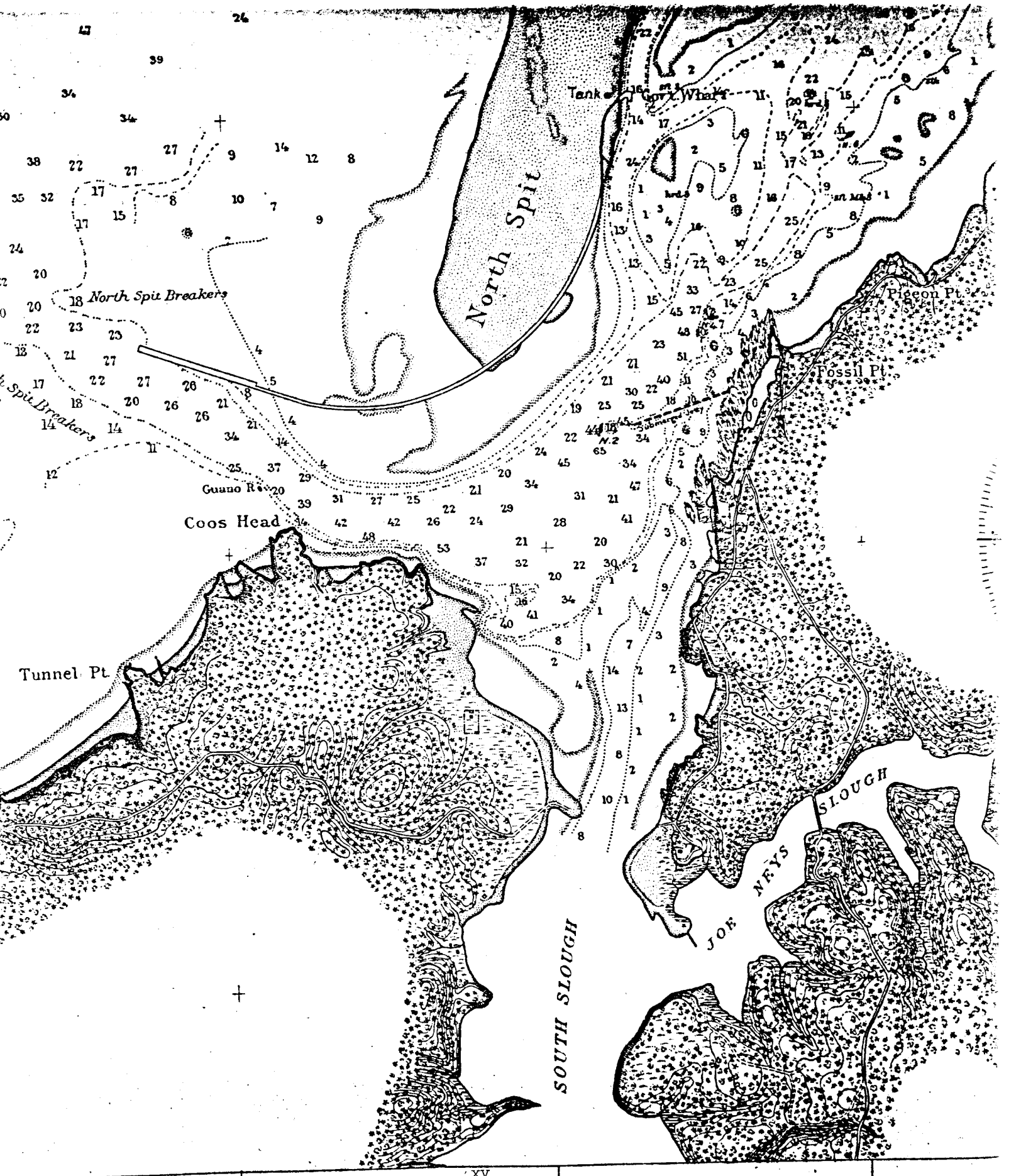
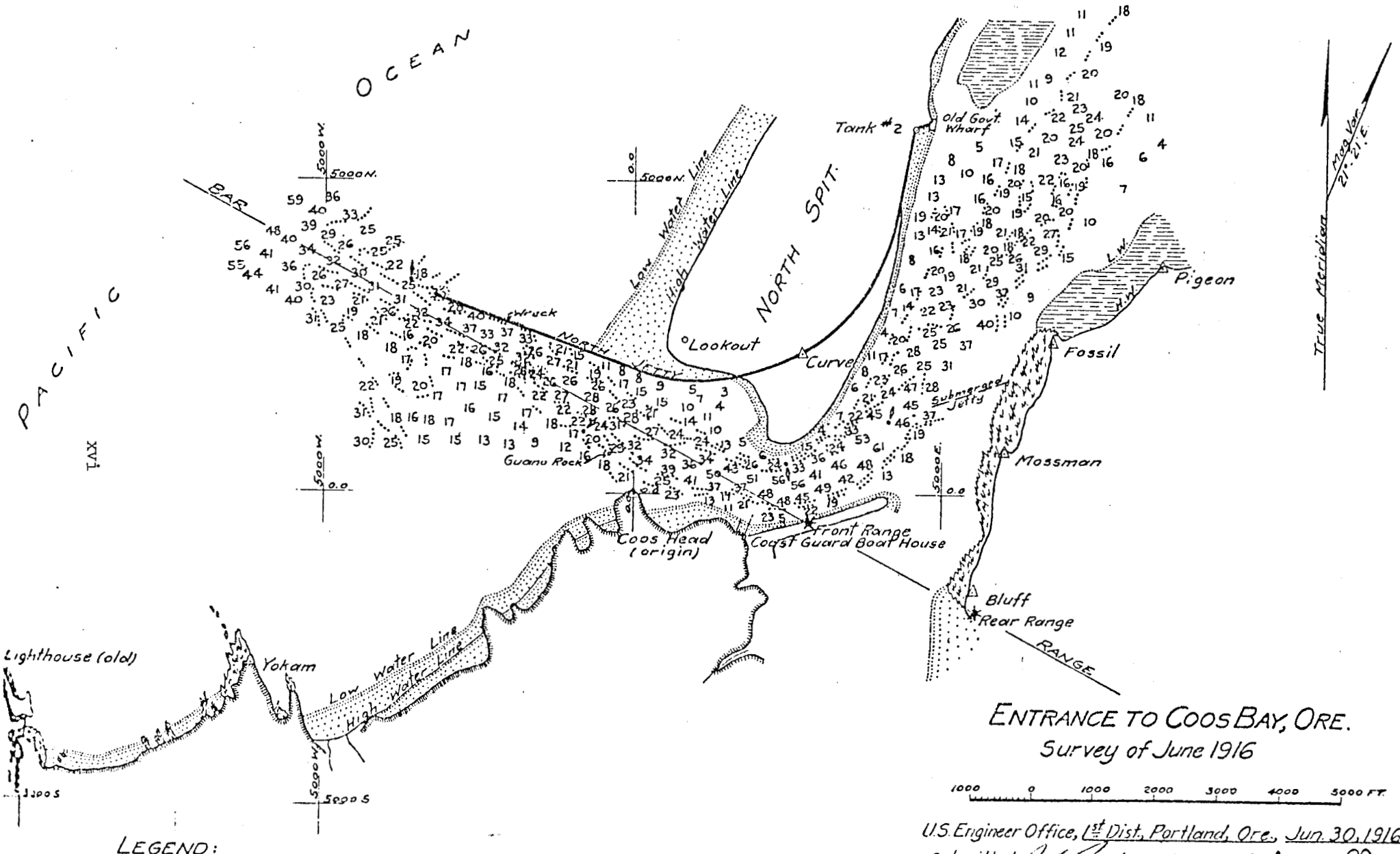
Glasgow
North Pt.
Jordan Pt.
North Bend
Yarrow
Pierce Pt.
Porter
Empire
B.M.
Crawford Pt.
C O O S B A Y
COOS RIVER
Marshfield
North Spit
Coos Head
Fossil Pt.
Yokam Pt.
L.H.
Cape Arago
Coos City
Southport
Sumner
BLUE MOUNTAIN
Beaver Hill
Fivemile Pt.
RANDOLPH TRAIL
Fairview
Randolph


North Spit
North Spit Breakers
Tank
Gov't Wharf
Pigeon Pt.
Fossil Pt.
Guano R.
Coos Head
Tunnel Pt.
SOUTH SLOUGH
JOE NEYS SLOUGH

21' 124° 20' 19



ENTRANCE TO COOS BAY, ORE.

Survey of June 1916

LEGEND:

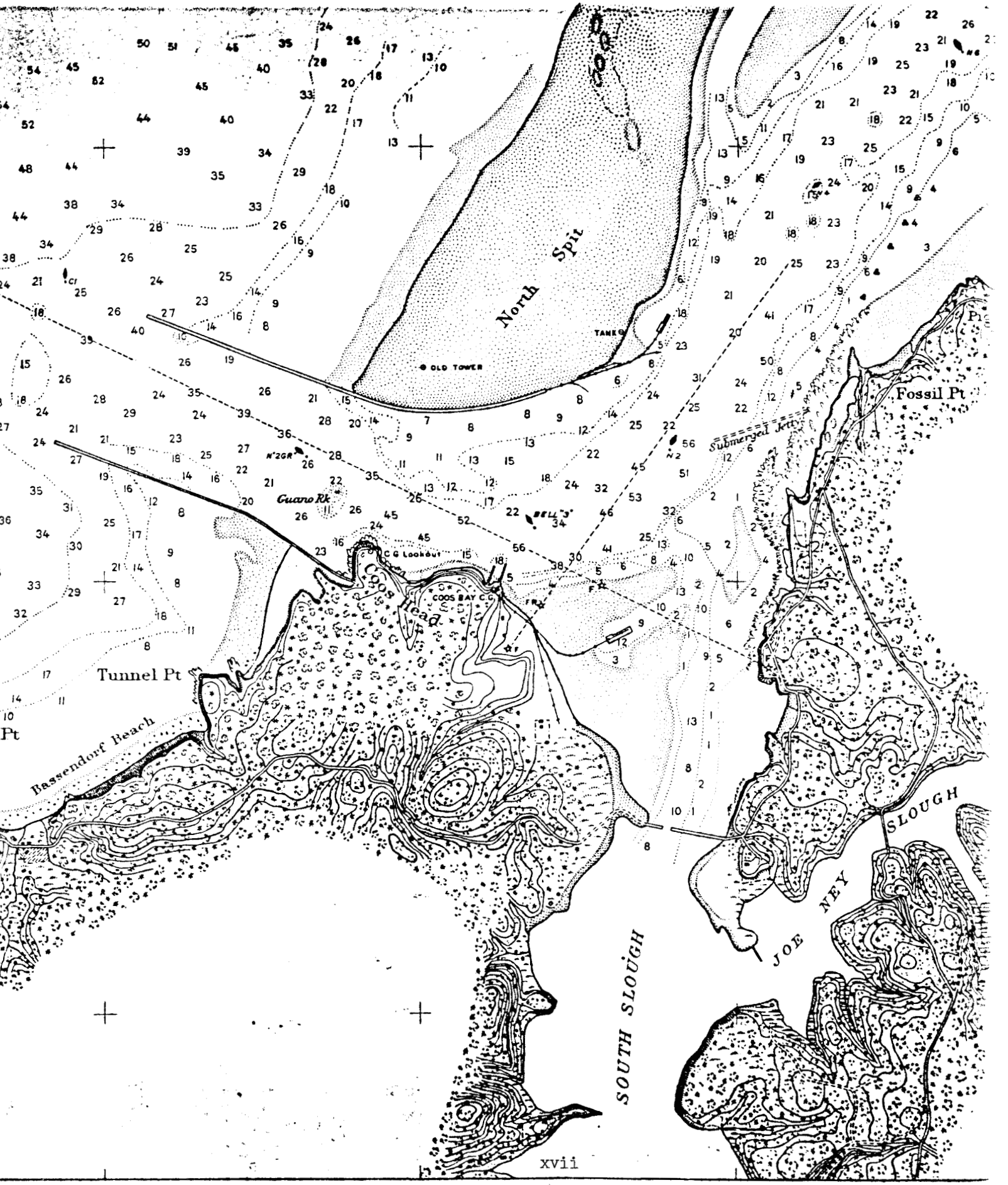
Soundings are expressed in feet and indicate the depth at Mean Lower Low Water.
The 18 Ft. contour is shown thus ... ...
" 24 " " " " " ... .
" 30 " " " " " ....

U.S. Engineer Office, 1st Dist. Portland, Ore., Jun. 30, 1916.

Submitted: J. M. Polhemus. Assistant Engineer

Approved: Clinton Sullivan Major, Corps of Engineers.

To accompany Annual Report for the fiscal year ending Jun. 30, 1916.


North Spit
OLD TOWER
Fossil Pt
Submerged Jetty
Guano Rk
C G Lookout
COOS BAY C G
Coos Head
Tunnel Pt
Bassendorf Beach
SOUTH SLOUGH
JOE NEY SLOUGH
xvii
21'
124° 20'
19'

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CHAPTER I

THE EARLY DAYS BEFORE MAJOR IMPROVEMENTS

Coos Bay, the most important port on the Pacific Coast between San Francisco and Portland, lies about two hundred miles south of the mouth of the Columbia River and four hundred and forty-five miles north of the entrance to San Francisco Bay. The Oregon Coast in the vicinity of Coos Bay is made up of the north-and-south trending ridges and deep valleys of the Coast Range. The bay is an intrusion into those valleys. The Coast Range isolates the Pacific Coast from the wide valleys and higher mountains of the interior of Oregon. At intervals the Coast Range is cut by rivers which flow west into the Pacific. Surface travel between the coast and the interior is generally confined to the valleys through which those rivers flow. The Umpqua River empties into the Pacific twenty miles to the north of Coos Bay, and the Coquille River reaches the ocean eighteen miles to the south of the bay. Both those streams and their valleys provide relatively easy east-west passage to the interior. The shorter Coos River, however, does not cut through the higher ridges of the Coast Range, and as a consequence the Coos Bay region is somewhat more isolated and less accessible than its neighbors. Before White settlement the Indians maintained a difficult trail north and south along the coast.[1]

The Pacific Coast from the mouth of the Columbia River to San Francisco Bay is alternately composed of low sandy hills and steep cliffs. Over that entire distance no good natural harbors are visible from the sea. In the days of early exploration, the rivers were difficult to sight and dangerous to enter. The entrances to all the rivers in the Pacific Northwest, prior to the improvement programs which began late in the nineteenth century, were blocked by shifting sandbars and treacherous breakers. The entrance to Coos Bay was hidden by a rocky headland and a long sandy beach. Like the others on the coast, the channel through the entry bar was changeable, often shallow and always unpredictable, but inside the bar the bay provided miles of excellent anchorage, with shelter from the winds of any season. The interior channels were deep, narrow and winding, with a few shoals located at points where tributaries joined the main bay.[2]

The advantages of the bay plus generous natural resources led to permanent White settlement at Coos Bay less than a decade after the discovery of gold in California. The shores of Coos Bay and the surrounding mountains and ridges were covered, like the rest of the region, with a dense forest of magnificent timber. The beach sands and shoreline terraces to the south contained gold. Under the hills and ridges around the bay was a large deposit of low-grade coal which could be sold in the San Francisco market, less than five hundred miles away. Within three decades after the first White settlers arrived, economic development reached a point where navigational improvements to the entrance and harbor of Coos Bay were necessary if economic growth was to continue in the area. During that period, advancements in engineering technology and a favorable economic and political

climate allowed those improvements to be made. Area economic growth, largely dependent upon the presence of a harbor suitable for large merchant vessels, continued as the harbor works were carried forward in the following years. The isolation, the potential of the harbor on a coast where good harbors were rare, the abundant natural resources of the area, the politics, the economics, and the technology involved in improving the harbor are all major factors in the history of the port of Coos Bay.

The tributaries of Coos Bay drain an area of over six hundred square miles. The part of that drainage affected by the tide contains about nineteen square miles. The main bay covers fifteen square miles at high tide. Coos Bay has two distinct arms which curve around the ridges of a peninsula which juts up from the south. The outer arm extends for eight miles to the northeast from the entrance, and flows through a lagoon similar to those which are found at intervals along the Pacific Coast from the Straits of Juan de Fuca to Cape Mendocino. The inner arm joins the outer arm near the north end of the bay and reaches to the south for five miles in a submerged valley. Thus, the main bay is U-shaped, with the bend to the north. The outer arm is separated from the Pacific by a low sandy peninsula, the North Spit. The inner arm is bounded on the east by the high ridges of the Coast Range. The shores of the bay are broken by several important sloughs and inlets, and by the Coos River and its branches. The south side of the entrance to the bay is marked by Coos Head, which is the northern end of a ridge which extends from the south. Five miles to the southwest of the entrance, Cape Arago juts seaward as the westward extension of that ridge, and Point Gregory lies midway between Cape Arago and the entrance to the bay.

Just inside the entrance, the South Slough stretches for five miles south in a sunken valley which is bounded by the Cape Arago ridge on the west and the interior peninsular ridge on the east. From the mouth of the South Slough, the outer arm of the bay follows low sandstone bluffs for six miles to the northeast. There, near the north end of the bay, the bluffs give way to high forest-covered dunes, which then drop sharply to the delta of Pony Slough. That slough flows from south to north, and divides the interior peninsula into two ridges. The eastern ridge forms the North Bend, which is the northern end of the peninsula. On the north side of the bay, across from Pony Slough and the North Bend, a wide shallow embayment divides the North Slough, which extends to the north, and Haynes Inlet, which tends northeast.[3]

From North Bend the inner arm of the main bay strikes due south for five miles. At the head, or south end of the bay, Coalbank Slough meanders to the southwest for three miles. A ridge known as Bunker Hill separates Coalbank Slough from the Isthmus Slough, which is a major tributary to the bay. That deep slough extends south for eight miles to a narrow saddle which divides the Coos Bay drainage from that of the Coquille River. To the east of Bunker Hill and the entrance of Isthmus Slough into the bay, yet another high ridge rises from the south and separates Isthmus Slough from Catching Slough, which also flows from the south, and is six miles long. In the same delta in the south-east corner of the inner bay where Catching Slough enters, the Coos River and its tributaries enter the bay. The main channel of the Coos River, the Marshfield Channel, cuts due west across the mud flat which occupies most of the wide inner bay and joins the channel of the inner bay near the head of the bay. A lesser channel of the Coos River

follows the east shore of the bay for a short distance and then cuts diagonally across the mudflats of the inner bay and joins the main channel at the northwest, near the North Bend. Finally, on the northeast side of the inner bay, Kentuck Slough enters the bay two miles to the southeast of Haynes Inlet. Those complex arms and tributaries are deep and narrow, and they have been the means by which the resources of the area could be brought to the main bay for processing and shipment to market.[4]

However, many years passed between the first visits of European explorers to the area around Coos Bay and permanent settlement by Whites. Europeans explored the Pacific Coast sporadically after the discovery of the New World. Francis Drake may have taken shelter for a few days in Cape Arago's South Cove in 1579. The Spanish explorer D'Aguilar was in the area in 1603. Captain James Cook located Cape Arago, which he named Cape Gregory, in 1776. Captain Robert Gray traded with Indians who paddled out to his ship in dugout canoes from the vicinity of Coos Bay in 1792. George Vancouver sailed his vessels through the region and made similar contacts with the Indians at Cape Blanco, forty miles to the south, in that same year. Lewis and Clark, at Fort Clatsop in 1805, saw Indian captives who came from a river far to the south who called themselves the "Cook-koo-oose" and whose tribe was estimated to number fifteen hundred people. The Hudson's Bay Company trader Alexander Roderick McLeod was in the Coos Bay region several times during the years from 1824 to 1828. Jedediah Smith and his party of Americans followed the hard coast trail up to Oregon country after being expelled from California in 1828, and they camped for a few days on the shore of Coos Bay in July of that year. Shortly

after leaving Coos Bay the party was ambushed by Indians near the Umpqua River, and only Smith and three other men escaped. The Hudson's Bay Company, which was in the process of expanding its operation into southwestern Oregon and northern California, sent Alexander McLeod to investigate the massacre, and after concluding his inquiry into the affair McLeod and his party continued south along the coast trail into California. Accompanying McLeod was the American John Turner, who had been in Smith's party when it came north up the trail earlier that year. In 1832, and in subsequent years, the Hudson's Bay Company trader Michel LaFramboise, who had been with McLeod at Coos Bay in 1826-27, took McLeod's route to California. In 1833 John Turner guided the Ewing Young party up the trail to the Umpqua River from California. The Hudson's Bay Company established a post on the Umpqua River at Elk Creek, less than fifty miles from Coos Bay, in 1836. Coos Bay was doubtless well known to those guides and traders, but travel over the coast trail, which involved the crossing of numerous rivers and single-file travel along cliff trails high above the sea, was not common, and as American involvement in the Oregon country became greater, land travel north and south shifted more to the routes in the interior, because of rising Indian resistance to the influx of Whites, and because the coast trail was not satisfactory for the movement of livestock.[5]

During that period before the British relinquished their part in the joint occupancy of the Oregon country south of the 49th Parallel to the United States, maritime traffic along the coast increased year by year. American vessels moved between San Francisco Bay and the Columbia River. Hudson's Bay Company vessels were sent to California to trade and to perform other company tasks. In 1835 Michel LaFramboise

told John McLoughlin, Hudson's Bay Company factor, that he had seen numerous sea otters along the coast on one of his trips to California. The factor sent LaFramboise south along the coast in the seventy-ton schooner Cadboro, which was commanded by Captain William Brotchie, to look for the valuable animals. During that trip, in 1836, the Cadboro might have entered Coos Bay. However, the entry of the Cadboro or any other vessel into the little-known rivers of the southern Oregon Coast was not a common occurrence. The risk of losing a vessel on the treacherous bars which blocked the entrances to the rivers probably outweighed any chance of possible profit which might have been gained at that time.[6]

In the years which followed, as the Hudson's Bay Company's involvement declined, American expansion into the Willamette Valley grew, but the Oregon Coast from the Umpqua River south to California remained unsettled until after the end of the war with Mexico. The cession of California to the United States and the near simultaneous discovery of gold there in 1848 led to the first American settlement on the southern Oregon Coast. By 1850 the California gold seekers had spread to northern California and southern Oregon Territory. In 1850 a group from California organized a joint stock company and chartered a ship with the intention of settling on the Klamath River in northern California and using their settlement as a base from which to prospect for gold. They mistook the mouth of the Rogue River in southern Oregon for the Klamath, and met so much resistance there from the Indians that they proceeded north up the coast to the mouth of the Umpqua River, where they laid out a town and brought in one hundred settlers by ship in

September, 1850. Some of those settlers subsequently joined in the development of Coos Bay.[7]

In 1851 more and more gold miners and settlers were moving into southwestern Oregon Territory. Gold was found on the upper reaches of the Rogue River in that year. Almost immediately Captain William Tichenor, master of the coasting propeller steamer Sea Gull, which ran between San Francisco and Portland, began scouting along Oregon's south coast for a likely port from which to supply the gold mines of the interior, which were located near Jacksonville. Tichenor selected Ewing Harbor at Cape Orford, eight miles south of Cape Blanco and fifty miles south of Coos Bay, as the best choice for a port. His efforts to establish a town, a port, and a route to the interior brought a series of clashes with the Indians of the area. The mining and prospecting to the east and south had already provoked the Indians of the Rogue River to violence which had been answered by the dispatch of Regular and Oregon Territorial forces to the interior. Now, with additional Indian hostilities, the Army established a fort at Tichenor's new town, Port Orford.[8]

In late December, 1851 the Army transport schooner Captain Lincoln was sent on a routine resupply journey with troops and supplies from Benicia, California to the new Army post called Fort Orford. The vessel was unable to land its cargo at Port Orford because of stormy weather, and proceeded to the north to await more favorable winds. Off Cape Arago she began to take water, and despite the efforts of those aboard, went ashore on the beach at North Spit opposite Coos Bay with no loss of life. The wrecking of the Captain Lincoln led to an expansion of the knowledge about Coos Bay. The ship's crew and the troops

spent several weeks in a camp on the North Spit. Her master, Captain Naghel, made a rough map of the bay during this time, and the men had leisure to explore the area around the bay. The troop commander, Lt. Stanton, had the mate of the Captain Lincoln bring a whaleboat around from the wreck on the beach, through the entrance over the bar and into the shelter of the bay. The mate reported finding more than thirty feet of water in the entrance. In late April, 1852 the Army engaged the schooner Nassau to enter Coos Bay and remove the cargo which the crew and troops of the Captain Lincoln had salvaged from the beached ship. The Nassau sailed down the coast from the Umpqua River, where she had been engaged in supplying the settlements along that river, and entered Coos Bay on May 5, 1852. The Nassau stayed on the bay for two weeks, loading the stores and awaiting a favorable wind, and departed for Port Orford and Benicia on May 19, 1852.[9]

A year after the departure of the Nassau, Perry B. Marple of Jacksonville, Oregon Territory, organized an enterprise which had as its goal the settlement of Coos Bay and the exploitation of the coal which had been discovered there. Marple sold stock in his Coos Bay Commercial Company and led a group of fourteen investors to the bay in May, 1853. There they laid out the town of Empire City on the outer arm of the bay, three miles southwest of the North Bend and directly across from the North Spit where the people of the Captain Lincoln had camped the year before. They were soon joined by settlers from the Umpqua and from other regions in the interior. Development of the area's resources started at once. San Francisco was booming, and Coos Bay's commerce expanded to supply the demand for fuel and lumber which accompanied San Francisco's growth. The first thirty years of White

settlement at Coos Bay were years when the area's coal reserves were developed, the manufacture of forest products grew to be a major industry, and vessels built at Coos Bay became an important factor in Pacific maritime trade. Those commercial endeavors were closely allied and interdependent. All centered about the bay and the port.[10]

Immediately following the establishment of Empire City in 1853, deposits of gold were found on the ocean beach and nearby terraces at Whiskey Run, six miles north of the mouth of the Coquille River, and ten miles south of the entrance to Coos Bay. The discovery brought hundreds of miners to the area. The gold finds helped to establish shipping traffic into Coos Bay. Although the mines were near the Coquille River, the entrance to the Coquille was less well known, and more difficult to enter than Coos Bay. Therefore, many supplies for the gold mines passed through Coos Bay and were packed overland to the mines. However, the beach diggings and the terrace mines in the vicinity soon played out. The fine gold was difficult to separate from the black sands in which it was found, and the boom was over in less than three years, but the finding of the gold helped to make the bay known to the rest of the country and reinforced the settlers' conviction that the area was a land of boundless resources.[11]

Coal was of much more importance than gold in the development of Coos Bay as a port. The coal was found at scattered locations around the shores of the bay and near the banks of some of the sloughs. As soon as they laid out Empire City, Marple and others began to mine coal. In 1854 the first cargo of coal for San Francisco was loaded on the sailing vessel Chansey, but she was lost on the bar while clearing the bay. Marple's leadership in the Coos Bay Commercial Company soon passed

to others, and his mine proved unsuccessful, but the development of other mines continued, and transactions were made which would later allow consolidation of holdings and the more efficient production of coal. The two best mines in the early days were found near Coalbank Slough, in a ravine southwest of the head of the inner bay. Those mines, the Newport and the Eastport, were within easy tramway distance of the slough, which was navigable at high tide. Steamers could be loaded near those mines and leave under their own power, but sailing vessels had to be towed in to the mines and back out over the bar into the Pacific. A steam harbor tug was introduced at Coos Bay in 1858. The Coalbank Slough mines were nearly fifteen miles inside the bay from the entrance, and some of the bay's inner channels were narrow, winding, and passable only at high tide. In addition, the bar at the entrance was sometimes difficult to cross. There was usually a channel through the bar, but it often moved and changed. Sometimes only nine feet of water was found over the bar, but at other times the entrance was thirty feet deep; enough to allow safe passage to any ship of that day. Even with the navigational problems, Coos Bay had a distinct economic advantage in the relatively easy access to the coal and in its nearness to San Francisco. It had the further advantage of providing a safe and roomy anchorage on a coast where such harbors were rare. As a rule, three or four vessels called at Coos Bay each week during the 1870's. The masters of the tugs sounded the bar and the entrance channel constantly, and after a few years they were at least able to forecast seasonal changes in the bar and channel. Generally, ships crossed the unimproved bar with regularity.[12]

Despite the unpredictability of the entrance, in 1860 the Coos Bay mines shipped 3,145 tons of coal to San Francisco. Between 1860 and 1866, the mines supplied the San Francisco market with an average of 2,370 tons of coal a year. Although less than three percent of the coal consumed in San Francisco, that tonnage represented a remarkable output from a newly settled and lightly populated area. When Coos Bay production began, San Francisco was importing coal from the eastern United States, Britain, Chile, British Columbia and Australia. Prices ranged from twenty dollars a ton for the coal from Vancouver Island in British Columbia to forty dollars a ton for Cumberland coal. The Coos Bay coal was not of good quality. Much of it was almost a lignite; dirty and used principally for rougher industrial and household fuel. It was not at first considered to be of good enough quality to fuel steamships, although some Coos Bay coal was occasionally used for that purpose. However, the Coos Bay coal was able to enter the market in competition with the Vancouver Island coal, and it stayed in the market when the Bellingham Bay coal of Washington Territory began to compete. In 1861 mining interests developed the Mt. Diablo coal mines in Contra Costa County, California, not far from San Francisco. That coal, like most found on the Pacific Coast, was of poor quality, but much nearer the market. In 1867 the Mt. Diablo mines produced almost half of the 249,000 tons consumed in the San Francisco market, while Coos Bay contributed 5,400 tons. In 1868 the Coos Bay coal production nearly doubled that of 1867, to over ten thousand tons. Coal production in the Coos Bay field then increased steadily by about five thousand tons a year through 1874, when 44,857 tons of coal were shipped to San Francisco. The next year, however, bad bar conditions forced the Coos

Bay mines to close during part of the peak winter period, and coal from mines at Seattle reached the market in great quantities, causing a general reduction in the amount of coal produced from other mines on the Pacific Coast. Coos Bay coal production stabilized at that point and averaged about forty thousand tons a year for the next decade.[13]

Although the coal resources were initially the primary factor in the development of Coos Bay, the lumber industry soon surpassed the coal mining in importance. Hand powered saw pits produced lumber for the earliest settlers and miners. Groves of California laurel or myrtlewood filled the river bottoms of the region, but the main timber resources were the fir, cedar, spruce and hemlock trees which covered the area with a dense forest. Coos Bay lumber went to California as early as 1854. In 1856 H. H. Luse and R. M. Moore established a steam sawmill at Empire City and in the same year Asa M. Simpson located a mill at the North Bend. The town of North Bend soon grew up around that mill. By 1861 those two mills were capable of sawing fifteen thousand board feet of lumber a day. Some of the production of the early days was consumed locally. The coal mines needed props for shoring, and timbers and piles for the wharves and bunkers where the coal was loaded into the ships. In addition, a shipbuilding industry began on the bay soon after settlement, and that required quantities of timbers, planks, knees, masts and spars, most of which were milled locally. Housing for the growing population and the local businesses required considerable output from the mills. In 1867 a third sawmill was built at the south end of the inner arm of the bay, near the mouth of Coalbank Slough at Marshfield Point. The town of Marshfield was sited there. That mill was soon capable of producing fifty thousand board feet of lumber a day.

In 1872 the area was sawing twelve million board feet a year. By 1880 the mills on the bay had a capacity of more than one hundred thousand board feet a day. There was an important by-product from the industry in plaster laths, and at that time Coos Bay mills also produced broom handles, bed slats and barrel staves. Lumber production averaged around twenty-five million board feet a year between 1880 and 1885, but in 1885 area capacity was increased by one hundred and fifty thousand board feet a day when the Southern Oregon Company built a large mill at Empire City. At that same time the capacity of the Simpson mill at North Bend was increased to nearly double that of which it had been capable previously. The Marshfield mill changed ownership and was moved to a site on the east bank of Isthmus Slough, about one mile from the mouth of the slough. After 1885 the Coos Bay mills ranked among the foremost of the cargo mills of the Pacific Northwest. Cargo mills cut rough, unfinished lumber and loaded it directly from mill docks onto ships for transportation to other mills for resawing and finishing. The mills at Coos Bay had been built by entrepreneurs in anticipation of a market which they were sure would develop in the immediate future. They stood ready to process the billions of feet of timber which stood in the forests around Coos Bay.[14]

The major sawmills on the bay had shipyards as an integral part of their lumber operation. The building of sailing vessels, ocean-going steamers, river steamboats, barges and smaller vessels grew to be an important industry at Coos Bay. The timber which surrounded the bay provided excellent material for maritime construction. The tall straight conifers furnished superior masts and spars. The abundant older growth timber was sawed for ships' timbers and planking. Ships

knees were formed locally and used in the Coos Bay shipyards, and they were also an export item for many years. The first major vessel to be built on Coos Bay was the brig Arago, of 185 tons, launched in 1859 from the yard which Asa M. Simpson established in connection with his North Bend sawmill. This ship was followed in 1860 by the 285-ton Blanco, then by the Advance in 1862, the Enterprise in 1863, the Isabel in 1864, the Juventa in 1865, the Melancthon in 1867, and the Web Foot in 1869. Another shipyard was established adjacent to the sawmill which had been built at Marshfield Point in 1867, and the two-masted schooner Stag Hound of 136 tons was launched there in 1868. That vessel was followed by two more schooners from the yard in 1869 and by two in 1870. In addition, at least two ships were built in connection with the Luse mill at Empire City. By 1878 forty ships had been built in Coos Bay yards, including the 1,110-ton clipper Western Shore. Between 1859 and 1904, Coos Bay yards produced about thirteen percent of the sailing vessels constructed on the Pacific Coast during that period, and a like percentage of mechanically powered vessels. Many of the ships built at Coos Bay were used to carry the coal and lumber produced at the bay to markets in San Francisco and Portland.[15]

Both sailing vessels and steamboats engaged in the early coastal shipping traffic which called at Coos Bay. The steamers carried passengers and freight and sometimes bulk cargos, while the sailing ships carried mostly bulk cargos of lumber and coal. As a rule the bulk cargo carriers were laden with paying cargo only on the outbound leg of their voyage. There was practically no incoming bulk cargo into Coos Bay, and as a consequence the ships brought in quantities of stone as ballast. The sailing vessels were slower than the steamships and required a more

skilled crew, but they were less expensive to build and operate. The coastal rivers were almost impossible for sailing vessels to enter unaided, and steam tugs were operating on the Oregon Coast almost as soon as it began to be settled. At Coos Bay, as at other ports in the Northwest, a tug would cross the bar to tow a sailing ship into the harbor, and when the ship was ready to leave a tug would tow it back out across the bar and into the Pacific to a safe departure point. The steamers did not require the aid of tugs. A steamer could travel the four hundred and fifty miles from San Francisco in forty-eight to sixty hours, and the steamers were able to adhere to a regular schedule. Occasionally, in calm seas, the trip might be more rapid, but in rough weather the trip might take much longer, and if bar conditions were not favorable a vessel might not be able to enter the harbor on arrival. Both screw propelled and sidewheel steamers were used on the coast, and both types were usually equipped with auxiliary sails until late in the nineteenth century.[16]

For sailing vessels, optimum conditions meant wind of the right intensity and from the best direction, but those conditions were seldom found on the Pacific Coast. In summer the prevailing winds come from the northwest, so that a passage for a laden sailing vessel from Coos Bay to San Francisco involved brisk onshore winds which were favorable for fast sailing, but which tended to drive a vessel toward the rugged coast. Consequently, in summer a southbound vessel had to stand well to the west to avoid the shore. The schooner soon became the favored coasting vessel because of its ability to sail close to the wind, and because its sails could be worked almost entirely from the main deck, requiring a less experienced crew. The northward trip in summer was

made against the strong northwesterlies, and required a long series of tacks to accomplish the voyage. Winter conditions were quite different. Gale force winds from the south and southwest were common, and a winter passage from Coos Bay to the south, in a deeply laden ship, could be an arduous undertaking. Winter or summer, a week or ten days was the usual time required for a sailing vessel to make the trip between San Francisco and Coos Bay. Sometimes, however, sailing vessels made the trip in four days or less, and some remarkably fast trips were logged. On the other hand, it was not uncommon for the trip to require more than twenty days during very calm or very stormy weather. Generally, however, in the years before the entrance to the harbor was improved, the ships which served Coos Bay operated with regularity. Occasionally, an important exception occurred, and that exception came when bad weather prevented vessels from crossing the entrance bar.[17]

As the years passed, output from the sawmills and coal mines gradually increased, and the marketing of those products was largely dependent on the ships being able to enter and leave the bay. Between 1871 and 1878 an average of fifteen vessels a month called at Coos Bay, most of them on a regular basis. The entire economy of the bay was based on that shipping. To work the mines, run the mills, build the ships and service those industries required a relatively large population. Workers directly involved in the three basic industries increased from less than twenty people in 1860 to over two hundred in 1870 and to more than three hundred in 1880. In the winter of 1874-75 bar conditions were so bad that almost no shipping entered or left Coos Bay for two months. The mines soon shut down and the sawmills ceased operations.

The total dependence of the area on the port for economic survival was strikingly revealed by the closure of the port at that time. However, nothing was done to improve the entrance to Coos Bay for several more years. The engineering and economic resources required to improve the entrance to Coos Bay were viewed as being outside the capability of private interests there. Such improvements were thought to be a function of the Federal government, and it was to be the Federal government which eventually performed most of the work which made Coos Bay into a modern seaport.[18]

Long before physical improvements to the entrance began, the Federal government provided navigational aids along the Pacific Coast. Lighthouses and channel markers, as well as accurate charts and hydrographic data, were recognized as necessary elements for both governmental and commercial expansion. The United States Treasury Department was responsible for building and maintaining lighthouses and for placing buoys and channel markers. Also under the direction of the Treasury was the Coast Survey. That institution's function was to map the coast and to establish a national triangulation network. Those operations were extended to the Pacific Coast soon after the cession of California to the United States. Physical improvements to navigable rivers and to harbors were the responsibility of the United States Army Corps of Engineers. However, the building of jetties and improvement and maintenance of the interiors of harbors lagged about twenty-five years behind the work of the Treasury Department on the Pacific Coast.

The Treasury Department built a lighthouse at the mouth of the Umpqua River in 1857. In 1863 that lighthouse collapsed in a winter storm, and the Department decided to replace it with a light on Point

Gregory outside the entrance to Coos Bay, which by then had significantly more shipping traffic than the Umpqua River. The new light was placed in operation on November 1, 1866. During that period, channels inside Coos Bay were marked with buoys which were maintained by the lighthouse tender Shubrick, a Treasury Department vessel of long service on the Pacific Coast. At the same time, those aids to navigation were backed by the work of the Coast Survey.[19]

In 1854 Cape Arago was included in a series of lithographs of prominent Pacific Coast capes and headlands published by the Survey and intended as navigational aids to mariners sailing the West Coast. Following that, the Coast Survey's annual reports for 1855 and 1858 gave brief written descriptions of the entrance to Coos Bay and of the extractive and industrial activity there. In June, 1861 the Coast Survey began the formal charting of the bay. Survey Sub-Assistant James S. Lawson and his party, operating from the brig R. H. Fauntleroy, spent the summer in preparing a preliminary chart of the entrance to the bay. Lawson found a minimum depth of twelve feet of water over the entrance bar and reported that the bar shifted to the north in the summer and to the south in the winter. Lawson made careful soundings of the approaches to the bay, of the entrance and bar, and of the outer arm of the bay to near Empire City. In addition to those soundings, Lawson began a triangulation survey of the area which he extended in subsequent surveys. He also undertook hydrographic measurements, including observations of the tidal flow in the bay. Lawson and his party returned to Coos Bay in the Fauntleroy in 1862, 1864, and 1865, and they concluded the work in 1866. That Coast Survey mapping and hydrographic study provided a sound base from which future engineering work would

proceed at Coos Bay. Those charts, with the lighthouse and the channel markers, were the first of the public navigational improvements which came to Coos Bay. Almost two decades more were to pass before physical work on the entrance was initiated.[20]

CHAPTER II

THE EARLY IMPROVEMENTS TO THE ENTRANCE AND HARBOR

Major improvements to Coos Bay's entrance did not start until 1879, when work was begun on an experimental training jetty inside the bay. The first harbor improvement originated as the result of long agitation by shipping and commercial interests for one or more harbors-of-refuge to be constructed at suitable sites along the Pacific Coast. Such harbors-of-refuge were to be created by adding breakwaters to locations which already possessed some natural advantages. The refuges were not necessarily to be located at points where they would provide a commercial advantage, or where shipping might normally call, but they were proposed as places into which vessels might flee and take shelter during stormy weather, particularily from the southwesterly winter gales. Harbor improvements of that nature were, under the law, the responsibility of the United States Army Corps of Engineers. For several years in the 1870's the Corps of Engineers investigated possible sites for harbors-of-refuge along the Pacific Coast from the Straits of Juan de Fuca to the entrance of San Francisco Bay. In 1872 the Engineers conducted a survey at Port Orford, and in 1876 they investigated several prospective harbors in northern California and southern Oregon; including Drake's Bay, Cape Mendocino, Shelter Cove, Humboldt Bay, Trinidad Harbor, Crescent City, Mack's Arch, Port Orford again, and Point Gregory, which is located just outside the entrance to Coos Bay. In 1878 the search was further extended to include the Coquille River,

Coos Bay, Yaquina Bay and Alsea Bay. At that time, late in the decade, doubts began to arise about the wisdom of expending vast sums on projects which might have no real utility, and emphasis shifted from the building of special harbors-of-refuge to the improvement of existing harbors and entrances in the areas with an economic need for reliable shipping.[1]

During the decade between 1880 and 1890, several major works of improvement to harbors and entrances took place on the Pacific Coast. Until that time only one harbor improvement project had been undertaken on the west coast, and that was the building of training walls at Los Angeles' port of Wilmington Harbor. Thus, the Corps of Engineers had little previous Pacific Coast experience to guide them in those works. The years between 1880 and 1890 were spent in learning how to build jetties at harbor entrances in the rough seas and bad weather which were typical at the isolated harbors along the Pacific Coast. Conventional jetties in other areas were usually built of stone, in pairs, and extended seaward from the entrance to a harbor or the mouth of a river. Gulf and Atlantic Coast jetties were built by dumping stone from barges or lighters. Such conventional jetties were designed to reduce wave action, maintain a navigable channel at a projected depth, and restrict the channel to a fixed location. Training jetties, on the other hand, were intended as channel shapers, and attempted to accomplish that by deflecting the natural currents into paths which would aid in deepening the channel and in cutting away unwanted shoals and bars. Training jetties were built with a variety of materials, including stone, pilings, and wood and stone cribwork. Pacific Coast jetties fell into the same categories as those elsewhere, but after the general beginning of jetty

construction in the west, it was soon found that harbor improvement projects on the Pacific Coast presented much worse problems and required different engineering techniques than those in other parts of the United States.[2]

In Oregon, exterior jetties were built or started at the mouth of the Columbia River, at Yaquina Bay, which is located one hundred miles north of Coos Bay, and at the mouth of the Coquille River, twenty miles to the south of Coos Bay. However, the Corps of Engineers proposed that both conventional exterior stone jetties and an experimental interior training jetty be built at Coos Bay. That proposal was put forward after Congress instructed the War Department to conduct a survey of the entrance to Coos Bay late in the search for locations for harbors-of-refuge, and the Corps of Engineers assigned a civilian employee, Channing M. Bolton, to perform the survey. Bolton made his brief survey in August, 1878. He found that the tidal flow into the South Slough, just inside the entrance, caused an eddy which prevented the channel in the main bay from being effectively scoured and maintained by the tidal action, and he thought that blocking the mouth of South Slough would alleviate that problem and allow the tidal flow to clean and deepen the natural channel while it cut away the south tip of the North Spit. Bolton also found that loose sand from the North Spit was blowing into the entrance channel and contributing to shoaling and channel blockage. He concluded that the entrance to Coos Bay could be improved by the building of an eight thousand foot long jetty which would originate inside the bay above the mouth of the South Slough at Fossil Point, a sandstone bluff on the northeast side of the outer arm of the bay, one and a half miles inside the entrance. Bolton proposed

that the jetty be built so as to block off the mouth of the South Slough, and then pass on out into the open sea on the south side of the entrance at Coos Head. As proposed, it would combine a conventional exterior jetty with an interior training jetty. Bolton further proposed that consideration be given to the building of a five thousand-foot exterior jetty on the North Spit, and finally that some method be employed to control the blowing sand on the North Spit. Although subsequent circumstances altered the order in which the improvements were carried out, and the mouth of the South Slough was never completely blocked, the present works at the entrance to Coos Bay are essentially those which were proposed by Channing Bolton in 1878.[3]

Using Bolton's hasty survey of August, 1878 as a basis, the Corps of Engineers soon recommended that Congress appropriate $972,000 for the entire work of improvement to the harbor entrance, a sum which was later reduced to $600,000. In the River and Harbor Act of March 3, 1879 Congress made an initial appropriation of $40,000 to start the work on the experimental jetty at Coos Bay. The training jetty was to extend:

> from a point 250 yards below the northern extremity of Fossil Point on a line towards the east end of Coos Head, this line in plan curving so as to be directed at its outer end to the head, or a little to the north of it. The structure to be of wood and stone, or stone, as may be found best.[4]

However, before construction could begin, further and more detailed examinations were necessary. The Army's Board of Engineers re-examined the harbor at Coos Bay during the summer of 1879. The board then met in Portland in August, 1879 and drafted an explicit proposal for the construction of the jetty. At that time, the Board decided to build the jetty with a wood and stone cribwork. That proposal was approved by the Secretary of War in November, 1879 and work at Coos Bay followed immediately.[5]

Coos Bay lay in the Engineer District administered from the United States Engineers Office in Portland, which was under the command of Major (Brevet Colonel) G. L. Gillespie, Corps of Engineers, United States Army. The direct supervision of the work at Coos Bay was placed with First Lieutenant Albert H. Payson, Corps of Engineers. Lt. Payson had graduated from West Point in 1864 at the top of his class, and subsequently gained extensive civil engineering experience as an Army officer, including the 1878 preliminary survey of the mouth of the Columbia River which preceded the jetty work there. Payson had accompanied the Board of Engineers to Coos Bay in August, 1879 and he remained there after they departed. During that period he spent several weeks conducting preliminary soundings of the bay and its entrance, and he began a search for stone suitable for the construction of the new jetty. Lt. Payson then returned for a time to his permanent duty station, but the work at Coos Bay was continued by W. L. Smith, a civilian employee of the Corps of Engineers, who arrived there in December, 1879, following final approval of the jetty project by the Secretary of War.[6]

The Corps of Engineers had decided that the training jetty was to be constructed of stone which was to be held in place by large wooden pens or cribs. Smith was authorized to negotiate locally for the lumber and iron needed to build the cribs and for the purchase and the delivery of the stone to the construction site. At that stage of the work the bid process was not utilized. Smith arranged with the Marshfield firm of E. B. Dean and Company to furnish the lumber and iron for the cribs and with H. H. Luse of Empire City for the stone. Lt. Payson returned to Coos Bay in February, 1880 and assumed direct charge of the

construction of the cribs and of their placement. He resumed his search for suitable stone for the jetty. A careful inspection of the outcrops on the bluffs of the Coos River led Payson to decide that the ordinary sandstone of the area was more suitable for the project than a harder metamorphic sandstone which was also found in the vicinity. A quarry was established twelve miles up the river; twenty-four miles from the jetty site at Fossil Point. Because of an accident at Luse's sawmill and the usual bad winter weather typical of the region, the work proceeded slowly through the winter and spring of 1880. Payson hired a small crew to assemble the cribs at Marshfield, and by mid-February Luse had repaired his mill and was building the first of four large scows in which to transport the stone. During this period of preliminary work, the jetty project became known as "The Cribs."[7]

Each of the first cribs was fifty feet long, twenty feet wide and twelve and a half feet deep. As the work progressed and deeper water was reached, their size was increased to twenty-six feet in width and eighteen and a half feet in depth. The cribs were made of heavy sawn timbers which were bolted together with iron bolts. After assembly at Marshfield each crib was towed by tug to Fossil Point, a distance of twelve miles. At Fossil Point the cribs were placed in position by the tug at peak high tide and secured during the following ebb tide. Once in their proper position, the cribs were filled with stone from the Coos River quarry, and they then remained firmly in place as extensions of the jetty. The operation was one of extreme difficulty. Only one scow load of stone could be brought down Coos River on a tide, and this delayed the work. The cribs were large and unwieldy and could

be managed only by the largest tug on the bay. As the jetty progressed from near the shore at Fossil Point into deeper water, the depth of the cribs had to be increased correspondingly, and soon they became too deep for the channel from Marshfield. The deeper cribs had to be buoyed up with specially built pontoons before they could be towed to the jetty site. Finally, the cribs were almost impossible to place in position because of adverse winds and currents. The high northwest summer winds were quietest in early morning, and a tide favorable for the operation seldom coincided with that time. However, the first crib was placed on April 6, 1880 and by June 30, 1880 eight cribs had been installed and filled with stone for a total jetty length of four hundred feet. At that time $24,358 had been spent from the original $40,000, and the remaining appropriation was spent during the summer of 1880, which fell in fiscal year 1881. Five more cribs were placed during that period before the appropriation was exhausted, and by August, 1880 the jetty was 650 feet long. At that time Lt. Payson's connection with the experimental jetty ended and he turned to other duties.[8]

Because of the difficulties encountered with the transportation of stone and the placement of the cribs, it was then decided to discontinue the use of cribs to hold the stonework. The last cribs had been sunk in twenty feet of water, and water of from forty to fifty feet in depth lay a short distance ahead along the line of the proposed jetty extension. On March 3, 1881 Congress included an appropriation of $30,000 for continuation of the project, and the Corps of Engineers now adopted a completely new approach to the work, one which they chose because of recent experience at the mouth of the Coquille River and at Yaquina Bay. The plan was to quarry stone in the immediate vicinity of

the jetty, to load the stone into small railway dump cars, and to transport the stone out to the end of the jetty on a tramway which was to be laid on top of the existing work. To accomplish that, Major Gillespie assigned R. S. Littlefield, a civilian employee of the Corps of Engineers, to Coos Bay. Littlefield supervised the building of the experimental jetty until the suspension of the project in 1890. The Corps of Engineers leased the sandstone bluff at Fossil Point as a quarry site and erected buildings for workshops and quarters for workmen there beginning in May, 1881. Following that, preparations were made to extend the jetty with rock from the Fossil Point quarry. When the original work of 1880 was started an interval, or gap, of 540 feet had been left between the shore and the first crib. The workmen's first task was to fill that gap between the shore and the first cribwork so that a tramway could be built out to the end of the jetty. More timber box cribs were built and placed in that interval and a tramway built out from shore. Then, the overburden of soil at the quarry was partly cleared and some stone was taken from the new quarry. That stone was carried out to the new cribs which extended from the shore and dumped into the boxes from dump cars and from scows to close the gap. By the end of July, 1881 the new crib and stone section of the jetty was complete and the tramway was extended to the end of the jetty. The closure of the gap connected the jetty to the shore at Fossil Point for a total length of 1,190 feet. With the jetty now connected to the shore and the nearby quarry, and the tramway extended to the end of the cribs, the work of enrockment was carried out through the remaining summer of 1881 and into the fall. By mid-November, 1881 more than seven thousand cubic yards of stone had been dumped into the bay from the slowly growing end

of the jetty and that stone advanced the work to a total length of 1,344 feet. At the outer end of the work a depth of thirty-three feet of water was found and the bottom at that point was sand instead of the rock on which the cribs had been placed nearer the shore. Severe storms damaged the cribs and the tramway in September and October, and jetty work ceased in November after the storm damage had been repaired. The funds remaining in the appropriation were expended in clearing more overburden, trees and stumps from the quarry face, and in building a dam across a nearby watercourse to provide water for sluicing the overburden away at the quarry. A ditch, tunnel and flume system was constructed to carry the water to the quarry, which was situated about one half mile from the reservoir.[9]

At that point the money from the appropriation of March 3, 1881 was exhausted and the business interests of Coos Bay formed a harbor committee which proposed the continuation of the quarry work with local funds. Littlefield agreed to the proposal and the workers hired by the committee cleared away an additional thirteen thousand cubic yards of overburden before the Portland office received news of the undertaking and ordered it stopped. The harbor committee had spent $811 and prepared an estimated twenty thousand cubic yards of stone for quarrying. That stone was not to be quarried for some time, however, because no appropriated funds became available until August, 1882, when Congress voted $30,000 to continue the project. Work was resumed in October, 1882. Part of the tracks and tramway had been destroyed by storms and they were repaired, but the fall of 1882 was stormy and new breaks in the tramway occurred at intervals. Finally, a storm in late December, 1882 carried away four hundred feet of track. Operations were then

stopped until spring, but the jetty had been advanced 130 feet. In April, 1883 work was resumed again. Experience on the Coquille jetties indicated a need for heavier pilings, and a steam pile-driver replaced the hand powered driver which had served previously. By June 30, 1883 the track to the end of the jetty had been completely rebuilt and a few more feet of rock added to the end of the jetty. The total length of the work at this time was 1,645 feet. In July and August, 1883 an additional forty-two feet was added to the length of the jetty. Water depth at that point had reached nearly forty feet, and such depth required great quantities of stone to show any forward progress. Most of the appropriation of August, 1882 had been spent. The remaining funds were spent in strengthening the outer end of the tramway and in sluicing away the overburden at the Fossil Point quarry during the period from November, 1883 to April, 1884. No funds were available for extension work during the following work season in the late spring and summer of 1884 until the River and Harbor Act of July 5, 1884 provided a new appropriation of $30,000. That allowed work to continue through December, 1884. During that period the time was spent in dumping additional stone from the end of the jetty into the deep water there, and the work was carried out to a total distance of 1,825 feet. Much of the outer end of the jetty was far below the surface of the bay. Again, that work and the plant maintenance and quarry sluicing consumed the available money and forced a suspension of the project. On August 5, 1886 a new appropriation of $33,750 was voted for the project, but the problems encountered now began to weigh heavily on the future of the jetty. The biennial appropriations restricted the project to an uneven schedule. Plant built one year would often lie idle

and suffer from weather and marine organisms the next year because of lack of funding. As deeper water was reached, the sandy bottom began to be washed or scoured away in advance of the enrockment and the jetty itself thus contributed to the slow progress and great expenses involved. Although the total cost of the jetty at this time averaged $75 a foot, the cost of the work at the outer end had risen to $417 a foot, and the prospect was for the jetty to reach even deeper water and cause more scouring and consequent greater expense unless a new course was taken.[10]

The Corps of Engineers decided that the solution lay in dumping a broad rock foundation ahead of the proposed jetty line to reduce scour, and invitations to bid on such work were advertised in San Francisco, Portland, and at Coos Bay. However, the $30,000 available appeared to be too little to attract bidding and the appropriation of August 5, 1886 was, except for a small sum for administration and quarry work, set aside. On August 11, 1888 Congress appropriated $50,000 for continuation of the work on the jetty, and the job of laying a foundation course ahead of the jetty was re-advertised. Low bidder was Patrick O'Neil, of Portland, who contracted to dump the stone from his own barges for $1.39 a cubic yard. O'Neil started his operation on May 1, 1889 and by July 1, 1889 had dumped more than three thousand cubic yards of stone in the deep water in advance of the jetty line. The stone came from the government quarry located on the North Fork of the Coos River. The stone dumping continued through much of the summer, and by July 21, 1890 O'Neil had placed forty thousand cubic yards of stone on the Fossil Point jetty project. No further work was ever done on the experimental jetty.[11]

The formal process which led to the abandonment of The Cribs began in 1888. The Corps of Engineers appointed a board to conduct a new study of the port in October, 1888, but that board was unable to reach a decision about terminating the Fossil Point project. Instead, from that board came the decision which led to the contract with O'Neil for the dumping of the foundation course of stone. There was, however, growing uneasiness about the utility of The Cribs, and a new board was appointed which visited Coos Bay in August, 1889. That board issued the report which recommended the cessation of work on The Cribs and the building of external jetties at the harbor entrance. The board report of October, 1889 referred to "marked" and "beneficial" effects produced by the training jetty, but recommended that only finishing touches be made to it. When O'Neil fulfilled his contract, The Cribs were quietly dropped.[12]

The contribution of the training jetty to channel improvement is difficult to assess. Before the work began, the channel across the bar was constantly shifting and the entrance under natural conditions was sometimes excellent but at other times, as in the winter of 1874-75, completely closed to shipping. The reports of the Corps of Engineers for the years 1880 to 1890 show a positive improvement to navigation on a gradual basis, except in the last year of work when a swash channel cut through the North Spit and channel depth sometimes fell to less than twelve feet. However, during that period when the channel was supposedly in poor condition, more tonnage moved through the port than had ever done so previously, and the exports for 1890 were not exceeded until 1909. Between 1880 and 1890 there was a general average increase in yearly shipping, but that increase appears to have been the result of growth and economic demand in California and elsewhere, when expansion

required the coal and lumber of Coos Bay. Ships of increasingly greater tonnage and draft were able to enter the bay during the years when The Cribs were being constructed, and traffic did increase, but the bulk of the cargo taken out of the port at that time was carried in the same ships which traded at Coos Bay before the improvement started.[13]

The board which halted work on The Cribs recommended the construction of two external jetties; one extending seaward from the south tip of the North Spit, and a companion jetty to be built out into the sea from Coos Head on the south side of the entrance; the two to be fifteen hundred feet apart. It was thought that such jetties would insure a low water channel depth of no less than twenty feet at the entrance, which was ample for the time; loaded draft of vessels regularily crossing the Coos Bay bar at that time was less than fifteen feet. On September 18, 1890 Congress appropriated $125,000 to enable construction to start on the North Spit Jetty. That peninsula, with its loose sand and shifting south tip, was the logical place for the first external jetty. The choice proved to be the correct one; the Coos Head or South Jetty was not built for almost thirty more years.[14]

The Corps of Engineers assigned a civil engineer employee, James Suydam Polhemus, to oversee the construction of the North Spit Jetty. Polhemus was a graduate of Lehigh University with eighteen years of public engineering experience, including eight years on the Gulf Coast and the Great Lakes and ten years of Pacific Coast river and harbor work. He had conducted one of the surveys of the entrance to Coos Bay in 1885, and he had supervised channel improvement work on the Umpqua River, but his primary and most important work for the

Corps of Engineers had been at Yaquina Bay, Oregon, where he had been in charge of building the first external jetties attempted on the Pacific Coast. At Yaquina Bay Polhemus introduced the elevated tramway and brush mattress technique of jetty building which was adopted immediately for the great jetty at the mouth of the Columbia River, and later at Coos Bay and other Pacific Coast harbor entrances.[15]

Polhemus' method of jetty building consisted of constructing an elevated railway trestle or tramway, high above the intertidal zone and the sea, upon which rock could be transported on railway dump cars and dropped upon brush mattresses previously sunk below the trestle. The mattresses were intended to reduce the scouring or washing effect of the waves and currents near the jetty. The tramway was built by driving and jetting pilings into the sandy bottom using a pump and piledriver which extended beyond the end of the work. The brush mattresses were either assembled under the tramway and then cut away and sunk by weighting them with rock, or if they were needed at the sides of the jetty they were assembled at the plant, carried to the jetty on dump cars and toppled into the sea at the side of the tramway. Polhemus knew from his experience at Yaquina Bay and from his survey of Coos Bay that his technique was equally applicable at both harbors. He began preliminary work on the new project in December, 1890. Polhemus saw that his most difficult initial problem would be one of logistics. The physical plant and construction materials would have to be transported by water and landed near the jetty site. The government held title to most of the land on the North Spit, but the extreme south tip was privately held. The government purchased that property to provide space to build a wharf, the tramway for the jetty, and the buildings in which to house

the workmen and shops for the project.[16]

During the winter and spring of 1890-91 Polhemus pushed ahead to prepare his wharf, build a plant and provide construction materials for the jetty. The North Spit wharf was completed during that period, and a Lidgerwood steam hoisting engine installed there for use in unloading material at the plant. Some of the old buildings from the quarry at Fossil Point were dismantled, ferried across the bay to the new project and reassembled. An engine house, locomotive shed, machine shop and a water tank were built. A water well was dug, and an Aeromotor windmill installed to pump the water. In addition, living quarters for fifty men were constructed on pilings at the site. Rails were ferried to the works, and a great piledriver which had been used on the Columbia River Jetty arrived from Fort Stevens at the mouth of the Columbia. Polhemus arranged for the purchase and delivery of pilings to the log storage boom which he had built at Yarrow, a village on the inner arm of the bay just south of North Bend. He decided to use the same quarry on the Coos River from which O'Neil had obtained stone for The Cribs, and to transport material to the jetty site he began construction at Yarrow of four stone-scows, each capable of carrying 250 tons. He planned on a work force of from forty-five to fifty-five men.[17]

By the late spring of 1891 Polhemus was building the approach tramway on the dunes of the North Spit. An eleven ton Baldwin locomotive called the "Yarrow" had arrived, as had some of the special dump cars for the project. Polhemus ran a water line from the bay to the route of the trestle, and pumped the pilings for the railway down into the sand. The tramway extended south from the wharf for 1,335 feet

across the low dunes and then curved gently to the west on a 3,400 foot radius. The tramway was built in sections or bents sixteen feet long and was made wide enough to accommodate a double-track narrow gauge railroad thirteen feet between track centers. The double track was necessary to carry the large revolving piledriver. That machine was placed in service when the trestle reached the intertidal zone and the workmen could no longer work on the dry sand of the spit. The big piledriver began work in July, 1891, and by October of that year, when tramway construction was halted for the winter, forty-eight hundred feet of trestle had been built. Eighteen hundred feet of that extended beyond the low-water line into the Pacific. Brush mattresses were placed under the trestle after the intertidal zone was reached, with side mattresses used in areas where additional protection from scour was thought necessary. The "Yarrow" was used to transport pilings, timbers, mattresses and mattress material, and stone to the jetty. Stone delivery from the government quarry on the North Fork of the Coos River began in August, 1891 and continued through March, 1892. During that period the contractor delivered one hundred scow loads of sandstone rock, the average piece of which weighed two tons, for a total of almost twenty-four thousand tons. The Lidgerwood hoisting engine on the wharf could unload a scow into the special railway dump cars in from six to eight hours. Work on the jetty was suspended for lack of funds in April, 1892. Rock had been placed under the tramway along thirty-two hundred feet of jetty; some of it rose above high water level, but the outer eighteen hundred feet of the jetty was all below the surface of the sea at low tide.[18]

The effect on the entrance channel of this small amount of rock was striking. Sand began at once to accumulate on the north side of the partially completed jetty, and the southern tip of the spit was cut away. The channel depth in the years immediately preceding the North Spit improvement had sometimes been less than eleven feet at low tide, now the depth increased to more than sixteen feet and considerably greater depths often were found. As the appropriation of September 19, 1890 dwindled away, plans were made to suspend the work. The machinery was cleaned, protected, and stored to be in readiness for the next work period. As the Engineers repeatedly pointed out, the maritime environment, including boring worms, severe storms, and salt air, meant a short life for plant and equipment. Speed in construction was essential and this speed required large appropriations which would allow a rapid conclusion to the work. If Congress failed to appropriate funds to continue the work, the tramway and the plant might be lost through deterioration.[19]

Work was resumed in the summer of 1892 after Congress appropriated $210,000 for continuing construction of the North Spit Jetty. Several measures were taken to hasten the progress of the work. The receiving wharf was enlarged and another hoisting derrick installed, a new quarry site of twenty-three acres was purchased on the South Fork of the Coos River, and a new stone contract was let with Daniel Kern of Portland. A second eleven ton Baldwin locomotive, the "Binger Hermann," so named for the incumbent Oregon Representative to Congress, was purchased in Philadelphia. In July and August, 1892 the tramway was extended 1,888 feet. Tramway work was suspended on October 1, 1892 but enrockment continued through the winter. Contractor Kern delivered

forty-one thousand tons of rock to the jetty between October 24, 1892 and June 15, 1893. Tramway construction was resumed on April 15, 1893 and by June 30, 1893 the wooden tramway reached out 8,768 feet from the wharf; 1,600 feet short of the total planned length. At the wharf end of the work, erosion threatened the wharf and the shore section of the tramway. To control the currents brush and stone were placed along the bay shore, but those measures failed to stop the erosion. Piles were then driven and groins 150 feet long were built into the bay, with brush and rock added to deflect the current. That work at last succeeded in protecting the wharf and tramway from the currents inside the bay.[20]

Between June 30 and July 11, 1893 the tramway was built out an additional 288 feet, making the jetty length at that time 9,250 feet. After the piledriver was dismantled for the winter, a large raft of pilings, which had been assembled at Coos Bay for towing to San Francisco, struck the tramway and caused some damage which was quickly repaired. Enrockment continued and by May, 1894 Kern had delivered all of the 150,000 tons of stone called for in his contract. However, there was enough money left from the appropriation to purchase an additional quantity of stone, so that nearly 12,000 more tons were added to the jetty before June 30, 1894. At the time that quantity of stone on the jetty brought the entire work up to low tide mark, and more than half was equal to medium tide or higher. At that point it was seen that the jetty must be rushed to completion before the tramway became unusable. Congress made a new appropriation of $95,000 for the project on August 17, 1894, and the tramway was extended to total project length of 10,368 feet. A parallel spur track was added to the

outer two hundred feet of tramway so that the extreme end of the jetty could be doubled in width. Violent wave action at the end of the jetty kept the stonework beaten down below the water level, and Polhemus thought that a wider base might remedy this condition. The earlier, in-shore sections of the brush mattress work had been three feet thick, but as the work progressed seaward this thickness had been increased to five feet and small stones woven into the brush so that they would sink more easily; now the rough seas and deep water at the seaward end of the jetty required a return to thinner mattresses, and the last brush mattresses placed were again only three feet thick. The additional width at the outer end of the jetty was only partially successful in maintaining the enrockment above tide level, but on the average the stone work stood well above high tide level everywhere except at the extreme outer end. By the end of May, 1895, the appropriation of August, 1894 had been spent, but the plan to dump as much rock on the jetty as possible in the time available had been successful. Almost one hundred thousand tons of rock had been purchased, delivered, and placed on the jetty during the work year. To June, 1895, about 286,000 tons of rock had been placed on the project. No work, other than plant maintenance, occurred until after June, 1896, when the River and Harbor Act of that date provided $95,000 more for the North Spit Jetty.[21]

A new contract for enrockment was let on October 30, 1896, with the Portland firm of Wakefield and Jacobsen, and a new administrative system installed. Previously, the Corps of Engineers had been in active charge of jetty construction; now the entire operation was conducted by the contractor, although J. S. Polhemus remained for a time as engineer in charge. The contractors maintained their own plant at

the government quarry on the North Fork of the Coos River, but paid $500 a month for the use of the government plant and equipment on the North Spit. Between December, 1896 and November, 1897, almost 160,000 tons of stone were placed on the jetty, most of it on the seaward end of the work, which finally was raised for a time above high tide level. By this time, the tramway was badly deteriorated, but the project was maintaining a channel depth of from eighteen to twenty-two feet of water across the entrance at low tide, and by any standard the jetty was a great success. The engineering techniques applied had proved to be correct, and the project depth had been attained with less than half of the sum of $1,281,987 estimated to be necessary to build the North Spit Jetty in 1890. The work done in 1897 was considered to be the end of the original project. That which followed was regarded as maintenance.[22]

A congressional appropriation in March, 1899 provided $150,000 for further enrockment of the jetty. A new contract was let with the firm of Wakefield and Jacobsen on August 15, 1899. The contract called for repairing the wharf, the plant and the tramway on the North Spit, and placing enough stone on the jetty to control the tidal flow at high tide. At this time the official project length of the jetty was reduced to the ninety-six hundred feet which had been proposed in 1890. Considerable rebuilding of the plant was necessary, and the wharf was extended farther into the bay. Repairs were made to the inshore sections of the tramway where necessary, and the outer end of the tramway was completely rebuilt. Stone dumping then followed, and from November, 1899 to June, 1900 more than 105,000 tons of stone were placed on the jetty. In previous years the weight of the stone had been

calculated by measuring the displacement of the scows, now track scales were used to weigh the material after it had been loaded onto cars at the North Spit. Between fifty and one hundred men, depending on the demands of the work, were employed on the project during that period. Morton L. Tower, who had formerly been an aide to J. S. Polhemus, served as the inspector for the Corps of Engineers. Between July, 1900 and March, 1901 the contractors placed another 104,000 tons of stone on the jetty. The contract was completed on March 15, 1901 and that date marked the end of the first major construction on the North Spit Jetty. In the years from 1890 to 1901 more than 637,000 tons of sandstone from the Coos River quarries were placed on the jetty. No work of any consequence was performed again there until the mid-1920's. The inactive North Spit plant was maintained after a fashion for several more years, but the exposed location caused rapid deterioration of buildings and machinery, and the plant was finally abandoned. In 1910 the remaining useable machinery was sent to the Dalles-Celilo Canal project on the Columbia River.[23]

Part of the original proposal for improvement to the entrance had included the restraint of the loose blowing sand of the North Spit. In 1878 Channing Bolton had suggested building a series of fences across the spit to hold the sand. In 1890 Captain Willard Young had undertaken a study of the general problem of confining large areas of blowing and shifting sand, and he and his successor, Captain Thomas W. Symons, had obtained reports from the United States Secretary of Agriculture and from the Board of Park Commissioners of San Francisco. That body's success in reclaiming the sand dunes at Golden Gate Park had resulted from a study which revealed that the best method for restraining

large tracts of loose sand lay in planting Arundo arenaria, sometimes called "Holland Grass," and encouraging it to spread. A supply of this plant was obtained from Golden Gate Park, and a small plantation started near the North Spit government jetty wharf. The plants were propagated and spread by hand labor during the years following 1891, and by 1913 over six hundred acres of the North Spit had been planted to the hardy grass which was remarkably successful in keeping the troublesome sand in place.[24]

The external improvements at the entrance were followed some years after the beginning work on the North Spit Jetty by dredging and channel improvement inside the harbor. In 1882 Captain Charles F. Powell, who was the Corps of Engineer officer in charge at that time, had forecast the need for internal channel improvement at Coos Bay. Powell had reported that a dredge and associated tenders would cost about $60,000 and that the shoals in the inner harbor could be removed and channels maintained for an annual cost of $10,000, but he recommended that the project not be started until the entrance had been permanently improved. Nothing further was done by the Corps of Engineers to plan inner harbor improvement until 1890, when a survey was undertaken to determine the need for deepening the channels inside Coos Bay. Considering the volume of traffic to the bay, it is remarkable that shipping had used the natural channels found inside the bay since 1853. Little had been done to improve internal navigation since the first White settlement. One work of some importance had been privately undertaken on Coalbank Slough in 1874, when Chinese labor was employed to dig a turnbasin in the slough near the landing of the Eastport Mine. That basin enabled steamships to ascend the slough bow-first, turn,

load and descend the narrow slough without the aid of a tug, but that was almost the sole navigational improvement in the harbor. By 1890 it was seen that the building of expensive external jetties must be accompanied by internal channel work which would provide a depth of passage similar to that across the entrance bar. Consequently, in September, 1890, when plans were going forward to build the North Spit Jetty, the Chief of Engineers ordered a preliminary survey of the upper harbor of Coos Bay. Captain Thomas W. Symons, Corps of Engineers, who had jurisdictional charge of Engineer work at Coos Bay, conducted the examination. He found, as had Captain Powell, that there were a number of shoals in the inner bay which interfered with navigation. Two were especially troublesome. One was near the coal bunkers at the extreme south end of the inner bay at the mouth of Isthmus Slough, and the other was nearby at Marshfield, where the Marshfield Channel of the Coos River deposited large quantities of silt. The Bunker Shoal, as the Isthmus Slough obstruction was known, hindered the passage of vessels to the coal mines found on that slough and to the large new Bay City sawmill which was situated two miles above the mouth of the slough. Hog's Back Shoal, at Marshfield, had only five feet of water over it at low tide and blocked traffic, not only to all the Isthmus Slough enterprises, but also to the coal bunkers and wharves located at the south end of the town of Marshfield.[25]

To remove those barriers to navigation, Captain Symons recommended the building of a combination dredge and snag puller for use on the Coos River and the sloughs, as well as in the bay. He estimated that the total cost, including the construction of the dredge and the removal of thirty-seven thousand cubic yards of material, would be

$27,390. The River and Harbor Act of August 17, 1894 appropriated $13,000 for improvement of the inner harbor, but by 1895, when the money became available, conditions had changed and the Engineers held the appropriation unspent. Captain Symons had recommended a mean low water channel of only ten feet in 1891 before the effects of the North Spit Jetty had been seen. The success of the jetty in maintaining an eighteen foot minimum depth across the entrance bar meant that ships of greater draft could regularily enter the harbor. The channel depth of ten feet deemed sufficient in 1891 was inadequate by 1895. On June 3, 1896 Congress appropriated an additional $14,390 for dredging and inner harbor improvements. Although this brought the money available to near the sum originally requested, the Engineers continued to hold the bulk of the appropriation unexpended, since the amount available was insufficient to accomplish the improvements they now considered necessary. Moreover, economic hard times which had prevailed through the mid 1890's rendered internal improvements less pressing. There was far less tonnage moving through the bay than in 1890, which had been a dramatic boom year on the bay. In addition, the Acts of 1894 and 1896 contained language which specified that the money be spent for construction of a dipper dredge. In 1895 it was found that the costs for such a dredge would exceed the appropriation. By 1897 the Corps of Engineers had decided that a pump dredge with a discharge pipeline would be more suitable for the conditions found in Coos Bay, but patent restrictions made the construction of a pipeline dredge prohibitively expensive. At that point the Engineers petitioned Congress for a change in the language of the previous laws which had mandated the purchase of a

dipper dredge and hopper scows, and in July, 1898 Congress amended the Acts to allow the dredging to be contracted.[26]

A contract for the dredging of the inner harbor of Coos Bay was signed with W. N. Concanon of San Francisco in December, 1898, eight years after the appearance of Captain Symons' original survey of 1890. In early 1899 the Corps of Engineers undertook a detailed survey of the inner arm of the bay which would provide exact locations for the dredging. From that survey, information was derived which enabled the Engineers to direct the contractor to dredge a channel 150 feet wide and 13 feet deep through the Hog's Back Shoal, another of the same dimensions through the Webster Point Shoal just to the north of Hog's Back, another through the Stave Mill Shoal still farther north between Marshfield and North Bend, and finally to dredge a channel 100 feet in width and 13 feet in depth through the Bunker Shoal in the mouth of Isthmus Slough.[27]

Concanon brought his dredge to Coos Bay from Puget Sound in April, 1899. The hydraulic dredge was 130 feet long and had a hold depth of 10 feet. The dredge operated around the clock and required two crews of ten men each, plus a blacksmith, carpenter, and coal tender for the day shift. Additional men were used to tend the shore lines, to build bulkheads, and to drive channel piles. Dredged material was discharged through an eighteen inch floating pipeline made up of twenty foot sections mounted on pontoons. That discharge line could be extended almost four hundred feet, and an additional three thousand feet of twenty inch shore line could be utilized if necessary. Dredging began on May 7, 1899 at Hog's Back Shoal. The material dredged

there was discharged behind bulkheads which had been built across the mouth of a small slough on the south side of the town of Marshfield. Later, as the dredging proceeded northward, the spoil material was placed to the north of Marshfield behind more bulkheads. By June 9, 1899 the channel through Hog's Back Shoal had been completed. More than thirty-six thousand cubic yards of material had been removed, and more than twenty-one hundred feet of channel completed.[28]

Immediately Concanon started dredging on Webster Point Shoal and placed the twenty-one thousand cubic yards of material removed from that shoal behind the bulkheads to the north of Marshfield. By June 19 dredging started at Stave Mill Shoal. New bulkheads were built north and south of the mill from which the shoal took its name and the dredged material placed there. The channel through Stave Mill Shoal was completed on July 8, 1899. More than thirty-four thousand cubic yards were removed from the cut at Stave Mill Shoal, and most of that spoil placed behind the bulkhead to the north of the mill. Next, the dredge was moved to Isthmus Slough southeast of Marshfield and work started at once on Bunker Shoal. There, the dredge encountered a hard clay which it could not remove, and the channel there was dredged only twelve feet deep, one foot shallower than the projected depth. Work at Bunker Shoal was finished on July 15, 1899. In dredging channel through the four shoals, Concanon removed 104,798 cubic yards of material at a contracted cost of $20,828. That first dredging in Coos Bay greatly improved the inner arm of the harbor in a very short period of time and at a low cost. It also increased the land area in and near the town of Marshfield through the use of the dredged spoil for landfill.[29]

Navigation within the harbor was further improved in September, 1899 when the remains of the cradle used in the construction of the log raft of 1893 was removed from the bay. That cradle had served as the form in which to assemble the raft which had damaged the North Spit Jetty in November, 1893. After the disastrous experience with that raft, the builders abandoned the cradle inside Coos Bay. The Corps of Engineers hired workers to remove the obstruction, an action illustrating the growing concern for control of any element which might block or impede navigation. In addition to the removal of the cradle, in the fall of 1899 work was done to improve the Marshfield Channel, which connected the main inner harbor with the Coos River. Thousands of tons of stone had been brought down the Coos River during the previous two decades, and extensive agricultural development had followed the clearing of the myrtle groves in the river bottom. River traffic had increased significantly. Dairy products, fruit and potatoes were carried on steamboats from the Coos River Valley to Marshfield and from there shipped to Portland and San Francisco. The small steamboats made regular runs on the river between the bay and the heads of navigation of Coos River and its forks on a daily basis, and the Coos River residents used the river to travel from their farms to Marshfield and North Bend for shopping and business. Log rafts were towed down the river to the Coos Bay sawmills. The Coos River was an important tributary to the bay, and its improvement was a logical extension of the harbor improvement. The Corps of Engineers brought a small scow from the Coquille River project and converted it into a bucket dredge. That makeshift, operated by the Engineers, then dredged the Marshfield Channel out to a width of sixty feet and a depth of seven feet across

the upper bay between the town of Marshfield and the mouth of the Coos River. A contractor was engaged to drive pilings to stabilize the Marshfield Channel at its junction with the main inner channel just north of Hog's Back Shoal. Those operations exhausted available funds by the late fall of 1899, but they vastly improved navigational conditions within the bay.[30]

No further internal improvements were undertaken until August, 1903, when an allotment was made from emergency funds for the removal of a shoal which had formed some time previously at the mouth of Pony Slough. To accomplish that work, the bucket dredge was rebuilt and two scows were converted to dump scows for removing the spoil. In January, 1904 the bucket dredge was put to work at Pony Slough, and by early April, 1904 the shoal area had been deepened to eleven feet for a short distance but the emergency funds had been spent. In May, 1904 another small sum became available and dredging resumed in June, 1904. At length a channel sixty feet wide was cut through the Pony Slough Shoal, and the dredge was set to work again in the Hog's Back Shoal area, which silted rapidly because of the debris carried to it by the Coos River. When that work was finished, the channel throughout the inner bay had been restored to a minimum depth of thirteen feet.[31]

The internal harbor improvements complemented the work at the harbor entrance. The North Spit Jetty allowed ships of greater draft to enter the port regularly, and the internal channel work enabled such vessels to move more rapidly to dockside, load or discharge cargo and depart with less delay. Deeper channels reduced the dependence on high tides for safe transit within the bay. Larger ships began to be used regularly in the coastwise traffic, and as the bar entrance improved

the draft of vessels calling at Coos Bay increased. In 1892 it was found that the low-tide channel depth at the entrance had increased from around eleven feet to an average of seventeen feet following the external jetty work. At that time the stone work on the jetty extended only eighteen hundred feet into the surf. However, during the next year there was a temporary decrease in minimum channel depth to twelve feet. That change in depth was typical of the pre-improvement conditions which had been observed for years. The channel had always shifted and changed depth with changes in season, weather, and ocean and river conditions, and the new jetty did not yet extend far enough in 1893 to overcome those factors. In 1894, when the jetty had been extended out to more than twenty-five hundred feet past low tide mark, a minimum depth of twenty feet was found on the bar. In 1895 or 1896 soundings again found a depth of twenty feet at low tide in the entrance channel. In 1897 the channel shifted slightly to the south from its position of the years immediately past, and low tide depth varied from eighteen to twenty-two feet, but in 1898 the channel moved back northward into its former position and maintained its average twenty-foot depth. Unusually severe winter storms during the winter of 1899-1900 caused the channel to shoal far more badly than usual, and at times only eight feet of water were found across the bar, but as soon as the storms ceased the channel returned to its normal depth. With a channel which could be relied upon to be at project depth, vessels such as the 525 ton steamer Empire, drawing seventeen feet, could make regular runs in and out of Coos Bay all year. Coos Bay, in 1904, stood ready to serve as a more efficient port.[32]

CHAPTER III

CHANGE: THE NEW MILL, THE PORT, THE RAILROAD AND THE WAR

The period between 1900 and 1920 was a time of change for the port of Coos Bay. In 1904 Coos County coal production reached its peak. Coal shipments from the Coos Bay mines had increased gradually between 1880 and 1904, but year to year production had fluctuated widely. During those years the mines still competed with those of Puget Sound, where vessels drawing eighteen feet could call; Coos Bay, even after improvement at the entrance, could not ensure reliable passage to ships of that draft. The Newport Mine, which came to be called the Libby Mine, was for many years the most productive in the area. In the period around 1900, the Newport Mine was owned and operated by the Oregon Coal and Navigation Company. Coal was taken to a large bunker on the bay by the company's short private railroad line. The Eastport Mine, which was situated near the Newport and which was capable of being as productive a mine as the Newport, was out of production by that time, but to the south on Isthmus Slough, the excellent Southport Mine contributed to the regional output. Until 1895 those mines, with some help from smaller and less successful mines, were never able to export more than seventy thousand tons of coal from Coos Bay in a year. In 1895 important new production began to come from the Beaver Hill Coal Mine. That mine, an extension of the Spreckles interests which had built a railroad from Marshfield to Myrtle Point just previously, was

located between the south end of the Isthmus Slough and the Coquille River. Its coal was transported to a bunker on Coos Bay via the new Coos Bay, Roseburg and Eastern Railroad. In 1896 and 1897 area coal production exceeded one hundred thousand tons, but that level of production was not reached again until 1904, when one hundred and eleven thousand tons of coal were produced, and in the following year of 1905, when one hundred and nine thousand tons were mined. By 1911 that production had dwindled to less than fifty thousand tons, and it continued to drop so that by the early 1920's export of coal had fallen to less than one hundred tons a year. After 1923 no Coos County coal was shipped from Coos Bay. The use of coal in California had been generally supplanted by the use of petroleum beginning in the early 1900's. The Beaver Hill Mine, which furnished fuel for the railroad, was closed by an explosion in 1921, and coal mining became a dead industy except for small amounts produced for local use.[1]

Loss of shipping through the port because of declining coal production was more than replaced by greatly increased lumber shipments which occurred at the time. As early as 1885, mills on the bay were capable of sawing two hundred and fifty thousand board feet of lumber a day, but except for the boom years between 1888 and 1891, the full productive capacity of the area mills was seldom utilized. Between 1880 and 1887, the mills' output averaged slightly less than sixty thousand feet a day. However, the average for 1888 was one hundred and twenty-four thousand board feet a day, and for 1889 the average daily production was one hundred and sixty thousand feet a day, but those were exceptional years, far better than usual. In 1890 the average fell to one hundred and ten thousand board feet a day, and output thereafter

soon fell back to the production typical of that prior to the boom. In 1906 demand for lumber increased again, and average daily production exceeded one hundred and seventy thousand feet a day; the highest to that time.[2]

In 1907 a new lumber enterprise came to Coos Bay which soon made the lumber output of the best years of the past seem small in comparison. C. A. Smith, a Swedish emigrant who had developed a large lumber business in the Middle West, saw the potential in the tremendous stands of old growth timber in Coos County and resolved to exploit that resource. In 1907 he purchased the E. B. Dean Company's Bay City Mill, and his people used that mill to cut the timbers for a huge new sawmill. The new mill, located on Isthmus Slough at the point where it entered the bay, was capable of sawing half a million board feet of lumber a day. Production began there in 1908. Two large modern steel-hulled lumber transports were built especially to carry the output of the mill to San Francisco Bay, where Smith maintained a distribution center. The new mill was an important addition to the ranks of the cargo mills of the Pacific Northwest. The establishment of the new mill on Coos Bay reinforced the continuing interest of local businesses in the development of the harbor.[3]

Congress had responded to those expressions of interest by approving a new formal survey of the harbor in the River and Harbor Act of March 2, 1907. The jetty-builder James S. Polhemus and an assistant conducted the new survey in the late spring and summer of 1907. The report which resulted from that survey recommended that an eighteen foot channel be dredged and maintained from the entrance at the jetty to the town of Marshfield, thirteen miles inside the bay. The River

and Harbor Act of 1907 had also appropriated $100,000 for the construction of a hydraulic pipeline dredge to be used to maintain the inner harbor at Coos Bay and those of other ports in the Northwest. That plant was built in Portland and launched as the dredge Oregon on September 10, 1908. Following the recommendation of the survey of 1907, the new dredge was first put to work at Coos Bay. The Oregon operated there from October 13, 1908 to April 30, 1909. The Corps of Engineers lacked operating funds for the new dredge, and more than $21,000 was provided by local business interests to keep the Oregon working until government funds became available. The first dredging took place at the mouth of Pony Slough, where the inadequate old dipper dredge had never succeeded in clearing a satisfactory channel. That shoal had been causing the greatest navigational problems within the bay and was attacked first. The channel there was widened to one hundred and fifty feet and deepened to sixteen feet at lower low water for a distance of fourteen hundred feet. The dredge was then moved to Isthmus Slough to work on the Bunker Shoal, and starting there, proceeded north along the inner arm of the bay, dredging to a depth of eighteen feet everywhere except near the coal bunkers south of Marshfield, where the hard clay still limited the channel depth to only sixteen feet. During the period when the dredge was operated with privately raised funds, the Oregon moved three hundred and twenty thousand cubic yards of spoil material from the channel to shore locations behind retaining bulkheads or to low areas in the bay outside the channel. When public funding became available, an additional ninety thousand cubic yards of spoil were removed before the dredge was towed to Gray's Harbor, Washington.[4]

In November, 1910 the Oregon returned to Coos Bay and resumed the task of dredging the inner harbor to the project depth of eighteen feet. By June, 1911 the dredge had deepened 13,300 feet of channel to a depth of seventeen feet at lower low water and widened the channel to 160 feet. The Oregon then spent the summer of 1911 on the Coquille River and returned to Coos Bay in September, 1911 to further widen and deepen the interior channels. The Corps of Engineers had proposed that the width of the channel be two hundred feet, with some areas widened to two hundred and fifty feet, but the newly organized Port of Coos Bay requested that the channel in the inner arm of the bay between Marshfield and North Bend be at least three hundred feet wide. The Port of Coos Bay agreed to pay the cost of the extra width. That three hundred foot wide portion of the channel extended from the C. A. Smith Lumber Company wharf, which was located just south of the town of Marshfield, to the Porter sawmill, which was situated on the inner arm of the bay between Marshfield and North Bend. The Smith Company paid for the five days' work done by the dredge in the area of the company wharf. More than a year's work had been done by the Oregon on her third trip to Coos Bay, and over 600,000 cubic yards of material had been dredged and placed around the edges of the bay, most behind bulkheads for landfill. The dredging of the inner harbor was, for a time, complete, and the channels were at project depth in all but a few difficult areas. There was a minimum channel width of two hundred feet throughout the bay, and much of the inner arm had been widened to three hundred feet, a width which exceeded the Corps of Engineers' project specifications. Improvement of the channels in the bay beyond project specifications was the immediate

result of the formation of a new organization in the area, the Port of Coos Bay.[5]

Action to organize a formal port governing body, with taxing authority, originated in 1908. Early in 1909 enabling legislation was enacted by the Oregon legislature and signed into law by the governor. Previously, the Port of Portland had been organized in Oregon under special legislation which was subsequently found to be unconstitutional. The act of 1909 cleared the issue and allowed all de facto ports in the state to organize as municipal bodies. Immediately, Coos Bay commercial interests, who had been instrumental in having the law passed, set out to establish a Port of Coos Bay. The land area upon which taxes could be levied was defined as the area which drained into the bay. The question of formation of the Port of Coos Bay was introduced to northern Coos County voters in April, 1909, and the measure passed by a five to one margin. The first body of commissioners included Henry Sengstacken, Dr. Everett Mingus, W. C. Harris and W. P. Evans. A test case to establish the constitutionality of the new port law was instituted in Oregon courts at once. That case required more than three years to be decided, and while it was being heard and appealed in successive courts, the Port of Coos Bay continued to operate, but without a tax levy. In 1912 the body of 1909 was disbanded, the Port of Coos Bay thrown into the hands of a receiver, and the port governing body reorganized under a revised charter. Oregon Governor Oswald West appointed Albert H. Powers, Peter Loggie, Henry Sengstacken and Louis J. Simpson as Port Commissioners. The reorganized port soon sold a $300,000 bond issue for the improvement of the harbor. That money was intended for internal dredging to increase the interior channel depths to twenty-five feet

and to dredge wide turning basins at selected points inside the harbor. In May, 1913 the Port reached an agreement with the Puget Sound Bridge and Dredging Company for the work, and that company operated under contract, using the twenty-inch suction dredge Seattle, until April, 1915. During this period the Port of Coos Bay sold another bond issue of $300,000, and the money from the sale of those bonds and of the previous issue went toward deepening the inner harbor.[6]

Meanwhile, the Corps of Engineers was also conducting dredging operations. By 1907 it was evident that dredging of the entrance at the jetty on a routine basis was necessary, but the dredges used in inner harbor work were incapable of withstanding the heavy seas found there. The survey report of 1907 had expressed a need for an ocean-going hopper dredge to be used for the maintenance of the entrance to Coos Bay and for other Pacific Northwest harbors. Hopper dredges had been engaged in clearing the entrances to harbors on the calmer Atlantic and Gulf Coasts but had only one inconclusive trial on the Pacific Coast. Hopper dredges operated in a manner similar to the hydraulic pipeline dredges, but instead of discharging their spoil through a long pipeline, the dredged material was placed in hoppers inside the vessel and carried away and dumped outside the channel area when the containers became full. In 1908 the Corps of Engineers recommended to Congress that an appropriation of $350,000 be made for the construction of a sea-going hopper dredge especially for the Pacific Coast. The River and Harbor Act of June 25, 1910 approved that recommendation, and construction began at Seattle on May 11, 1912. The steel vessel was launched as the Colonel P. S. Michie on August 16, 1913, and after initial trials and additional outfitting, arrived at Coos Bay on January 22, 1914.

Stormy weather kept the Michie out of the entrance at first, so she dredged inside the bay on the Pony Slough Shoal, but was occasionally able to venture out to work on the bar. In one hundred and sixty hours of dredging there she removed more than one hundred and thirty-six thousand cubic yards of sand from the jetty channel, and substantially increased the depth there during the winter months which had historically been the time of shoalest water on the bar. However, the Corps of Engineers soon learned that the late spring through early fall months were those most favorable for the operation of the hopper dredge at Coos Bay, and subsequently scheduled the Michie for work at the port at that time. In the following years, she more than proved the feasibility of such plants for the Pacific Coast. During the operating season in the years from 1914 to 1920, the Michie always restored the entrance to a depth of twenty-seven feet and she averaged removing over seven hundred and fifty thousand cubic yards of sand from the entrance, with one banner year of over one million, two hundred thousand yards dredged. The pipeline dredge Oregon, however, worked only parts of two seasons in Coos Bay from 1914 to 1920. In 1914 the Port of Coos Bay's contract with the Puget Sound Bridge and Dredging Company was in full swing in the inner bay, so the Oregon was again assigned the task of dredging at the mouth of Pony Slough, on the outer arm of the bay. At that time two hundred and seventeen thousand cubic yards of spoil were removed from that shoal. Meanwhile, the contract dredge Seattle was engaged in widening the channel in the inner arm of the bay to three hundred feet, with five hundred foot-wide turning basins, and deepening the channel to twenty-five feet from the C. A. Smith Mill above Marshfield to Pigeon Point, two miles from the entrance. The contract dredging for the Port of Coos

Bay, which exceeded the Corps of Engineers project depth of eighteen feet, produced over four million cubic yards of spoil in addition to that dredged by the government plants. After 1914 the Oregon returned to Coos Bay again only once before the end of the decade, in June, 1919. The Michie, however, returned every year, and on each trip she would clean up problem shoals within the harbor, but no new major dredging program took place inside the bay from 1916 until after the end of the First World War. In 1915 Coos Bay stood in the best navigational condition ever. There was a reliable summer entrance depth of twenty-seven feet, and an inner harbor depth of twenty-five feet everywhere except across Pigeon Point Reef. However, the First World War and the coming of the railroad to Coos Bay from the Willamette Valley were events which delayed the full reaping of economic benefits which should have accompanied the improvements to the harbor. Both the war and the railroad acted to reduce the tonnage from the port for the next several years.[7]

Railroads had been a part of the facilities of the port of Coos Bay since the 1870's, but until 1916 the port had no rail connection with other parts of the state. In early days the Eastport Mine moved coal from the minehead to Coalbank Slough, a distance of nearly a mile, on a wooden tramway with a strap iron rail covering. The loaded cars traveled by gravity to the loading dock and the empty cars were towed back to the mine by draft animals. The Newport Mine, two miles from Coalbank Slough, was also served by a tramway which by 1876 had been upgraded to a modern railway with a small steam locomotive. In the early 1870's an isolated, short rail line connected Isthmus Slough and Coos Bay with Beaver Slough and the Coquille River; spanning the mile

and a half isthmus or ridge which separated the two drainages. In the same period an unsuccessful coal mine at Utterville was connected with Isthmus Slough by a short rail line, and still another carried the coal of the Southport Mine to that slough, which was deep enough for ships to ascend almost to the Isthmus. All those rail lines were short and make-shift in nature, but a serious move was under way by 1879 to build a railroad from Coos Bay to the main line of the north-south Oregon and California Railroad at Roseburg, Oregon. The Oregon Central Railroad Company was chartered for that purpose in 1886, and in 1889 construction started between Coos Bay and Coquille. That section of the line was nearly complete to Coquille by the summer of 1890, at which time the road was reorganized at the Coos Bay, Roseburg and Eastern Railroad. In 1893 the line reached the town of Myrtle Point, a distance of about twenty-six miles from Marshfield. No further progress was ever made in building the road on to Roseburg from that point, although C. A. Smith and his associate Albert Powers extended the line as a private logging road from Myrtle Point to the town of Powers some years later. Despite the failure to reach the main line in the interior, the Coos Bay, Roseburg and Eastern was an important part of the transportation system which led to the port. Before the completion of the railroad, the agricultural products of the fertile Coquille Valley had been shipped out across the treacherous Coquille River bar at Bandon. As soon as the railroad reached Coquille those products began to be diverted through Coos Bay, and they constituted an important part of the exports from Coos Bay. In 1895 the Coos Bay, Roseburg and Eastern ran spur lines to the large new coal mine complex which had been established at Beaver Hill; and nearer Marshfield the Libby Mine, formerly the Newport Mine, had ceased using

Coalbank Slough and built a modern narrow-gauge line from the mine to a large bunker at the mouth of Isthmus Slough. While those railroads aided the internal commerce of the port, the area was still effectively isolated from the rest of the state by the rugged mountains of the Coast Range.[8]

The Southern Pacific Railroad gained control of the Coos Bay, Roseburg and Eastern in 1906, and began at once to search for routes other than that through the difficult Coquille Valley to Coos Bay. One route was considered from Drain to the Umpqua River Valley via Elk Creek, another from Eugene west to the coast through the Siuslaw River Valley to Florence and thence south to Coos Bay. After an expensive false start on the Umpqua Valley route, the Southern Pacific Railroad began construction in 1909 on the Eugene-Siuslaw Valley alternate route. That branch of the Southern Pacific was known as the Willamette Pacific Railroad, and required seven years and $12,000,000 to complete to Coos Bay.[9]

At Coos Bay there was a widely held belief that the attitude of the Southern Pacific officials was one of high-handed unconcern for the welfare of the region. That belief was reinforced by the long delay in completing the railroad and encouraged by those who disliked the prospect of railroad competition with ocean shipping. There was thus an enormous background of hard feelings against the railroad which was only partly dispelled after the completed railroad proved to be an outstanding success. A part of the antagonism arose from the controversy over a bridge across the north end of the bay. Once the Southern Pacific determined the general line of construction, it became obvious that the most feasible approach to North Bend and Marshfield was from the north, at the point where the inner and outer arms of the bay joined.

Factions opposed to the railroad charged that a bridge there would constitute a serious hazard to navigation, although the Corps of Engineers approved the projected swing bridge after careful study. To further complicate the matter, the railroad then tried to alter the approved plan for the bridge, which resulted in more delays. However, the hostility toward the Southern Pacific was countered by the efforts of the general commercial interests in the area, who wanted the railroad to come to Coos Bay as a mark of economic maturity and as an alternate outlet for their products. The Corps of Engineers had predicted that rail service connecting Coos Bay with the main railroads would have only a minor effect on shipping through the port. However, after the line was finally completed and connected with the Coos Bay, Roseburg and Eastern in 1916, there was an immediate and drastic effect on the waterborne passenger traffic of the port. That business dropped from a high of almost twenty-two thousand passengers carried by the ships serving the port in 1914 to a low of six hundred and fifty people in 1918, but that reduction was due only in part to the coming of the railroad. The war in Europe also affected the port.[10]

The First World War did not bring a dramatic boom to Coos Bay. A severe shipping shortage developed in 1915 as ships which normally carried the output of the mills to market became involved in the war in the Atlantic. The inability to ship lumber from the ports of the Northwest caused a general cutback in the lumber industry on the Pacific Coast, but the newly completed railroad did much to keep the war years from being a time of complete economic disaster for Coos Bay. In spite of a shortage of rolling stock throughout the United States during the war, the railroad carried a substantial amount of lumber out of Coos Bay in 1917 and 1918.[11]

The World War revived one industry at Coos Bay which had fallen into a decline; the building of wooden ships. By the turn of the century, wooden Pacific Coast sailing vessels were being gradually replaced by steel ships equipped with steam and internal combustion engines. The building of wooden ships at Coos Bay continued, however. Between 1901 and 1905, ten sailing vessels of over one hundred tons were built in Coos Bay. At North Bend the firm of Kruse and Banks began the construction of the hybrid sail-steam coasting vessels known as "steam schooners" in 1907. In 1908 their yard launched three vessels and in the following year they built a large ferry. In the next three years they built a tug, several barges, two gasoline powered vessels, and several large steam schooners; including the A. M. Simpson and the 933-ton San Ramon. Despite those activities, slack times fell on the industry after 1912, and in 1913 the yard closed for lack of work. After 1914 the war in Europe began to draw away West Coast shipping, and in 1915 the Kruse and Banks yard went back into general production. By 1916 the yard employed two hundred men. Five steam schooners were built for private interests before the Emergency Fleet Corporation granted the yard contracts for six large wooden Hough-design steamers in August, 1917. Those ships were far larger than any previously built on Coos Bay; averaging two thousand net tons each. At the peak of the construction boom Kruse and Banks employed eight hundred men. Another yard was established at the mouth of Isthmus Slough near the C. A. Smith Mill during the war years. The Coos Bay Shipbuilding Company, an affiliate of the Coos Bay Lumber Company, also built several of the big Hough vessels for the Emergency Fleet Corporation of the same type

as those undertaken by the North Bend yard. The Marshfield yard employed as many as five hundred men, and like Kruse and Banks, did much to ease the problem of lack of work in the sawmills. The ships themselves, being of wood, absorbed some of the unused productive capacity of the area sawmills. By late 1919 twenty large wooden hulls had been built at Coos Bay. At war's end ships in the stocks were continued; some were launched as schooners, but there were no new starts, and by 1920 Coos Bay's brief boom in shipbuilding had subsided.[12]

The Coos River also made its contribution to the efforts of the war years and to the general growth and improvement of the port during the early years of the twentieth century. After 1896, the improvement of the Coos River became the responsibility of the Corps of Engineers. The Coos River, which drains most of northeastern Coos County, is the only stream which contributes a significant fresh water flow to the bay. The sloughs drain only their immediate and comparatively small individual watersheds, and the flow of water in them is predominantly controlled by the tides, but the Coos River drains a densely timbered area of over six hundred square miles and funnels the heavy rainfall of that area into the bay. About six miles above its entrance into the inner arm of Coos Bay, the river divides into two branches; the South Fork and the North Fork or Millicoma River, as it was alternatively known. The narrow valley of the Coos River provides the only agricultural land of any consequence near Coos Bay. By 1890 the valley furnished the area with much of the food consumed there, and exported some produce in addition. That produce moved to market on the river steamboats which served the valley. Jetty building had always depended on stone from the quarries along both main forks of the river, and that

stone was transported to the harbor improvements in barges which were towed down the Coos River. As the forests adjacent to the bay were cut, the river became increasingly important as a means of moving the logs from the more distant stands of timber to the mills of Coos Bay. The river is tidally affected up to Allegany on the North or Millicoma branch and to Dellwood on the South Fork, a distance of about fourteen miles from the mouth of the river in each case. Several hundred thousand tons of rock were barged down the river to be used on the jetties between 1880 and 1900, and millions of feet of lumber in uncut logs were towed to the Coos Bay sawmills in the period between 1896 and 1920. In the peak war year of 1916, over one hundred thousand tons of logs moved on the river, but by 1919, when the lumber industry of the area was almost completely shut down, only slightly more than nine hundred tons of logs were rafted to the bay.[13]

Corps of Engineers involvement on Coos River began with the River and Harbor Act of June 3, 1896, when $5,000 was appropriated for snag removal and deepening of shoal places in the river. Another $3,000 was allocated for further improvements in 1899. Similar appropriations were continued at intervals through the years before 1920. The river required relatively little work to keep it navigable, and the cost-benefits ratio was highly favorable, as shown by the thousands of passengers carried, the tons of rock moved to the harbor improvements, and the millions of feet of logs rafted to the mills on the river. The Coos River was a vital part of the port of Coos Bay.[14]

Another small project similar to the improvement of the Coos River was considered at the harbor entrance in 1910. After strong pressure by local interests, the Corps of Engineers surveyed a rock

ledge there which projected from the water at one point as a pinnacle known as Guano Rock. That rock had been a feature at the entrance to the bay from the earliest days. It was shown on James Lawson's preliminary chart of the entrance in 1861. Then, and in subsequent years, the rock stood to the south of the channel and served as a marker for the southern edge of the entrance channel. Over the years wave action cut away the sandstone at the base of the projecting rock, and in 1905 the ten feet of rock which had projected above the surface broke off and toppled into deeper water nearby. After that only two feet of the rock projected above the surface at low tide, and it was therefore considered by some to constitute a hazard to navigation. The River and Harbor Act of June 25, 1910 called for an examination of the entrance to determine if the rock needed to be removed. The examination was conducted in November, 1910 and the Corps of Engineers concluded that because the rock stood well to the south of the channel it did not require removal. However, it was suggested that the Light House Establishment might place some sort of marker on the reef in addition to the buoy which had been anchored nearby, but that suggestion was never acted upon. Guano Rock remained untouched for many years and the sandstone reef upon which it had stood was not removed until after the Second World War.[15]

Although some of the improvements desired by the business interests at Coos Bay were not immediately accomplished, private facilities inside the bay were considered to be more than adequate for the days prior to the First World War. After the turn of the century, terminal facilities at Coos Bay included docks, wharves, tugs, lighters, warehouses, marine ways, loading appliances, coal bunkers, electrical

services, communications services, fuel, roads, railways, food supplies, and shore lodging for ships' crews and passengers. Such improvements had always accompanied the economic development of Coos Bay and had been added and expanded as they became necessary to commerce and as technological advances allowed. The earliest colliers were loaded from wagons and lighters, but tramways and docks soon supplanted such methods, and those were in turn replaced by railroads and bunkers from which to load the ships. Wharves to accommodate passengers and cargo were built almost as soon as Empire City was established, and early travelers could be put up there in a primitive frontier inn. Sawmills were all built on the bay shore, a triply convenient arrangement, as the logs could be rafted to the mill, stored in the water while awaiting processing, and loaded into ships for export after being sawed. Each sawmill thus had its own log boom for timber storage as well as a wharf for loading ships. Some of the mills also had a shipyard in conjunction, so marine ways were available for repairs to vessels as well as for new construction. The wharves, docks and piers at Coos Bay were generally constructed upon wooden pilings driven into the bay bottom. The bay was infested with boring marine organisms, so that wooden structures in the water had a short life. Pilings had to be replaced often, and the pile drivers were in constant demand. Steam tugs were present on the bay from almost the beginning days of White settlement. Steamers could enter and leave under their own power, but the sailing vessels almost always had to be towed in and out of the harbor, and in later days, large steamers required the assistance of tugs to dock. A military road was built between Coos Bay and Roseburg to the east in the 1870's, but it was usually impassable in the winter months, and

served principally for the carriage of mail to the main railroad. Land travel north to Gardiner on the Umpqua River was along the ocean beach, by wagon and team, and later by automobile until the roadbuilding era of the 1920's. Around 1912, before the railroad to Eugene was completed, a combination of steamboat and automobile service connected Coos Bay with the main Southern Pacific Railroad line at Drain, Oregon. Passengers traveled by steamboat from Coos Bay to Allegany on the Coos River, then across the ridges of the Coast Range by automobile to Scottsburg on the Umpqua River. From there they continued by automobile along the banks of the Umpqua to the railroad at Drain. That route was an exception to the general rule of confinement of travel to the valleys, since the roads followed the mountain ridges. At any rate, before 1916 most travelers went by ship to San Francisco and Portland. Telegraph service came to the bay in the 1870's, and naval and commercial radio stations were established soon after the introduction of wireless telegraphy. The towns of North Bend and Marshfield had no rail service between them until just prior to the arrival of the Southern Pacific Railroad in 1916. An interurban link was then built between the two towns which tied the Southern Pacific to its subsidiary Coos Bay, Roseburg and Eastern line. That connection provided the opportunity of rail service to the wharves, mills and small factories which lined the shore at intervals along the inner arm of the bay between the two towns. Previously none of the North Bend industries could ship by rail, and at Marshfield only the coal bunkers of the Coos Bay, Roseburg and Eastern and the Oregon Coal and Navigation Company had been served by rail. However, the main C. A. Smith sawmill at the mouth of Isthmus Slough had a rail siding, and logs were brought to the Smith mills

from southeastern Coos County, forty-five miles away, after the completion of the Smith-Powers Logging Company railroad as an extension of the Coos Bay, Roseburg and Eastern in 1916.[16]

At the time of the First World War, dock and similar facilities intended specifically for the loading of ships included a wharf six hundred and twenty feet long at the Southern Oregon Company Mill at Empire, a thousand foot municipal wharf with a warehouse at North Bend, as well as additional private mill and factory wharves there with a combined length of fourteen hundred feet. Between North Bend and Marshfield were two small docks in poor condition; a public one of two hundred feet, and a private dock three hundred feet in length. On the north side of Marshfield there was a short public wharf fifty feet long, a private dock which belonged to the Standard Oil Company, the two hundred and fifty foot Ocean Dock, and a broken line of private wharves which stretched to the south for six hundred feet. Those were followed by a solid line of pile wharf a thousand feet long. Two hundred feet of that wharf was leased by the Portland and Coos Bay Steamship Company, a subsidiary of the Southern Pacific Railroad. To the south of that was another private wharf eight hundred and fifty feet long, with a warehouse. Then came the Coos Bay, Roseburg and Eastern coal bunker, and a five hundred and ten foot railroad dock, the only such dock on the bay prior to 1916. Above that was the old bunker of the Libby Mine, almost inactive after 1913. On Isthmus Slough to the east of the Libby bunker was the modern loading facility of the C. A. Smith Mill; a thousand foot wharf with a four hundred foot slip, equipped with two electric cranes. Farther up the slough, Smith's Bay City Mill was also served by a wharf with an electric crane. At that

point in its history the terminal facilities of Coos Bay were quite adequate for the trade carried on there, except for the lack of public facilites from which to load lumber sawed outside the immediate area. Those port facilities would be further improved in the next decade as Coos Bay entered an era of increased American marketing of its products, and the beginnings of an important international trade with the Orient.[17]

CHAPTER IV

THE PORT OF COOS BAY IN THE NINETEEN-TWENTIES

The industrial base of the Coos Bay region was firmly established by the early 1920's. At the beginning of the decade the C. A. Smith sawmills alone would have made the port an important factor in the American lumber trade, and the other mills on the bay combined could almost equal the output of the Coos Bay Lumber Company, as the Smith mill complex on Isthmus Slough was then called. To that was added the mill capacity of the area at the mouth of the Umpqua River, the Siuslaw Valley, and the upper Coquille Valley; all of which could export their lumber through Coos Bay after the railroad was completed in 1916. Although the timber immediately tributary to the bay was gone, the more distant stands of Douglas fir, spruce, and Port Orford cedar were brought to the bay by the Southern Pacific Railroad or by the Coos River and the sloughs which reached back into the surrounding hills. Prior to 1921 the better port facilities for loading ships were privately owned, which tended to restrict the exportation of lumber sawed outside the bay, but this limiting factor was removed late in 1921 when the Port of Coos Bay constructed a large new wharf and warehouse. The terminal was located on the west side of the inner bay to the north of Marshfield and was equipped with a locomotive crane and served by a railroad siding which connected with the Southern Pacific Railroad.[1]

Despite those advantages, national and world trade conditions remained such that the first three years of the 1920's were years of

recession for Coos Bay. The bay area had emerged from the First World War in poor condition. The mills, including the C. A. Smith mills, were almost completely shut down in 1919. Tonnage through the port in 1919 was just over half what it had been in the previous record year of 1914, and 1920 was only slightly better than 1919. Traffic and tonnage through the port in 1921 was lower than any year since 1910, with 1921 the worst year of the decade, but in 1922 the picture brightened. In 1922 the port tonnage exceeded that of 1914, and in 1923 the port set a freight record of 712,000 tons which was not broken until after World War II. Most of the record 1923 tonnage went to American markets, but exports of lumber and logs to the Orient, especially to Japan, accounted for over one-fifth of the area's production. In spite of the bad early years, the companies on the bay prepared for recovery. The veneer mills which had been built on the bay since 1910 were adapted for what was to become an important peripheral wood products industry: the manufacture of Port Orford cedar separators for use as insulators in lead-acid storage batteries. Older mills were overhauled, and new mills were planned for Coos Bay. The Pacific Northwest had expectations of marketing its lumber products in the Eastern and Central United States because of the depletion of Southern timber. The Japanese were interested in certain of the lumber products of the West Coast and actively engaged in negotiations for them by 1921. It was believed, however, that Coos Bay industries could not take full advantage of those potential markets because the harbor and entrance were too shallow to allow modern deep-draft freighters to enter the bay.[2]

Although the North Jetty and the ocean-going hopper dredge Col. P. S. Michie had produced results beyond original expectations,

there were problems at the entrance and inside the bay which restricted shipping to maximum ladings of less than twenty feet. The North Jetty, last maintained in 1901, had been so badly beaten down by strong wave action that its outer end, while still effective, was completely below the surface of the ocean at low tide in 1920 and thus was a hazard to navigation. The Michie worked on the bar during the late spring, summer, and early fall months, and could often obtain as much as a thirty foot channel over the bar, but she was unable to operate on the bar in the stormy winter months, and it was common for the bar to shoal to eighteen feet over the course of a winter. Insurance companies allowed only eighteen feet of draft for vessels trading at Coos Bay in winter, and nineteen and a half feet for those calling in summer months. Inside the bay it had been found in the years since the first dredging in 1899 that a yearly dredging program was necessary to maintain the project depth. Until 1919 the Corps of Engineers had supported a project depth of eighteen feet, although the Port of Coos Bay had dredged the bay channel to twenty-five feet from Marshfield to Pigeon Point, which was two miles from the entrance, during the years 1913 to 1915. In 1917 the Corps of Engineers, at the urging of Coos Bay interests, had recommended an increase in channel depth inside the bay to twenty-two feet. This new project depth was approved by the River and Harbor Act of March 2, 1919, and work started on the deepening of the harbor in August, 1919. The dredge Oregon was set to work at dredging the inner harbor to the twenty-two foot project depth. By May, 1920 the Oregon had completed most of the inner harbor work except for the sandstone reef at Pigeon Point, and her crew conducted an examination of that reef at the time, but the dredge was unable to remove the soft stone

found there. The Port of Coos Bay dredging project in the years between 1913 and 1915 had temporarily achieved an inner harbor depth of twenty-five feet everywhere in the bay except across the Pigeon Point Reef, which was to the northeast of the submerged Fossil Point Jetty. However, Pigeon Point Reef set the controlling depth of the harbor and effectively restricted shipping to a maximum loading depth of twenty-two feet, which the marine underwriters further reduced to less than twenty feet. In October, 1920 the Corps of Engineers put a new grapple dredge, the Coos, to work on the soft sandstone at Pigeon Point. Attempts were made at that time to cut a channel through the reef by detonating explosive charges on the surface of the rock, but those efforts were unsuccessful. The Coos was pulled off the work after a month, and the Corps of Engineers began a search for a plant which could drill the reef for more effective blasting. In 1921 the U.S. Drill Boat No. 12 was set to drilling and blasting the reef, with the Coos removing the broken rock. A twenty-two foot channel through Pigeon Point Reef was completed in May, 1924. More than forty-five thousand cubic yards of rock had been removed from the cut at a cost of slightly over $100,000. That new section of the channel was three hundred feet wide and four thousand feet long, with a rather abrupt curve to the south on its lower half near Fossil Point. That curve through solid sandstone rock caused the Coos Bay harbor pilots to avoid the new cut and use a channel to the west which was shallower but less risky than the new channel. Although the Corps of Engineers was reluctant to admit error in planning the placement of the cut, the boycott of the channel forced the Engineers to dig a new channel to the west in the early 1930's. Meanwhile, a large new project two miles away at the entrance occupied the Corps of Engineers for several

years through the 1920's; the rebuilding of the North Jetty and the construction of a new South Jetty westward from Coos Head on the south side of the entrance.[3]

Following the end of World War I the industrial interests at Coos Bay embarked on a campaign to gain major aid in further improving the port's navigational facilities. The Port of Coos Bay, which represented the business interests of the region, wanted the government to rebuild the North Jetty, and it wanted the South Jetty which had been proposed in 1890 but never built. The port commissioners maintained that deeper entrance and interior channels were necessary if modern deep-draft ships were to call at the port and carry regional products to national and world markets. It was argued that new jetties would allow an entrance depth of as much as thirty or even forty feet throughout the year and possibly eliminate the need for the hopper dredge at the entrance. The arguments were persuasive, and in addition, the Port had a solid background as an organization which stood ready to help itself. The Port of Coos Bay by 1920 had spent more than $600,000 for channel dredging and was in the process of selling bonds to pay for the planned terminal wharf and a hydraulic suction dredge at a cost of $250,000.[4]

A preliminary survey of the bay was undertaken by the Corps of Engineers in 1920, and a formal survey followed in 1921. The final survey recommended the building of the two jetties, the extension of the twenty-two foot channel two miles up Isthmus Slough to a mill at Millington, and the continuation of the bar dredging by the Michie. That plan of action was approved by Congress in the River and Harbor Act of September 22, 1922. Plant and equipment from other harbor improvement projects arrived at Coos Bay late in 1922 and in early 1923,

and preliminary work got underway in the summer of 1923. The two jetties were to be built simultaneously, with the main plant to be located on the south side of the entrance at Charleston Bay. Both jetties were to be built in much the same way as the original North Jetty of 1890-1901, except without the use of brush mattresses, which had come to be regarded as unnecessary. Receiving wharves were built for the machinery and stone; and shops, offices, messhalls, and dormitories were built for the work force.[5]

By early summer of 1924 the approaches to the South Jetty were complete. The receiving wharf was located in the South Slough embayment at Charleston, and a double track tramway extended from the wharf to the beginning of the jetty, four thousand feet away. To reach the jetty site it was necessary to build 3,600 feet of pile tramway, to excavate a cut 368 feet long through a bluff, and to dig a tunnel 580 feet long through Coos Head. The South Jetty originated at the west portal of that tunnel. In the first year's work the receiving wharf and part of the approach tramway were built with untreated pilings. At the end of nine months the marine organism Teredo navalis had completely destroyed two hundred piles, and their replacement cost $20,000. In spite of that setback, 3,600 feet of track and the tunnel were finished by midsummer of 1924. The jetty tramway was built west of the tunnel portal after August, 1924 and by June, 1925 the South Jetty tramway extended nearly two thousand feet from the tunnel, and seventy-five thousand tons of rock from a quarry on the North Coos River had been placed under the tramway. By June, 1926 an additional two thousand feet had been constructed and 260,000 tons of stone added. The projected length of thirty-nine hundred feet had been reached, but the enrockment was still in

progress. At the seaward end of the jetty deep water had been reached, and the work began to show far less progress. Much of the outer tramway had been destroyed by storms and had to be replaced before work could proceed. Only 224 feet were attained between July, 1926 and June, 1927. During that period Congress authorized a change in the project. The River and Harbor Act of 1922 had approved an expenditure of $3,250,000 for the construction of jetties to a fixed length. As the work progressed, it was seen that the jetties could be finished for less than that amount, and it was thought that additional length would increase the depths across the bar. The local interests then requested that the jetties be extended as far as the original appropriation would allow, and that extension was authorized by the River and Harbor Act of January 21, 1927. South Jetty construction then continued through most of 1928, and the jetty was completed on November 6, 1928. A total of more than 858,000 tons of rock had been used in building the new jetty, and the crest of the enrockment stood at 4,350 feet west of the Coos Head tunnel portal.[6]

The building of the North Jetty had proceeded while the South Jetty was under construction. Both parts of the project had shared a main plant located at Charleston, but the North Jetty also had a small plant, with an office, dormitory, shop, eating facilities and a wharf for receiving stone for the jetty. Approach tramway construction followed the line of the curved approach of 1890. The tramway was built over the old jetty, and the new stone simply dumped on top of the earlier work. Tramway construction on the North Jetty started shortly after that on the South Jetty, in October, 1923. The approach tramway of 2,000 feet was built across the North Spit; jetty construction

began in May, 1924, and in the next twelve months over 4,700 feet of jetty tramway were built, so that by July, 1925 the outer end of the work was 6,700 feet from the receiving wharf. During that period the Corps of Engineers barged over one hundred thousand tons of sandstone from the Coos River to the North Spit receiving wharf. In the following year construction was slowed by the replacement of tramway which had been destroyed by storms. However, in the 1926-27 work season 560 feet of tramway were added and 170,000 tons of rock placed. By June, 1927 the jetty reached over 7,700 feet from the receiving wharf and an additional 115,000 tons of rock had been placed on it. More storms in the period which followed reduced the length of the tramway so that by June, 1928 the end of the jetty was still only 7,700 feet from the wharf. Stone placement for that work season was 123,000 tons. The plague of storms continued, but by June, 1929 the end of the work stood at eight thousand feet, only three hundred feet from the projected end of the jetty. One hundred and thirty thousand tons of rock were added in late 1928 and 1929, and the North Jetty was completed to a crest length of slightly over 8,200 feet in November, 1929, although more rock was added following that. Total rock added to the North Jetty between 1924 and 1930 was 690,000 tons. The construction of both jetties had required more than one and one-half million tons of stone, most of which had come from the quarry on the North Coos River.[7]

As the jetties neared completion the Corps of Engineers decided that the works could be protected from the heavy seas if concrete caps were poured over the outer ends. In April, 1929 preparations began for capping the South Jetty. A concrete plant and a derrick were constructed and in May, 1930 capping began on the outer one thousand

feet of the jetty. The cavities between the rocks were filled with rubble stone, and a stone and concrete mix was poured over the top of the jetty. That work went quickly and the South Jetty cap was completed in August, 1930. A similar process was employed to cap the outer end of the North Jetty. Concrete work on the seaward five hundred feet of the jetty began in June, 1930 and was completed in September, 1930. The concrete and rubble stone caps were considered to be maintenance on the jetties. No further work was done on them until the late 1930's.[8]

The effect of the entrance improvement was not as marked as had been expected. It had been thought by the Corps of Engineers that a minimum depth across the bar of thirty feet might be attained by the jetty work, and the Coos Bay interests had predicted that a depth of as much as forty feet might result from the jetty extension work done after 1927, but the depth found over the bar in the winters of 1928-29, 1929-30, and 1930-31 was never more than twenty-five feet, and in 1931 the depth was found to be twenty-three feet. Moreover, the twin jetties had caused an unexpected problem. Soon after the South Jetty reached a length where its effects began to be felt, in 1926, strong ocean swells appeared inside the bay, a phenomenon which had not previously occurred at Coos Bay. From a practical standpoint the swells inside the bay created a navigational problem of considerable importance. Before the South Jetty funneled the swells into the bay, shipping could depend on the water depth varying only with the tides, now that was complicated by the swells which might subtract as much as five feet from the channel depth as they passed under a vessel. At Pigeon Point Reef this meant that a loaded vessel might be dashed against the rocky bottom by wave

action. The cut through Pigeon Point Reef which had been completed in 1924 was thus further reduced in usefulness. To the bend in the middle of the cut and the rock bottom were now added the swells which began to appear after the South Jetty was in progress. All combined to persuade the harbor pilots to avoid the channel and seek the shallower but safer channel to the west. Eventually, in the next decade, the Corps of Engineers cut a new channel through Pigeon Point Reef along the route taken by the pilots. Meanwhile, other work proceeded on a regular basis to keep the port operating.[9]

Maintenance of the channel across the bar and between the jetties was carried out each year by the Col. P. S. Michie. Following the end of World War I, the Michie was forced to suspend dredging at Coos Bay on two consecutive years because of a shortage of fuel oil. The government took steps to remedy that situation in 1919, when construction of a fueling station at Empire was authorized. The buildings, dock and storage tank required two years to complete, but the fuel dock solved the problem of interruptions during the work season. In the years which followed the Michie was better able to carry out not only the bar dredging for which she had been designed, but considerable work in maintaining the inner channel also. The Corps of Engineers had, at one point, predicted that the twin jetties would maintain a bar channel deep enough to reduce or eliminate the need for a hopper dredge at the entrance. However, as the jetties neared completion it was seen that entrance dredging must continue. The jetties were far less effective in attaining a winter deep-draft channel than had been hoped. The Michie could easily dredge a channel of twenty-seven feet across the bar and between the jetties during the course of a summer's work, but

the storms of autumn quickly reduced that depth to less than twenty-five feet, and it was common to find only eighteen to twenty feet on the bar when the dredging season resumed each spring. As a result most of the deep-draft shipping from the port occurred in the summer and early fall months. Partial loading of ships was common. Japanese and East and Gulf Coast ships would load first at Coos Bay and then sail to deeper ports to finish taking cargo, a procedure which Coos Bay business interests thought put the port at a competitive disadvantage. Early in the spring and late in the fall, when it was often too rough to work outside, the Michie would sometimes be put to work at shoal places inside the harbor; however, most of the inner channel work was done by the fifteen-inch pipeline dredge owned by the Port of Coos Bay. After its completion in 1921 the dredge was annually contracted out to the Corps of Engineers to do the maintenance dredging for which the Corps was responsible. The Port's dredge, with occasional help from the dredge Coos, replaced the dredge Oregon, which never returned to Coos Bay after the twenty-two foot project dredging of 1919-20. The River and Harbor Act of 1922 had authorized an extension of the twenty-two foot channel up Isthmus Slough for two miles to the mill and dock of the Oregon Export Lumber Company, or the Western White Cedar Company as it was known after 1922, at Millington. That stretch of channel up Isthmus Slough was never improved during the 1920's, although it was an authorized part of the port project. Late in the decade there was a renewed push for improvement to the slough as far as the Southport Coal Mine, which underwent a brief period of prospective expansion at the time. The channel extension work had been made contingent upon local interests finding and providing spoil disposal sites, which were not

readily available along the narrow slough. During the late 1920's the Corps of Engineers continued to maintain that there was insufficient traffic on the slough above the Coos Bay Lumber Company mills to justify the greater depth even after the project was approved by Congress.[10]

Neither the failure to complete the channel project nor the inability of the jetties to maintain the depth expected of them curtailed the shipping traffic to the port to any great extent. Except for the first three years of the decade, the 1920's were years of relative stability and steady productivity for the port. The annual output of the Coos Bay mills was remarkably steady during the years between 1924 and 1930. Shipments across the bar during that period averaged 586,000 tons a year and varied from that figure by less than 30,000 tons in any of those years. That stability in traffic through the port was maintained in spite of changes in the wood products industry at Coos Bay. Diversification had appeared around 1910, when the first veneer mills came into production, followed by an early attempt at pulp making by the Coos Bay Lumber Company. Prior to that, subsidiary products such as plaster laths, shingles, firewood, box shooks, and match wood had contributed minor tonnages to the bay's exports, but the primary shipments had been rough lumber, with some finished lumber, pilings and logs. The coming of the railroad in 1916 tended to foster small industry and the manufacture of finished products which could be economically shipped in quantities smaller than a shipload. The growing American automobile industry required lead-acid storage batteries and the veneer mills were easily adapted to the manufacture of wooden insulators for the batteries. The Japanese wanted large square balks of timber and unprocessed logs which they sawed to their specifications

in the home islands. The Menasha Woodenware Company mill and other small mills produced wood specialties of various types. Those and related industries, while they did not greatly reduce the shipping of rough lumber which remained as Coos Bay's mainstay, did provide a broader industrial base for the area, expanded employment, and helped to level out the ups and downs of the California construction market upon which the area's economy had been largely based. However, except for the exports to Japan, the smaller new industries added little if any tonnage to the ship's cargos leaving the port.[11]

Lumber companies merged and their plants were modernized. Following the death of Asa M. Simpson in 1915, many of Simpson's holdings at Coos Bay were acquired by the Buehner Company, and Buehner in turn was bought by Stout Lumber Company in the early 1920's. The Stout interests then proceeded to further absorb the Simpson holdings which Louis J. Simpson had owned independently of his father's estate. The C. A. Smith Company emerged from the war as the Coos Bay Lumber Company, with the founder relegated to a subordinate position in the company. The main towns on the bay, Marshfield and North Bend, grew into small cities during the 1920's, with multi-story buildings, sanitary water supplies, modern sewage disposal, and the general use of electricity, telephones, radios, and personal automobiles. Population grew, and modern health care came with hospitals and disease control. There was a growing tendency toward surplus income for ordinary families, despite generally low wages for the working class. There was an increase in the employment of women, many of whom worked in the veneer plants. Even with those changes, the basic tonnage through the port still came from the large sawmills found on the bay, particularly the mills of the Coos Bay

Lumber Company, and from unprocessed logs which went to the Orient. The C. A. Smith Mill at the mouth of Isthmus Slough was one of the largest in the world, and its output more than equaled all the others of the bay combined. When the larger of the Stout Lumber Company mills burned in 1926, the drop in production was hardly noted when the year's output was tallied; all the mills had excess productive capacity. The Southern Oregon Company mill at Empire, built in 1885, operated so seldomly that it did not even appear on the list of area mills after 1917. Although the Coos Bay mills had a conservative capacity of 1,000,000 board feet of lumber a day, during the 1920's they averaged only about 640,000 feet a day, or less than sixty-five percent of capacity.[12]

Port Orford cedar, or Western White cedar, was in such demand by the Japanese and by the battery separator manufacturers that it was thought to be in danger of extinction for a time. Several new mills were built at Coos Bay for the sole purpose of processing the cedar during the 1920's. The cedar trees were found in some quantity in Coos County, on South Slough and in the more remote areas of the southeastern part of the county, but they grew principally in Curry County, which made up the rugged and lightly populated area on the coast between Coos County and the California border. The cedar harvesting boom coincided with the major highway building program which was taking place in Oregon as elsewhere in the United States during the early 1920's. The building of the new highways allowed motor trucks to be used at times to transport cedar logs out of the woods, and introduced trucking to the Coos Bay lumber industry; a facet of the port's transportation system which would grow in importance with the passage of time.[13]

Automobiles came to Coos Bay early in the twentieth century. The summer jitney line across the Coast Range ridges from Allegany to Drain was in operation in 1912, and a motor stage line operated to Roseburg soon after. In 1914 a Ford dealership was established in Marshfield. The automobiles came despite the incredibly bad roads. The coast had been linked to the Umpqua River Valley at Roseburg by the Coos Bay Wagon Road since the 1870's, but that was more of a trail than a road and hardly fit for wagons when at its best in summer. The Coos County road department did what it could with very limited funds, but before the automobile age most transportation in Coos County was by boat. After 1895 passengers could travel between Myrtle Point and Marshfield by train, and that service was extended to Powers after 1916. The farmers who lived in the Coos Bay drainage journeyed to town by steamboat or by gasoline launch. Between 1901 and 1930 passenger travel on the Coos River averaged almost thirty thousand people a year, and although other rural areas around the bay had smaller populations, they also traveled to the towns on the bay by boat. Those who traveled outside the area went by ocean steamer or, after 1916, by train. Bridges were a special problem and a major hindrance to road building. Coos Bay was so oriented to water transportation that any structure which might impede navigation or the movement of logs to the mills was regarded with suspicion. The permission of the War Department was required before a navigable body of water could be bridged, and proposed structures which were located inside designated harbor lines also required the approval of the port commission. The streams and sloughs were many and deep, and around the bay there were no shallow places where streams could be forded, so ferries were used where crossing was absolutely necessary. Nevertheless,

road building became a major public endeavor in the 1920's at Coos Bay and along the Oregon Coast.[14]

Following World War I the public began to demand good highways. In 1919 Oregonians supported a plan for a north-south highway along the Pacific Coast which would link the three states which bordered the ocean. The Roosevelt Highway, as it was called, was approved in 1921 and construction of short segments of the road soon followed at various points along the coast. The building of the Roosevelt Highway, most of which was initially surfaced with gravel, required several years. The southwestern Oregon portion was completed to the California border in 1927. The numerous minor streams along the route were bridged, while the larger streams were crossed by ferry. At Coos Bay traffic was carried across the bay by a new ferry, the Roosevelt, which had been built especially for the highway traffic. The Roosevelt was put into operation in 1924, and the volume of highway traffic soon grew to such an extent that it became necessary to add a second ferry. By 1928 the ferries were carrying six hundred and fifty thousand passengers a year across the bay, and in 1929 that number increased to over a million people a year. That volume continued through 1931, when the Depression reduced travel on the highway. Road construction in southern Coos County and northern Curry County proceeded with relative rapidity through the level sandy country found there, and some sections of the highway were completed in time to serve the cedar boom of 1923. At one point during that year fifty trucks were engaged in moving cedar logs in Curry County, but the roads were not in condition to carry such heavy traffic and bans and weight limits were soon imposed to protect the new highways.[15]

In addition to the north-south highway, east-west roads were built through the Coast Range to the interior valleys. In 1919 highway construction was started along the Middle Fork of the Coquille River between Myrtle Point and Roseburg. It connected with county roads which had previously linked Myrtle Point and the Coquille Valley with Coos Bay. The section of the Coos Bay-Roseburg highway which was found between Marshfield and Coquille was paved with concrete in 1919 and 1920. That same section also became part of the Roosevelt Highway as well as a part of the highway to the interior. The Coquille River was bridged at Coquille, and the Roosevelt Highway followed the south bank of the Coquille River to Bandon before proceeding on south to Curry County and Port Orford. To the north of Coos Bay another east-west highway was built from Reedsport up the Umpqua River Valley through Scottsburg, across to Drain, and on to the Willamette Valley, and when the Roosevelt Highway was completed between Coos Bay and Reedsport that road became an important route to the interior also. Local roads were built at the same time. A road to the jetty construction camp at Charleston was completed in 1923, with a bridge across the South Slough, and it was extended later in the decade to Coos Head, Sunset Bay, and Cape Arago, where Louis J. Simpson had donated land for a public park. A road was completed to the forks of the Coos River in 1926, and other roads in the northern part of Coos County were extended out from the Roosevelt Highway. On all those roads some truck traffic carried cargos of freight and logs, but those early highways had been intended primarily for the use of private automobiles. Except for the cedar boom days of 1923, the trucking which began in the early twenties did not bring much

freight to Coos Bay until after the Second World War when highways were rerouted and rebuilt to handle heavier truck traffic.[16]

Most of the timber processed in the mills of Coos Bay in the 1920's was transported on the rivers and sloughs. After the stands of timber immediately adjoining the bay were cut, the lumber companies extended their logging into the more remote areas, and the logs were transported in rafts to the mills through the deep sloughs or down the Coos River. The log transportation technique known as splash dam logging had been introduced into Coos County around the turn of the century, and by the mid-1920's the technique was being fully utilized to log the mountain tributaries of both the Coos and Coquille Rivers. The method was simple. Temporary dams of logs and planks were constructed across mountain streams, and logs were cut nearby, skidded to the impoundment and stored there until the rainy season. When high water came, the dams were opened and the gathered logs rushed downstream to tidewater where they could be sorted and rafted to the mills. The technique enabled areas to be logged cheaply which might otherwise have been left unexploited for a time, but it was discontinued after the Second World War because of its damage to the environment. In 1929, the year of greatest log traffic on the Coos River in the 1920's, 120,000 tons of logs were floated to Coos Bay down that river alone. The Coquille River also brought logs to mills on its banks and indirectly served as a feeder of both sawed and uncut lumber to the port of Coos Bay. Lumber sawed outside the bay area came to the port on the Southern Pacific Railroad, especially after the Port of Coos Bay built its terminal to attract and handle such freight. The railroad extended both north and south and served the drainages of the Umpqua and the Siuslaw Rivers as well as that of the Coquille. The Smith-Powers

Railroad, which joined the Southern Pacific at Myrtle Point, brought logs from both private and public timber holdings in the Powers area along the South Fork of the Coquille River. However, in spite of the encroachments of railroad and highway, most of the timber processed on the bay during the 1920's arrived and departed by water.[17]

Although the railroad carried carloads of battery separators and other wood specialties from the veneer mills, the sawed lumber which comprised the bulk of the port's traffic went out across the bar in ships. During the 1920's that tonnage averaged over 520,000 tons a year, far more than any previous year other than the exceptional year of 1914, when over 500,000 tons passed through the port. Yet the record cargos of the 1920's were transported out of the bay through a channel and over a bar which were only marginally better in 1930 than in 1919. The controlling depth of eighteen feet of 1920 had been increased to only twenty feet by 1930. Of the 391 vessels which left the harbor in 1929, only twenty-five drew over twenty feet on departure, and none drew over twenty-one feet. The export of the large tonnages from the port during the decade was the result not of the improvements to the harbor, but of strong demand for the products of the harbor and of the use of expedients which included partial loading, taking advantage of high tides, and seasonal shipping. Partial loading was a requirement which was often imposed on ships of deep draft. Such vessels took only enough cargo at Coos Bay to load them to the depth allowed by the insurance underwriters and then sailed to deeper ports to complete their cargo. Taking advantage of high tides was a matter of practical seamanship, and a practice followed in all but the deepest ports of the world. The average range of tide at Coos Bay was about

five feet. The Corps of Engineers based both project depth and controlling depth on "mean lower low water," which was the year-round average depth of water at lowest tide. This meant that for the controlling depth of eighteen feet over the reef at Pigeon Point the average high tide would add five feet. Some high tides, of course, were lower than others, and some higher. Winter high tides were generally higher than summer high tides, a condition offset by the much rougher water which prevailed on the bar in winter and by the shoaling which occurred then as a result of the storms; while the summer low tides were made less restrictive to shipping because the hopper dredge Michie could work during that period. Consequently, winter trade, while generally steady, was far lighter than that of summer and was carried on by smaller coasting vessels. The big cargos were carried out in summer and early fall; a schedule which did little to smooth the month-to-month production at the mills, where storage was at a premium.[18]

Coos Bay left the second decade of the twentieth century changed in several important ways, but the basic industrial productive capacity remained much as it had been at the beginning of the decade. The engineering improvements sought earlier had been completed, except for the rectification of the Pigeon Point channel. Foreign trade had been initiated and developed into a dependable outlet for almost one quarter of the area's lumber production. At the end of the 1920's, the channel deepening and straightening program across Pigeon Point Reef was approved, and that project would help solve part of the problem of shallow controlling depth, partial loading and seasonality during the decade which followed.

CHAPTER V

THE PORT FROM 1930 TO 1952

The River and Harbor Act of July 3, 1930 provided for moving the channel at Pigeon Point to the west and for deepening it to twenty-four feet through the reef. Channel depth elsewhere in the bay was to be twenty-two feet as previously approved, and channel width was to be three hundred feet through Pigeon Point Reef and opposite the cities of North Bend and Marshfield. Channel width through most of the bay, however, was to remain at two hundred feet, with a reduction to one hundred and fifty feet in Isthmus Slough. Work started on the Pigeon Point Reef project in 1931, with funds made available through the Emergency Construction Act of December 20, 1930. The drilling, blasting, and removal of the rubble were accomplished with the dredge Coos, which had been adapted for such work since the earlier project of 1922-24 on the reef. The project to deepen the channel through Pigeon Point Reef was completed on October 2, 1931. The completion of the controversial project had required the removal of less than ten thousand cubic yards of sandstone at a cost of $73,591. The correction of the channel there went far toward making Coos Bay a more modern harbor; one capable of serving many of the larger world cargo ships of the day.[1]

During that period maintenance dredging at the entrance and inside the bay continued as it had in previous years. The hopper dredge Col. P. S. Michie worked between the jetties and on the bar at the entrance when weather permitted, but when she could not dredge there the

Michie's alternate task was to maintain the channel in the outer arm of the bay between the entrance and the railway bridge. The dredging of the inner arm of the bay fell to the fifteen inch pipeline suction dredge owned by the Port of Coos Bay. That plant was utilized by the Corps of Engineers from year to year on a contractual basis. The Port of Coos Bay also submitted an unsuccessful bid for the dredging of Isthmus Slough in 1931. The improvement of that slough from its mouth to Millington, a distance of two miles, had been approved and part of the inner harbor project since 1922, but no disposal site for spoils had been made available as required by the law. Finally, in 1931, the Port of Coos Bay acquired land along Isthmus Slough for the discharge of spoils, and the Corps of Engineers let a contract with the Oregon Bridge and Dredging Company for the widening and deepening of the slough. The channel, twenty-two feet deep and one hundred and fifty feet wide, was dredged between February and April, 1932. Two hundred and seventy-eight thousand yards of spoil were removed at a cost of slightly more than $34,000. The Corps of Engineers had held the position that the improvement was unnecessary and that traffic on the slough to the mill there did not warrant the expense. Economic conditions were so bad by 1932 that the Engineers' position was well justified, but the improvement went forward despite that opposition.[2]

Although the overall output of the Coos Bay mills had been stable during the 1920's, individual mills had not operated steadily in that period. The cargo mills of Coos Bay operated only because they could dump their output on the California market at below market price, using shallow-draft coastal lumber carriers to deliver their product. The largest mill, the Coos Bay Lumber Company's C. A. Smith Mill, was in

constant danger of closure or financial failure. That company, which was a subsidiary of the Pacific States Lumber Company, underwent several reorganizations in the 1920's. Stout Lumber Company's Mill A had been the second largest operating mill on the bay before it burned in 1926, but it was never rebuilt in that decade; its output was simply not needed. The big mill of the Southern Oregon Company at Empire was modernized and expanded in 1928-29 after being acquired by an enterprise known as the Empire Development Company, but the mill operated only in a sporadic fashion after that until World War II. A large combination pulp mill and sawmill was erected on the outer arm of the bay below Empire at the same time and as part of the Empire Development Company. It operated for a time, but shut down through the mid-1930's. However, the Coos Bay veneer industry, which concentrated on the manufacture of battery separators, gave a measure of stability to the Coos Bay work force which the big mills were unable to provide. The veneer companies grew and expanded with the automobile industry and managed to keep operating through the worst years of the Depression. The output of those mills was customarily transported from the area by rail, however, not by ship, and the veneer industry was not able to protect the port of Coos Bay during the worst years of the Depression. Using tonnage through the port as a measure of the economy, the decline started in 1931, reached a low point in 1932, and made a slow recovery through 1934. Tonnage through the port increased remarkably in 1935, when it returned to near the average of the 1920's, and during the remaining years of the decade dropped below that average only in 1938. The port was aided in that recovery by the major project of deepening the harbor which was completed after 1935.[3]

Those interested in improving the port had always pressed the government for channel depths greater than the Corps of Engineers thought necessary. Delegations were sent to Washington to testify before Congressional committees, visiting dignitaries were entertained when they went to Coos Bay, and systematic lobbying efforts were supported by area industrialists. When the Depression struck it became apparent that the time was favorable to conduct a renewed campaign for a deeper and wider internal channel as a public works project. The Isthmus Slough improvement had been an early expression of that campaign. After some years of lobbying by port interests, Congress passed the River and Harbor Act of August 30, 1935, which included provisions for a twenty-four foot channel from Pigeon Point to the mouth of Isthmus Slough with a general width of two hundred and fifty feet, except through Pigeon Point and at Marshfield and North Bend, where the width was to be three hundred feet. A width of four hundred and fifty feet was authorized in the vicinity of the railroad bridge at the north end of the bay, and a turning basin six hundred feet wide by one thousand feet long was planned for the area near the mouth of Coalbank Slough. Work on the project started in 1936 and was completed in April, 1937. After the completion of the project, the deepening of the channel gradually produced the effect which the proponents of the deeper channel had predicted. In the years following the channel improvement of 1936-37, the draft of the vessels calling at the port tended to increase, and consequently the average tonnage per vessel increased also.[4]

In 1890, prior to the building of the North Jetty, the vessel of maximum draft carried only fifteen and a half feet; in 1900 the maximum draft for the year was eighteen feet. After 1920 the Corps of Engineers

kept more careful records of the drafts of ships calling at Coos Bay. Those records reveal the gradual success of the improvements to the entrance and inner channel through the years. During the 1920's only one vessel left Coos Bay drawing more than twenty-two feet, and that passage occurred in the boom year of 1923, before the first improvement through Pigeon Point was completed. During the early years of the 1930's, only six ships drawing as much as twenty-three feet sailed from Coos Bay; one ship which drew twenty-four feet departed in 1931. However, after 1937, drafts of twenty-four feet were reported each year, although most vessels calling in the late 1930's and the early 1940's still carried only twenty-two feet or less out of the harbor. Freight tonnage averages for the three decades between 1921 and 1950 show marked increases as the improvements went on. For the 1920's the average tonnage per vessel, inbound and outbound across the Coos Bay bar, was 594 tons. For the 1930's the average tonnage per vessel increased to 816 tons, while for the 1940's the average was 1,453 tons per vessel. The twenty-four foot channel made Coos Bay a much more competitive port and one which was better able to serve the larger and more efficient cargo ships of the day.[5]

Meanwhile, modern road and bridge building was taking place in the area which was tributary to the port. As the timber near the bay was cut, the logging moved farther away into the difficult terrain of the more distant sections of the Coast Range. In the 1930's public roads and highways superseded the use of privately funded railroads as a means of transporting timber out of the woods. The shift to highway transportation of logs, which had started with the white cedar boom of the 1920's, increased in the 1930's when an extensive road network was

constructed in the publicly owned forests. The main highways, which had been hastily built in the 1920's, began to be improved and strengthened to carry heavier loads in the late 1930's, and a program to hard surface the highways was in progress during the same period. An ambitious bridge building project was an integral part of the highway improvement. Modern bridges were constructed across all of the streams along the coast. To span Coos Bay with a highway bridge was a major undertaking. Plans for crossing the bay at the north end between the village of Glasgow and the city of North Bend were considered before 1930. Necessary navigational clearances were determined and permits obtained in 1933. Bids for construction were let in 1934 and the bridge was completed in June, 1936. The McCullough Bridge, named for the Oregon State Highway Department bridge engineer C. B. McCullough, was of cantilever construction, 5,338 feet long, 793 feet wide across its widest span, with a minimum vertical clearance for navigation of 123 feet. At the time of its completion the bridge ranked as the twelfth largest of its type in North America. The bridge greatly facilitated the transportation of logs and sawed lumber to the port, and it eliminated a long ferry trip across the bay for hundreds of thousands of automobile passengers each year. The completion of the McCullough Bridge and others in southwestern Oregon in the 1930's did much to relieve the geographical isolation of the area and to improve transportation to the port.[6]

In addition to the new improvements in the harbor and along the highways, routine maintenance of the harbor channels and entrance continued on a yearly basis through the middle 1930's and early 1940's much as in the previous decade. The Michie was joined by the

government dredge A. Mackenzie for a time in 1933, and in 1937 the dredge Pacific helped the Michie in dredging on the entrance, while during the following year all three hopper dredges performed duty at Coos Bay. Major maintenance work on the jetties was conducted late in the 1930's and early 1940's. Restoration of the North Jetty took place between 1938 and 1940. A railroad spur was extended from the main line on the north side of the bay to the jetty site on the North Spit, and rock was brought in from quarries on the Umpqua River. The South Jetty was also completely repaired during the years 1940 to 1942. The channel of the inner arm of the bay was maintained, as in the past, by contract dredges, although the Port of Coos Bay dredge did not perperform that duty after the early 1930's. The beginning of the Second World War found the port in excellent condition because of the improvements and the maintenance which had been conducted during the 1930's.[7]

The effect of the Second World War on the port of Coos Bay was much the same as that of the First. Shipping through the port was sharply reduced in the years 1943 through 1946, and tonnages fell to near the low levels of 1917 to 1921. The big cargo mills continued to operate, although not steadily, and much of their output was carried to market by rail. The veneer mills worked steadily, with an increase in the production of plywood, while the wooden box industry prospered. Shipbuilding had been carried on sporadically at Coos Bay through the 1920's and 1930's, and the coming of the Second World War revived the industry. Despite the general requirement that vessels be constructed of welded steel plates, Coos Bay was still engaged in the building of wooden hulls, and four wooden minesweepers, developed especially for

the clearing of magnetic mines, were built for the United States Navy at the Kruse and Banks yards in 1941 and 1942. After the completion of those vessels, Kruse and Banks built four wooden steam rescue tugs for the Navy. Hillstrom Brothers, a Coos Bay firm with years of experience as highway contractors, opened a shipyard at Marshfield where between 1942 and 1944 ten small tugs were built for the Army Corps of Engineers. However, the shipbuilding efforts during World War II were on a much smaller scale than during the First World War. The vessels were all small, the yards employed fewer people, and the contracts terminated before the end of the war. The war with Japan deprived Coos Bay of an important market. After 1921, when the first shipment of forest products went to Japan, through 1940, an average of one fourth of the shipments through the port had gone to foreign markets. At one point in the mid-1930's nearly fifty percent of Coos Bay freight was destined for foreign ports. Most of that tonnage went to Japan, although China, Australia, and Northwest Europe also took considerable lumber. Before American entry into the war, Coos Bay had participated in the scrap metal trade with Japan. The first scrap shipments occurred in 1928 and 1929, but no trade in scrap took place in the early 1930's. Trade resumed in 1934 and continued to 1939. A protest against the shipment of scrap to Japan was staged at Marshfield in 1939, and no further shipments were made following that year. Total scrap shipments from the port during those years amounted to about twenty thousand tons. When the war came, not only did trade with Japan end, but other markets were also shut off because of a lack of shipping. Consequently, the output shipped through the port dropped sharply. Nevertheless, shortly after the war the Coos Bay cargo mills were sawing lumber at a rate which

equalled and then exceeded that of the record years between the wars. That lumber was shipped to market from a port which received additional improvement soon after the war ended.[8]

Those interested in improving the port had not allowed the war to blunt their determination to obtain better and deeper harbor facilities. Congress authorized a new survey of the harbor to be made in March, 1945 and a public hearing was held at the city of Coos Bay in May, 1945 as part of that survey. At the hearing, the Port of Coos Bay requested a new project depth of forty feet on the entrance bar and thirty feet in the interior channel. Those new depths were established by the River and Harbor Act of July 24, 1946. That act allowed the Corps of Engineers to develop and maintain a depth of forty feet over the bar, but required that the depth be gradually reduced to thirty feet inside the jetties near Guano Rock. The interior channel was to be deepened to thirty feet from Guano Rock to the Coos Bay Lumber Company mill at the mouth of Isthmus Slough, but to remain at twenty-two feet from that point to the end of improvement at Millington. In addition, the channel was to be widened to three hundred feet throughout, and two anchorage basins six hundred feet wide and two thousand feet long were to be established on the outer arm of the bay. Work on those improvements started on July 6, 1948 with drilling at Guano Rock. The channel between Guano Rock and Empire was deepened to thirty feet during the ensuing months, but work then ceased for several months. In January, 1950 the project was resumed, and the thirty foot inner channel was completed on January 15, 1951. Work on the bar and entrance proceeded while the inner harbor was being deepened, but the project width there was not reached until 1952, although the required depth had

been achieved at the entrance in 1951. During that period the dredges Pacific, Kingman and Biddle worked on the bar, between the jetties and on the outer arm of the bay at various times. Their tasks included both new project dredging and continuing maintenance of a harbor which, with the increased depth, was very difficult to maintain to project specifications.[9]

During the early years of the war, maintenance of the harbor had been neglected, and the twenty-four feet required by the River and Harbor Act of 1935 was not found until 1945, when the harbor was dredged over-depth to twenty-six feet. The advantage gained by the extra depth was soon lost, and by 1946 a controlling depth of only eighteen feet was found in the bay. After completion, the thirty foot project was even more difficult to maintain. In 1949, when the new project was just starting, the controlling depth inside the harbor was only twenty feet. After the completion of the project in the early 1950's, depths of less than twenty-four feet were usual. The inner harbor had always tended to shoal rapidly following dredging. Intensive logging over the bay's drainage systems caused enormous deposits of silt to be left in the bay after each winter's rain, and some of the spoils which had been placed behind bulkheads also washed back into the bay. The relatively narrow channels dredged through soft bottom mud tended to fill quickly because of sidewall instability. Maintenance dredging became more expensive as time went on and the project depths increased. However, the channel problems did not prevent the port from exporting record cargos of lumber in the years which followed the war.[10]

In 1946 shipments from Coos Bay were less than four hundred thousand tons, but more than half of that went to the foreign market, a

forecast of future trends. In 1947 the tonnage increased to near that of the best years of prewar times, and 1948 tonnage was almost as large. However, not until 1949 did cargo shipped from Coos Bay exceed that of 1923, and in 1950 the port set a new record of over nine hundred thousand tons a year. Reconstruction in Europe and the post-war building boom combined with the demands for lumber created by the Korean Conflict resulted in a market for the products of Coos Bay which had never previously existed. Timber in other areas of the Northwest more accessible to deep draft transportation had been heavily cut over, while that surrounding Coos Bay still provided a backlog with which to feed the mills for another thirty years. The modern highways and the railroad brought logs from distant ridges and valleys in Coos, Curry and Douglas Counties to be processed in the old cargo mills which had been built in the late nineteenth and early twentieth centuries. After sitting idle for most of the years since first built in 1885, the mill originally constructed by the Southern Oregon Company at Empire finally became a productive force during the Second World War. Mill B at North Bend evolved from Asa Simson's first mill of 1856. The C. A. Smith mill of Coos Bay Lumber Company, built in 1907, was still the main sawmill of the region until after 1950. The only new cargo mill of any consequence was that at Empire which operated in conjunction with the pulp mill built in the late 1920's. The old mills on the bay were supplemented by the veneer mills, which were generally of more modern construction, but which contributed little to the port's cargos and which processed relatively little of the total lumber output of the area. New mill construction of any importance did not occur at Coos Bay until after 1950, when the Weyerhaeuser Company began construction of their

large sawmill at North Bend. Other plants followed and a major sub-industry in plywood and particle board grew up in the area in the 1950's. In 1952 the bay area had a dozen important mills with a combined capacity of one million board feet of lumber a day, and that did not include mills in the Coquille and Umpqua River drainages which shipped through Coos Bay. New mills were built in the years which followed, and the older mills were fitted with more modern machinery. The stage was set for the period of highest productivity for the port of Coos Bay and the region's lumber industry, which occurred during the years between 1952 and 1982.[11]

The development of Coos Bay into a modern port had been a complicated process, involving commercial need, political influence, and technological ability. The major improvements to the port were undertaken and paid for by the Federal government. The work of the United States Army Corps of Engineers at Coos Bay was only one of scores of similar projects which were carried on across the nation during the same period. In the long process of development which extended from 1880 through 1952, Coos Bay received governmental aid which was proportionate to its importance as a port, but no more. The developers of the mines and mills of the area who lobbied for publicly funded improvements to their transportation system were not more politically influential than their counterparts in other regions who wanted similar improvements. Nevertheless, pressure on the Federal government assumed increasingly sophisticated forms as the Coos Bay region matured economically. The organization of the Port of Coos Bay in 1909 provided local interests not only with a body for the administration of the port, but with a formal base from which to lobby as well.

At times the local interests pressed for improvements which appeared to exceed the immediate needs of commerce. In such situations the Corps of Engineers, as the agent of the government, was placed in a difficult position. They filled a paradoxical role in River and Harbor work. They were required by law, and directed by Congress, to conduct the surveys which determined not only the engineering feasibility, but also the economic need for each improvement. Congress, of course, had the power to change or overrule any Corps of Engineers determination, but Congress usually concurred with the findings of the Corps. Thus the Corps of Engineers had a degree of power, but that power was tempered by an understanding of the political realities which governed the actions of Congress. Over the years the Corps of Engineers learned that they must be economically conservative in their forecasts of business and industrial prospects, or risk losing the regard of Congress.

Out of those relationships a remarkable balance evolved in the development of the port. The Port of Coos Bay had gradually grown from a busy, if unimproved, backwoods harbor to a well maintained modern port capable of receiving and loading all but the world's largest ships. That evolution had occurred because markets existed for the materials which originated in the region served by the port. To reach those markets a vast organized work effort had been carried out. Coal mines had been developed, mills had been built in which to process the region's timber, and the port had been painstakingly mapped, lighted, improved and maintained from the time of James Lawson's first visits in the 1860's. The Corps of Engineers' role in that improvement had become more important in each decade which passed. Their professional conservatism had been countered by the foresight

of the commercial users of the port. As a consequence, the port grew as it should have: the engineering work was sound and the improvements accompanied the foreseeable needs of commerce. When commercial requirements changed, the Corps of Engineers was quick to recommend improvements. The port stands as a model of the results which can be achieved through political compromise and the application of sound engineering techniques in a developing region.

The hundred years which followed the entry of the schooner Nassau into Coos Bay in 1852 had been years in which the history of the port paralleled that of the United States. They were years of rapid technological change; years when the population grew to number thousands to provide labor for the mills and mines of the area. It was a time when the development of the natural resources of the region followed the dictates of capricious markets, and a period dominated by people of outstanding entrepreneurial, technical, and political ability who strove mightily to develop the Port of Coos Bay into the world port which it had become in 1952.

TABLE 1

Coal Exports From the Port of Coos Bay, 1860-1915

Year	Short Tons	Year	Short Tons
1860	3,143 a	1888	35,000 c
1861	4,628	1889	44,850
1862	2,815	1890	69,052
1863	1,185	1891	40,000 c
1864	1,300	1892	36,183
1865	1,525	1893	31,245
1866	1,753	1894	35,665 d
1867	5,235	1895	61,277
1868	10,524	1896	89,960
1869	14,758	1897	74,549
1870	20,567 b	1898	46,881
1871	28,690	1899	56,717
1872	32,562	1900	39,602
1873	38,066	1901	38,303
1874	44,857	1902	44,482
1875	32,869	1903	49,906
1876	41,286	1904	60,150
1877	40,000 c	1905	75,785
1878	40,000 c	1906	40,033
1879	40,000 c	1907	27,192
1880	46,276 d	1908	26,629
1881	31,500	1909	20,000 c
1882	30,000 c	1910	9,055
1883	16,085	1911	4,746
1884	38,000	1912	966
1885	29,000	1913	2,825
1886	51,595	1914	8,300
1887	35,000 c	1915	709

Sources:

[a]1860-1869 production from Alta California, San Francisco, January 6, 1870. Receipts of Coos Bay coal at San Francisco.

[b]1870-1876 production from W. A. Goodyear, The Coal Mines of the Western Coast of the United States (New York: John Wiley & Sons, 1879), p. 133. Receipts of Coos Bay coal in San Francisco.

[c]Shipments estimated for years 1877, 1878, 1879, 1882, 1887, 1888, 1891, and 1909.

[d]Reports of the Chief of Engineers, 1880 to 1916. Figures for 1880 to 1894 are for Fiscal Years; 1895 to 1915 for Calendar years.

TABLE 2

Freight Tonnages Through the Port of Coos Bay, 1880-1919

Year	Short Tons		Year	Short Tons
1880	97,831	a	1900	104,294
1881	95,963		1901	97,500
1882	n/a		1902	122,232
1883	93,380	b	1903	135,178
1884	100,635		1904	136,958
1885	75,715	b	1905	178,945
1886	111,131		1906	184,455
1887	n/a		1907	167,562
1888	n/a		1908	216,631
1889	165,042		1909	281,008
1890	242,329	c	1910	242,969
1891	137,581		1911	303,008
1892	137,074		1912	406,727
1893	109,044		1913	473,376
1894	109,152	d	1914	520,409
1895	128,544	d	1915	448,447
1896	144,934		1916	466,100
1897	115,679		1917	446,062
1898	103,039		1918	323,369
1899	116,567		1919	282,591

Sources:

[a]From Reports of the Chief of Engineers, 1891, p. 3167; 1900, p. 641; 1923, p. 1230.

[b]Years 1883 and 1885 include both inbound and outbound tonnages, other years from 1880 to 1889 show outbound tonnages only.

[c]Years from 1890 onward show both inbound and outbound tonnages.

[d]Years to 1894 given for Fiscal Years; 1895 onward for Calendar Years.

TABLE 3

Number of Vessels Entering and Leaving Coos Bay, 1880-1919

Year	Vessels	Year	Vessels
1880	366	1900	534
1881	338	1901	559
1882	224	1902	560
1883	304	1903	604
1884	311	1904	585
1885	279	1905	n/a
1886	372	1906	n/a
1887	376	1907	n/a
1888	233	1908	n/a
1889	544	1909	1,218
1890	708	1910	854
1891	n/a	1911	940
1892	694	1912	1,024
1893	430	1913	929
1894	371	1914	1,072
1895	643	1915	962
1896	840	1916	829
1897	715	1917	765
1898	557	1918	553
1899	691	1919	n/a

Sources:

Reports of the Chief of Engineers, 1880-1920.

TABLE 4

Freight Tonnages Through the Port of Coos Bay, 1920-1952

Year	Domestic Shipments	Domestic Receipts	Foreign Shipments	Total Short Tons	
1920	357,179	21,408	-0-	378,587	
1921	249,345	18,912	4,949	273,206	
1922	475,780	20,494	36,928	533,202	
1923	492,819	39,528	179,850	712,197	
1924	422,143	37,383	134,677	594,203	
1925	407,162	40,634	102,249	550,045	
1926	422,401	33,446	101,999	559,846	
1927	347,076	46,371	112,438	505,885	
1928	361,621	34,404	169,738	565,763	
1929	332,397	31,790	133,804	497,991	
1930	378,289	34,423	136,560	549,272	
1931	263,607	63,005	93,931	420,606	
1932	98,127	40,107	44,576	182,810	
1933	149,018	29,600	68,711	247,329	
1934	127,482	54,834	168,182	350,498	
1935	253,017	45,369	208,503	506,889	
1936	272,908	42,076	247,049	562,033	
1937	329,414	45,758	277,786	652,958	
1938	304,982	29,036	118,522	452,540	
1939	465,154	32,977	97,605	595,736	
1940	415,803	35,336	32,719	483,853	
1941	594,870	37,262	12,760	644,892	
1942	n/a	n/a	n/a	463,963	
1943	371,307	6,526	6,885	384,718	
1944	262,927	15,795	99,280	378,002	
1945	235,253	19,275	53,837	308,365	
1946	159,322	26,900	208,356	394,578	
1947	227,267	35,510	359,585	622,362	a
1948	272,339	82,329	252,695	607,619	
1949	461,057	95,887	163,644	720,605	
1950	645,298	124,546	156,621	926,883	
1951	495,537	166,844	343,833	1,006,700	
1952	697,862	136,000	225,029	1,059,315	a

Sources:

Reports of the Chief of Engineers, 1920-1953.

[a]The totals for the years 1947-1952 include foreign imports of less than five hundred tons each year.

TABLE 5

Passenger Traffic Through the Port of Coos Bay, 1892-1927

Year	Passengers	Year	Passengers
1892	3,047	1910	12,393
1893	2,425	1911	11,875
1894	2,305	1912	13,789
1895	2,626	1913	13,706
1896	4,209	1914	21,994 a
1897	3,343	1915	13,038
1898	2,876	1916	4,115 b
1899	2,978	1917	5,641
1900	3,538	1918	655
1901	3,216	1919	2,292
1902	3,226	1920	1,828
1903	5,003	1921	732
1904	5,437	1922	1,059
1905	9,598	1923	1,024
1906	9,032	1924	646
1907	13,908	1925	311
1908	16,335	1926	114
1909	15,453	1927	9

Sources:

Report of the Chief of Engineers, 1892-1928.

[a]The unusually high numbers of passengers for the year 1914 may have been the result of Coos Bay area visitors to the San Francisco Exposition.

[b]Railroad service to the main north-south line at Eugene began.

TABLE 6

Number of Vessels Entering and Leaving Coos Bay, 1920-1952

Year	Vessels	Maximum Draft Feet
1920	546	n/a
1921	468	21
1922	845	22
1923	995	23
1924	1,262	22
1925	1,210	21
1926	932	22
1927	814	22
1928	758	22
1929	767	21
1930	865	22
1931	662	24
1932	662	22
1933	682	21
1934	680	23
1935	632	23
1936	559	22
1937	591	24
1938	528	24
1939	668	25
1940	532	24
1941	604	24
1942	n/a	n/a
1943	264	24
1944	242	24
1945	230	24
1946	189	23
1947	476	28
1948	440	+24
1949	476	26
1950	457	26
1951	522	29
1952	567	30

Sources:

Reports of the Chief of Engineers, 1921-1958.

Vessels reported are those which drew twelve feet and over. Barges, which constituted an increasingly important source of port traffic after 1930, are not included because of their shallow draft. Several thousand smaller vessels drawing less than twelve feet are also excluded from each year's total.

TABLE 7

Congressional Appropriations for Coos Bay, 1879-1952

Date	Appropriation	Date	Appropriation
3-3-1879	$ 40,000	1926	$ 545,000
3-3-1881	30,000	1927	750,000
8-2-1882	30,000	1928	280,000
7-5-1884	30,000	1929	808,000
8-5-1886	33,750	1930	312,000
8-11-1888	50,000	1931	107,000
9-19-1890	125,000	1932	-0-
7-13-1892	210,000	1933	223,635
8-11-1894	108,000	1934	25,797
6-3-1896	109,390	1935	-0-
3-3-1899	150,000	1936	238,400
6-6-1900	10,000	1937	60,000
6-13-1902	53,500	1938	305,000
3-3-1905	4,527	1939	808,000
6-25-1910	400,000	1940	587,000
2-27-1911	40,000	1941	580,000
3-4-1913	80,000	1942	97,000
1915	140,000	1943	56,000
1917	70,000	1944	-0-
1918	80,000	1945	355,000
1919	285,000	1946	106,000
1920	125,000	1947	100,000
1921	219,000	1948	695,000
1922	160,000	1949	1,569,000
1923	900,000	1950	990,000
1924	663,000	1951	757,035
1925	750,000	1952	111,286
		Total	$15,362,320
		Deductions	-387,358
		Net Total	$14,974,962

Sources:

United States Congress, House, House Document No. 106, 76th Congress, 1st Session, pp. 945-46, [Serial 10331]; Reports of the Chief of Engineers, 1936-1953. Deductions in the years 1905, 1932, 1935, and 1944 reduce the total by $387,358.

NOTES

CHAPTER I

1. Report of the Chief of Engineers, 1952, p. 2149; United States, Department of Defense, U.S. Army Corps of Engineers, The Ports of Coos Bay, Oreg., Longview and Vancouver, Wash., Port Series No. 33 (Revised 1963), (Washington: GPO, 1964), p. 1; Map 1, "Coos Bay and Vicinity, 1981"; Alice Bay Maloney, "Camp Sites of Jedediah Smith on the Oregon Coast," Oregon Historical Quarterly XLI (1940), 304-23.

2. United States Congress, House, House Executive Document No. 70, Report of the Superintendent of the Coast Survey, 1861, 37th Congress, 2d Session, pp. 264-65 and Sketch No. 26.

3. Coos County (Oregon) Comprehensive Plan, Vol. II, Coos Bay Estuary Management Plan, Part 2, Inventories and Factual Base, Third Draft, August, 1982, p. 2.0-1; Map 2, "Coos Bay and Vicinity", Survey of 1895-96", edition of May, 1900.

4. Ibid.

5. Samuel Eliot Morison, The European Discovery of America: The Southern Voyages, A.D. 1492-1616 (New York: Oxford University Press, 1974), p. 664; Hubert Howe Bancroft, The Works of Hubert Howe Bancroft, Volume XXVII, History of the Northwest Coast, Volume I: 1543-1800 (San Francisco: A. L. Bancroft & Company, 1884), pp. 139-45, 146, 167, 187-88, 274; Lewis A. McArthur, Oregon Geographic Names, 5th ed. rev. and enl. by Lewis L. McArthur (Portland: Western Imprints, 1982), pp. 120-21; Elliott Coues, ed. History of the Expedition Under the Command of Lewis and Clark, to the Sources of the Missouri River, Vol. II (New York: Francis P. Harper, 1893), p. 760; Frederick Webb Hodge, ed. Handbook of American Indians North of Mexico, Part I, Smithsonian Institution Bureau of American Ethnology, Bulletin 30 (Washington: GPO, 1907), pp. 341-42; K. G. Davies, ed. Peter Skene Ogden's Snake Country Journal, 1826-27 (London: Hudson's Bay Record Society, 1961), pp. 185-199, 204; Maloney, "Camp Sites of Jedediah Smith," pp. 305, 310, 314-23; E. E. Rich, ed. Simpson's 1828 Journey to the Columbia (London: The Hudson's Bay Record Society, 1947), pp. 59-62; _____, The Letters of John McLoughlin From Fort Vancouver to the Governor and Committee: First Series, 1825-1838 (London: The Publications of the Hudson's Bay Society, 1941), pp. 111-12; Stephen Dow Beckham, Requiem for a People: The Rogue Indians and the Frontiersmen (Norman: The University of Oklahoma Press, 1971), pp. 30-31.

6. Rich, The Letters of John McLoughlin, pp. 156-57; William A. Slacum, "Slacum's Report on Oregon, 1836-7," Oregon Historical Quarterly, XIII(1912):190, 203.

7. Socrates Scholfield, "The Klamath Exploring Expedition, 1850," Oregon Historical Quarterly, XVII (1916):341-57.

8. Beckham, Requiem for a People, pp. 52-67.

9. United States Congress, House, House Executive Document No. 1, 32d Congress, 1st Session, pp. 103-122; Stephen Dow Beckham, Coos Bay: The Pioneer Period, 1851-1890 (Coos Bay, Oregon: Arago Books, 1973), pp. 1-6.

10. Hubert Howe Bancroft, The Works of Hubert Howe Bancroft, Volume XXX, History of Oregon, Volume II, 1848-1888 (San Francisco: The History Company, 1888), pp. 331-34; A. G. Walling, History of Southern Oregon (Portland: np, 1884), pp. 470-71; Beckham, Coos Bay, pp. 7-14.

11. William V. Wells, "Wild Life in Oregon," Harpers New Monthly Magazine, XIII (June-November, 1856), pp. 593-96; Bancroft, History of Oregon, 1848-1888, pp. 329-30.

12. Ibid., pp. 330-34, 743-44; Walling, History of Southern Oregon, p. 493; San Francisco Alta California, July 1, 1854; Coose County (Oregon) Deed Book "A", 1854-, pp. 21, 26-27, 55-56, 70-71, 98, 115 (Various spellings of Coos include Cook-koo-oose, Cahoose, Cowis, Cowes, Koo'as, Kowes, Koos, Coose and Coos. See McArthur, Oregon Geographic Names, p. 175); Wells, "Wild Life in Oregon," p. 599; United States Congress, Senate, Senate Executive Document No. 22, Report of the Superintendent of the Coast Survey, 1855, 34th Congress, 1st Session, pp. 179-80; _____, Senate Executive Document No. 14, Report of the Superintendent of the Coast Survey, 1858, 35th Congress, 2d Session, p. 379; _____, House, House Executive Document No. 70, Report of the Superintendent of the Coast Survey, 1861, 37th Congress, 2d Session, pp. 264-65; Empire City (Oregon) Rustic, November 18, 1871; Empire City (Oregon) Coos Bay News, May, 1874 to March, 1875; Marshfield (Oregon) Coast Mail, May, 1879 to December, 1880.

13. San Francisco Alta California, June 30, 1854, February 3, 1855, January 6, 1870; W. A. Goodyear, The Coal Mines of the Western Coast of the United States (New York: John Wiley & Sons, 1879), pp. 133, 152-53; Donald C. Duncan, Geology and Coal Deposits in Part of the Coos Bay Coal Field, Oregon, U.S. Geological Survey Bulletin 982-B (Washington: GPO, 1953), pp. 53-73; J. S. Diller, "The Coos Bay Coal Field, Oregon," in Nineteenth Annual Report of the United States Geological Survey, 1897-98, Part III, Economic Geology (Washington: GPO, 1899), pp. 309-376; Wells, "Wild Life in Oregon," pp. 607-08; Report of the Superintendent of the Coast Survey, 1855, p. 180; Report of the Superintendent of the Coast Survey, 1858, p. 379;

Frederick Eugene Melder, "History of the Coal Industry in the State of Washington," Pacific Northwest Quarterly, XXIX: 155-59; Edward W. Parker, "Coal," in Mineral Resources of the United States, 1904, David T. Day, ed., (Washington: GPO, 1905), p. 530; Table 1, "Coal Exports From the Port of Coos Bay, 1860-1915."

14. Orvil Dodge, Pioneer History of Coos and Curry Counties, Or. (Salem, Oregon: Capital Printing Company, 1898), p. 293; Coose County Deed Book "A", pp. 67-69, 148; Report of the Superintendent of the Coast Survey, 1861, p. 265; San Francisco Alta California, June 30, 1854; John S. Hittell, The Commerce and Industries of the Pacific Coast (San Francisco: A. L. Bancroft & Company, 1882), pp. 587, 594; Report of the Chief of Engineers, 1879, p. 1794; Marshfield (Oregon) Coast Mail, January 10, 1884; Report of the Chief of Engineers, 1880, pp. 2325-26; Report of the Chief of Engineers, 1886, p. 1995. The Report of the Chief of Engineers, 1879 lists fourteen mills as being in operation, which was probably a misreading of four, although the error was repeated in subsequent Reports.

15. Robert E. Johnson, "Schooners Out of Coos Bay," unpublished Masters Thesis, University of Oregon, 1953; Jim Gibbs, West Coast Windjammers in Story and Pictures (Seattle: Superior Publishing Company, 1968), Appendix A, "Commercial Sailing Vessels Over 100 Tons Constructed on the Pacific Coast: 1850-1908," pp. 136-162; Hittell, Commerce and Industries of the Pacific Coast, p. 633; Walling, History of Southern Oregon, p. 494; United States Congress, Senate, Senate Misc. Doc. No. 30, 42d Congress, 3d Session, pp. 1-2; Empire City (Oregon) Coos Bay News, July 22, 1874, January 27, 1875; Report of the Chief of Engineers, 1886, p. 1996.

16. Empire City (Oregon) Coos Bay News, October 7, 1874, January 6, 1875; Marshfield (Oregon) Coast Mail, January 31, 1880. The stones used for ballasting the vessels were sometimes dumped into the channel, although they were much in demand for fill material at the town of Marshfield, which was low and swampy along the bay shore.; Bancroft, History of Oregon, 1848-1888, p. 333; Report of the Superintendent of the Coast Survey, 1861, p. 265; Marshfield (Oregon) Coast Mail, May 24, 1879, May 31, 1879, June 28, 1879, July 19, 1879, August 30, 1879, January 24, 1880, January 24, 1884. Coos Bay tugs served both the entrance to Coos Bay and that of the Umpqua River, twenty miles to the north. A watch was maintained from a high vantage point at Empire City for vessels which needed the assistance of a tug.

17. Marshfield (Oregon) Coast Mail, April 17, 1880. The schooner Gotama made the round trip to San Francisco in twelve days, with the northward leg requiring forty-eight hours. Almost every issue of the Coos Bay newspapers carried shipping news.

18. Report of the Chief of Engineers, 1879, p. 1794; Marshfield (Oregon) Coast Mail, June 19, 1880; Report of the Chief of Engineers, 1880, p. 2325; United States, Census, Eighth Census, 1860, Oregon, Vol. I, Coose County, Empire District, pp. 90-91; Oregon Historical Quarterly XIV (1913): 64; United States, Census, Ninth Census of Population, 1870,

Oregon, Coose County, pp. 1-26; United States, Census, Tenth Census of Population, 1880, Oregon, Coos County, pp. 1-30; Empire City (Oregon) Coos Bay News, October 21, 1874, December 30, 1874, January 6, 1875, January 13, 1875, March 31, 1875; Goodyear, The Coal Mines of the Western Coast, pp. 84-85.

19. United States Congress, House, House Executive Document No. 3, Report of the Secretary of the Treasury, 1864, 38th Congress, 2d Session, p. 171; _____, House Executive Document No. 4, Report of the Secretary of the Treasury, 1866, 39th Congress, 2d Session, p. 225; Empire City (Oregon) Coos Bay News, May 13, 1874, August 12, 1874, October 14, 1874.

20. Report of the Superintendent of the Coast Survey, 1854 (Washington: Beverly Tucker, 1855), Sketch 42J, No. 2 (no document designation, but Serial Set No. 757); United States Congress, Senate, Senate Executive Document No. 22, Report of the Superintendent of the Coast Survey, 1855, 34th Congress, 1st Session, pp. 179-80; _____, Senate Executive Document No. 14, Report of the Superintendent of the Coast Survey, 1858, 35th Congress, 2d Session, pp. 378-79; _____, House, House Executive Document No. 70, Report of the Superintendent of the Coast Survey, 1861, 37th Congress, 2d Session, Sketch No. 26; _____, Senate, (no document designation, Serial Set No. 1224) Report of the Superintendent of the Coast Survey, 1864, 38th Congress, 2d Session, p. 36; _____, House, House Executive Document No. 75, Report of the Superintendent of the Coast Survey, 1865, 39th Congress, 1st Session, p. 30 and Sketch No. 24; _____, House, House Executive Document No. 87, Report of the Superintendent of the Coast Survey, 1866, 39th Congress, 2d Session, p. 23.

NOTES

CHAPTER II

1. United States Code, 1970 Edition, Vol. VIII, Title 33, Section 540 (Washington: GPO, 1971), p. 8610; United States Congress, House, House Executive Document No. 75, Report of the Superintendent of the Coast Survey, 1865, 39th Congress, 1st Session, p. 30; _____, Senate, Senate Misc. Doc. No. 29, 42d Congress, 3d Session; _____, Senate, Senate Executive Document No. 14, 45th Congress, 3d Session; Report of the Chief of Engineers, 1877, pp. 1049-59; Report of the Chief of Engineers, 1879, pp. 1791-98, 1854-55; Marshfield (Oregon) Coast Mail, June 28, 1879 contains a reprint of a letter by Asa M. Simpson which states his views in opposition to the Harbor-of-Refuge movement.

2. Thomas W. Symons, "Jetty Harbors of the Pacific Coast," Transactions of the American Society of Civil Engineers, XXVIII (March, 1893):170-74. Captain Symons was the United States Army Corps of Engineers officer in charge of Coos Bay projects from 1890 to 1895, and he was also involved in the establishment of the village of Yarrow, which later became part of the town of North Bend.

3. Report of the Chief of Engineers, 1879, pp. 1791-96.

4. Report of the Chief of Engineers, 1880, pp. 2323-24.

5. Letter, C. H. Merchant to Col. G. L. Gillespie, June 7, 1879, Old Civil Files, Records of the Portland District, Corps of Engineers, Box 4, Book Set No. 1, Book 32. Oregon Historical Society, Portland, Microfilm Reel No. 13 from the Old Civil Files. Original files held in National Archives and Records Service Center, Region 10, Seattle, WA.; Report of the Chief of Engineers, 1880, pp. 2323-24.

6. United States Congress, House, House Document No. 740, Index to the Reports of the Chief of Engineers, U. S. Army, 1866-1912, Vol. 1, Rivers and Harbors, 63d Congress, 2d Session, p. 1600; Francis B. Heitman, Historical Register and Dictionary of the United States Army, Vol. I (Washington: GPO, 1903), p. 777; Report of the Chief of Engineers, 1880, p. 2323; Marshfield (Oregon) Coast Mail, August 3, August 30, October 4, November 15, December 6, December 27, 1879.

7. Report of the Chief of Engineers, 1880, pp. 2324-28.

8. Marshfield (Oregon) Coast Mail, December 27, 1879, January 17, January 31, February 7, February 14, February 28, March 6, March 20, March 27, April 10, April 17, April 24, May 1, May 8, May 15, May 22, July 17, August 14, 1880; Report of the Chief of Engineers, 1880, pp. 2323-28.

9. Report of the Chief of Engineers, 1881, pp. 2583-87; Report of the Chief of Engineers, 1882, pp. 2674-78.

10. Ibid., p. 2676; Index to the Reports of the Chief of Engineers, 1866-1912, p. 1601; Report of the Chief of Engineers, 1883, pp. 2055-61; Report of the Chief of Engineers, 1884, pp. 2260-65; Report of the Chief of Engineers, 1886, pp. 1989-1998; Report of the Chief of Engineers, 1887, pp. 2460-63.

11. Report of the Chief of Engineers, 1888, p. 2142; Report of the Chief of Engineers, 1889, pp. 2508-09; Report of the Chief of Engineers, 1890, pp. 2930-34. The Report for 1890 is of special value because it includes a recapitulation of previous work; the report of Lt. Payson from 1880, and a lengthy report on the problem of restraining sand dunes along the seashore.

12. Report of the Chief of Engineers, 1889, pp. 2510-11; Report of the Chief of Engineers, 1890, pp. 2936-37.

13. Report of the Chief of Engineers, 1886, p. 1995; Report of the Chief of Engineers, 1890, p. 2930; Report of the Chief of Engineers, 1891, p. 3167; Table 2, "Freight Tonnages Through the Port of Coos Bay, 1880-1919."

14. Report of the Chief of Engineers, 1890, p. 2942; Table 7, "Congressional Appropriations for Coos Bay, 1879-1952."

15. "James S. Polhemus, Engineer, Passes," Portland Oregonian, September 30, 1930; Report of the Chief of Engineers, 1886, map facing p. 1989; Letter, Col. G. L. Gillespie to J. S. Polhemus, January 4, 1881, copy at Coos County Historical Society Museum, North Bend, Oregon; Thomas W. Symons, "Jetty Harbors of the Pacific Coast," pp. 160-67; William W. Harts, "Description of Coos Bay, Oregon, and the Improvement of Its Entrance by the Government," Transactions of the American Society of Civil Engineers, Vol. XLVI (December, 1901): 489. Like Symons, Harts was a captain in the Corps of Engineers who had the improvements of Coos Bay in his charge from 1899 to 1900.

16. Symons, "Jetty Harbors of the Pacific Coast," p. 162; Report of the Chief of Engineers, 1892, pp. 2674-78; Report of the Chief of Engineers, 1891, pp. 3163-66.

17. Ibid., pp. 3164-65.

18. Report of the Chief of Engineers, 1892, pp. 2674-77; Harts, "Description of Coos Bay Harbor," pp. 498-502.

19. Report of the Chief of Engineers, 1892, pp. 2674, 2677.

20. Report of the Chief of Engineers, 1893, pp. 3338-41; Map 3, "Entrance to Coos Bay, 1892."

21. Report of the Chief of Engineers, 1894, pp. 2561-69; Report of the Chief of Engineers, 1895, pp. 3357-67; Report of the Chief of Engineers, 1896, p. 3234.

22. Report of the Chief of Engineers, 1897, pp. 3384-86; Report of the Chief of Engineers, 1900, pp. 4274-79.

23. Report of the Chief of Engineers, 1901, pp. 3471-74; Report of the Chief of Engineers, 1911, p. 2578; Map 4, "Entrance to Coos Bay, 1916."

24. Report of the Chief of Engineers, 1879, p. 1793; Report of the Chief of Engineers, 1890, pp. 2941, 2947-65; Report of the Chief of Engineers, 1891, pp. 3157, 3166; Report of the Chief of Engineers, 1902, p. 2366; Report of the Chief of Engineers, 1913, p. 3057.

25. Report of the Chief of Engineers, 1882, p. 2677; Empire City (Oregon) Coos Bay News, May 20, 1874; Report of the Chief of Engineers, 1891, pp. 3283-85.

26. Report of the Chief of Engineers, 1895, pp. 3367-69; Report of the Chief of Engineers, 1896, p. 3235; Report of the Chief of Engineers, 1897, pp. 3387-88; Report of the Chief of Engineers, 1899, pp. 3205-07; Table 2, "Freight Tonnages Through the Port of Coos Bay, 1880-1919."

27. Report of the Chief of Engineers, 1899, pp. 3205-07.

28. Ibid.

29. Ibid.

30. Report of the Chief of Engineers, 1900, pp. 4280-84.

31. Report of the Chief of Engineers, 1904, p. 3443.

32. Report of the Chief of Engineers, 1892, p. 2670; Report of the Chief of Engineers, 1893, pp. 3333, 3341; Report of the Chief of Engineers, 1894, p. 2568; Report of the Chief of Engineers, 1895, pp. 3359, 3365; Report of the Chief of Engineers, 1896, p. 3234; Report of the Chief of Engineers, 1897, p. 3385; Report of the Chief of Engineers, 1898, p. 2964; Report of the Chief of Engineers, 1900, p. 4277; Report of the Chief of Engineers, 1904, p. 3442. Reports for several years following 1901 give names of vessels crossing the bar during the year, with tonnage, draft, number of crossings for each vessel and other information.

NOTES

CHAPTER III

1. United States, Department of the Interior, United States Geological Survey, Edward W. Parker, "Coal," in Mineral Resources of the United States, 1911, Part II, Nonmetals (Washington: GPO, 1912), pp. 166-67; Codding and Robinson, Civil Engineers,"Map of Coos Bay, Oregon," 1:20,000, 1906, Map 4294.C6G, 1906 in map file at Southern Oregon State College, Ashland, Oregon; Report of the Chief of Engineers, 1895, p. 3365; Mineral Resources of the United States, 1923, Part II (Washington: GPO, 1926), p. 697; Compare the coal production given by Parker with the exports of coal given by the Corps of Engineers, Table 1, "Coal Exports From the Port of Coos Bay, 1860-1915." One explanation for the large discrepancy is that the railroad was using a large percentage of the Beaver Hill Mine coal.

2. Report of the Chief of Engineers, 1891, p. 3167; Table 2, "Freight Tonnages Through the Port of Coos Bay, 1880-1919."

3. American Lumberman, November 11, 1911, pp. 60, 76, C. A. Smith and his ventures are featured in the issue; Marshfield (Oregon) Coos Bay News, December 22, 1908, June 29, 1909, Portland Oregonian, April 15, 1907, March 2, 1908; Marshfield (Oregon) Coos Bay Times, August 18, 1910; Table 2, "Freight Tonnages Through the Port of Coos Bay, 1880-1919."

4. United States Congress, House, House Document 958, 60th Congress, 1st Session, pp. 1-12; Report of the Chief of Engineers, 1909, p. 2206; Marshfield (Oregon) Coos Bay News, June 29, 1909.

5. Report of the Chief of Engineers, 1911, p. 989; Report of the Chief of Engineers, 1912, p. 1180.

6. The Journal of the House of the Twenty-Fifth Legislative Assembly of the State of Oregon, Regular Session, 1909 (Salem, Oregon: Willis S. Duniway, 1909), pp. 26, 65, 90, 161-62, 179-80, 266, 310, 450; North Bend (Oregon) Coos Bay Harbor, January 1, 8, 29, 1909, February 5, 1909; Marshfield (Oregon) Coos Bay News, January 19, 1909, March 2, 15, 1909, April 27, 1909, May 11, 1909, June 1, 22, 1909; Minutes of the Proceedings of the Board of Commissioners in and for the Port of Coos Bay, Vol. I, pp. 1-115. The Minutes in Volume I cover the period from May 10, 1909 to July 14, 1924.; North Bend (Oregon) Coos Bay Harbor, April 11, 1912, August 1, 29, September 12, 1912; Report of the Chief of Engineers, 1915, p. 1478; United States, War Department, Corps of

Engineers, U.S. Army, Part 1, Edmund Brown, Jr., "Control of the Port," Shore Control and Port Administration (Washington: GPO, 1923), pp. 128-33.

7. United States Congress, House, House Document 958, 60th Congress, 1st Session, pp. 7-8; Report of the Chief of Engineers, 1909, p. 841; Report of the Chief of Engineers, 1914, pp. 3182-83; Report of the Chief of Engineers, 1923, Part III, "Floating Plant Report," p. 156, Contains specifications and data on construction of the Michie.; Report of the Chief of Engineers, 1915, pp. 3358-59; Report of the Chief of Engineers, 1916, pp. 3194-95; Report of the Chief of Engineers, 1917, pp. 3303-04; Report of the Chief of Engineers, 1919, pp. 3412-14; Report of the Chief of Engineers, 1920, pp. 2919-21; Marshfield (Oregon) Coos Bay News, January 4, 1916.

8. Empire City (Oregon) Coos Bay News, October 14, 1874, January 13, 1875; "Prospectus, Northern Pacific Coal Mining Company," nine page holograph manuscript with hand-drawn map in Special Collections Division, University of Oregon Library, Eugene, Oregon, CA 1873 Mar.25; Goodyear, The Coal Mines of the Western Coast, pp. 86, 88, 90, 97; Marshfield (Oregon) Coast Mail, May 31, 1879, June 28, 1879, July 5, 1879, May 16, 1889; Report of the Chief of Engineers, 1883, p. 2060; Report of the Chief of Engineers, 1884, p. 2264; Report of the Chief of Engineers, 1886, pp. 1996-98; Report of the Chief of Engineers, 1890, p. 2932; Report of the Chief of Engineers, 1891, p. 3159; Report of the Chief of Engineers, 1893, p. 3337; Report of the Chief of Engineers, 1894, p. 2565; Report of the Chief of Engineers, 1895, p. 3365; Map 2, "Coos Bay and Vicinity, Survey of 1895-86."

9. "Historical Outline, Southern Pacific Company," mimeograph (San Francisco: Southern Pacific Railroad, Bureau of News, Development Dept., 1933), pp. 68-69; Second Annual Report of the Railroad Commission of Oregon to the Governor (Salem, Oregon: Willis S. Duniway, 1908), p. 10; North Bend (Oregon) Coos Bay Harbor, April 6, 13, 1916, August 17, 24, 1916.

10. Marshfield (Oregon) Coos Bay News, April 20, 1915; Minutes of the Port of Coos Bay, Vol. I, pp. 95-97, 148; Portland Oregonian, November 19, 1906, December 12, 1906, June 29, 1907; Report of the Chief of Engineers, 1907, p. 754; Report of the Chief of Engineers, 1915, p. 3361, Report of the Chief of Engineers, 1919, p. 3414; Table 5, "Passenger Traffic Through the Port of Coos Bay, 1892-1927."

11. Marshfield (Oregon) Coos Bay News, May 4, 1915; Report of the Chief of Engineers, 1917, p. 1674; Report of the Chief of Engineers, 1918, p. 1726; Report of the Chief of Engineers, 1919, p. 1817; United States Congress, House, House Document No. 325, 65th Congress, 1st Session, pp. 16-17; _____, House Document No. 150, 67th Congress, 2d Session, p. 32. The last document states that 124,000 tons of lumber were exported from Coos Bay by rail in 1918 and 1919.

12. Johnson, "Schooners Out of Coos Bay," pp. 52-59, 61-65, 75-89; 'Report to the Board of Directors,' in "Correspondence of James Henry Polhemus Relating to Coos Bay Shipbuilding Company, 1919-1921," AX299, Box 1 in University of Oregon Library Special Collections Division. At that date four partially completed vessels had required one and one half million board feet of lumber.; 'Blueprint of Hough-type Wooden Ship,' in "Kruse and Banks Collection," Item #22 University of Oregon Library Special Collections Division; United States Congress, House, House Document No. 150, 67th Congress, 2d Session, p. 31.

13. Report of the Chief of Engineers, 1895, pp. 3502-05; Report of the Chief of Engineers, 1897, pp. 3388-89; Report of the Chief of Engineers, 1920, pp. 1813-15; Table 2, "Freight Tonnages Through the Port of Coos Bay, 1880-1919."

14. Report of the Chief of Engineers, 1920, p. 2922; Report of the Chief of Engineers, 1921, p. 1273.

15. Report of the Superintendent of the Coast Survey, 1861, "Preliminary Chart of Koos Bay, Oregon," Sketch 26; Report of the Chief of Engineers, 1905, p. 2444; United States Congress, House, House Document No. 284, 62d Congress 2d Session, pp. 1-6; United States, Department of Commerce, United States Coast Pilot, Pacific Coast: California, Oregon and Washington, 3d Edition (Washington: GPO, 1917), pp. 150-51.

16. Bancroft, History of Oregon, 1848-1888, p. 743; Wells, "Wild Life in Oregon," p. 598 with lithograph of wharf at Empire City; Report of the Superintendent of the Coast Survey, 1865, Sketch No. 24, "Koos Bay, Oregon," showing wharves at Empire City; Goodyear, Coal Mines of the Western Coast, pp. 86-88, 90-98; Marshfield (Oregon) Coos Bay News, May 20, July 1, 22, August 12, 26, December 30, 1874; United States Congress, Senate, Senate Misc. Doc. No. 30, 42d Congress, 3d Session, p. 1; Marshfield (Oregon) Coast Mail, October 4, 1879. Telegraph service may well have antedated 1879 by several years; this reference relates to the transmission of weather reports.; United States Congress, House, House Document No. 226, 63d Congress 1st Session, p. 1440; Henry E. Haefner, "Reminiscences of an Early Forester," Oregon Historical Quarterly LXXVI (March, 1975): 59-67.

17. United States Congress, House, House Document No. 226, 63d Congress, 1st Session, pp. 1436-1440; United States Coast Pilot, Pacific Coast, (1917), pp. 149-153.

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CHAPTER IV

1. United States Congress, House, House Document No. 652, 66th Congress, 2d Session, pp. 2096-2113; _____, House Document No. 150, 67th Congress, 2d Session, pp. 2-24; North Bend(Oregon) Coos Bay Harbor, April 1, 1921, October 14, 1921.

2. Report of the Chief of Engineers, 1913, p. 3060; North Bend (Oregon) Coos Bay Harbor, August 27, November 19, 1920, June 17, September 16, October 14, 1921; United States Congress, House, House Document No. 150, 67th Congress, 2d Session, p. 16; Table 4, "Freight Tonnages Through the Port of Coos Bay, 1920-1952."

3. United States Coast Pilot, Pacific Coast, (1917), pp. 150, 153; United States Congress, House, House Document No. 150, 67th Congress, 2d Session, p. 16; _____, House Document No. 325, 65th Congress, 1st Session, pp. 1-18, Report of the Chief of Engineers, 1919, pp. 1914-15; Report of the Chief of Engineers, 1920, p. 1809; Report of the Chief of Engineers, 1921, p. 1823; Report of the Chief of Engineers, 1922, p. 1837; North Bend (Oregon) Coos Bay Harbor, December 12, 1920; United States Congress, House, House Document No. 110, 70th Congress, 1st Session, p. 9; Report of the Chief of Engineers, 1924, p. 1699.

4. United States Congress, House, House Document No. 150, 67th Congress, 2d Session, pp. 24-38; North Bend (Oregon) Coos Bay Harbor, August 22, December 19, 1919, January 16, 23, October 1, 15, November 12, 1920, January 14, March 18, October 14, 1921.

5. United States Congress, House, House Document No. 150, 67th Congress, 2d Session, pp. 3-23; North Bend (Oregon) Coos Bay Harbor, March 9, 30, 1923; Report of the Chief of Engineers, 1923, p. 1694; Report of the Chief of Engineers, 1924, p. 1698.

6. Ibid., Report of the Chief of Engineers, 1925, p. 1629; Report of the Chief of Engineers, 1926, p. 1621; Report of the Chief of Engineers, 1927, pp. 1633, 1635; Report of the Chief of Engineers, 1928, pp. 1694-95; Report of the Chief of Engineers, 1929, p. 1718.

7. North Bend (Oregon) Coos Bay Harbor, July 20, August 10, September 14, 1923; Report of the Chief of Engineers, 1924, pp. 1698-99; Report of the Chief of Engineers, 1925, p. 1629; Report of the Chief of Engineers, 1926, p. 1621; Report of the Chief of Engineers, 1927, p. 1635; Report of the Chief of Engineers, 1928, pp. 1694-95; Report of the Chief of Engineers, 1929, pp. 1718-19; Report of the Chief of Engineers, 1930, pp. 1810-13; Report of the Chief of Engineers, 1931, p. 1825; North Bend (Oregon) Coos Bay Harbor, August 21, 1925; Map 5, "Entrance to Coos Bay, 1927."

8. Report of the Chief of Engineers, 1929, p. 1718; Report of the Chief of Engineers, 1931, p. 1824.

9. United States Congress, House, House Document No. 150, 67th Congress, 2d Session, pp. 4, 25; _____, House Document No. 110, 70th Congress, 1st Session, pp. 24, 28-29; Report of the Chief of Engineers, 1929, pp. 1719-20; Report of the Chief of Engineers, 1930, p. 1814; Report of the Chief of Engineers, 1931, p. 1825; North Bend (Oregon) Coos Bay Harbor, September 11, 1925.

10. Minutes of the Port of Coos Bay, Vol. 1, pp. 290, 473, 494; _____, Vol. II, pp. 13, 75; Report of the Chief of Engineers, 1919, p. 1815; Report of the Chief of Engineers, 1920, p. 1809; Report of the Chief of Engineers, 1921, pp. 1822-23; United States Congress, House, House Document No. 150, 67th Congress ,2d Session, pp. 4-5, 7, 10, 19-20; _____, House Document No. 110, 70th Congress, 1st Session, pp. 2,4, 11, 14, 19, 26; Report of the Chief of Engineers, 1923, p. 1695; Report of the Chief of Engineers, 1925, pp. 1629-30; Report of the Chief of Engineers, 1926, p. 1622; Report of the Chief of Engineers, 1927, p. 1636; Report of the Chief of Engineers, 1924, p. 1699; North Bend (Oregon) Coos Bay Harbor, November 10, 1922.

11. Table 4, "Freight Tonnages Through the Port of Coos Bay, 1920-1952;" United States Congress ,House, House Document No. 1701, 64th Congress, 2d Session, pp. 8, 12; North Bend (Oregon) Coos Bay Harbor, April 1, May 27, June 17, 1921.

12. Ibid., April 1, October 21, 1921, February 2, March 2, March 30, May 25, July 13, October 12, 1923, August 22, December 12, 1924, March 20, April 3, May 15, December 4, December 11, 1925, January 22, February 5, February 26, 1926; United States Congress, House, House Document No. 110, 70th Congress, 1st Session, pp. 12-13; _____, House Document No. 226, 63d Congress, 1st Session, p. 1436.

13. North Bend (Oregon) Coos Bay Harbor, August 20, November 19, 1920, June 17, September 16, 1921, March 20, 1925, January 13, January 22, 1926.

14. Polk's Coos County Directory, Vol. IV, 1913-14 (Portland, Oregon: R. L. Polk & Co. 1913); William E. Knowles, "To Oregon By Auto, 1915," Oregon Historical Quarterly, LXXII (June, 1971): 159-164; Report of the Chief of Engineers, 1930, p. 877; Report of the Chief of Engineers, 1926, p. 1190; United States Congress, House, House Document 1491, Laws of the United States Relating to the Improvement of River and Harbors, August 11, 1790 to March 4, 1913, 62d Congress, 3d Session.

15. Marshfield (Oregon) Evening Record, December 22, December 30, 1919; Marshfield (Oregon) South Western Oregon Daily News, February 9, 1922; North Bend (Oregon) Coos Bay Harbor, August 29, September 5, October 3, October 24, 1919, September 20, October 29, November 11, December 10, 1920, February 11, February 18, February 25, May 6, October 14, December 12, 1921, January 19, February 2, March 16, March 30, May 4, July 20, August 10, September 7, October 5, November 23, 1923, April 25, May 16, 1924, October 30, November 13, 1925, March 19, May 21, September 10, 1926, October 21, October 27, 1927; United States Congress, House, House Document No 110, 70th Congress, 1st Session, p. 19; Report of the Chief of Engineers, 1938, p. 1081.

16. North Bend (Oregon) Coos Bay Harbor, August 29, 1919, September 17, October 29, November 19, December 20, 1920, May 6, July 1, October 14, December 16, 1921, February 2, March 16, March 30, July 13, 1923, March 19, May 21, October 1, 1926; Report of the Chief of Engineers, 1926, p. 1626.

17. Minutes of the Port of Coos Bay, Vol. 1, p. 269; _____, Vol. II, p. 13; North Bend (Oregon) Coos Bay Harbor, November 2, 1923, July 25, October 31, 1924, February 6, February 13, February 20, 1925, March 12, 1926, March 25, June 3, 1927; Haefner, "Reminiscences of an Early Forester," pp. 59-63.

18. Table 4, "Freight Tonnages Through the Port of Coos Bay, 1920-1952;" Report of the Chief of Engineers, 1930, p. 1814; _____, p. 877; United States Congress, House, House Document No. 110, 70th Congress, 1st Session, p. 2; North Bend (Oregon) Coos Bay Harbor, April 17, 1925; United States Congress, House Document No 325, 65th Congress, 1st Session, p. 2; see North Bend (Oregon) Coos Bay Harbor, "Weekly Shipping" for the entire period for further study of seasonality.

NOTES

CHAPTER V

1. Report of the Chief of Engineers, 1930, p. 1811; Report of the Chief of Engineers, 1931, pp. 1825-26; Report of the Chief of Engineers, 1932, p. 1729.

2. Report of the Chief of Engineers, 1931, pp. 1824-25; Report of the Chief of Engineers, 1932, p. 1729; Minutes of the Port of Coos Bay, Vol. II, pp. 158, 168-69, 174-75; Report of the Chief of Engineers, 1929, p. 1719.

3. United States Congress, Senate, Senate Document No. 253, 79th Congress, 2d Session, p. 25; North Bend (Oregon) Coos Bay Harbor, December 4, December 11, 1925, February 26, May 14, October 29, 1926, February 11, April 8, July 8, August 19, December 2, 1927, February 3, March 23, July 24, September 28, October 5, October 12, October 26, November 2, November 23, December 14, 1928, January 25, March 22, May 3, August 9, September 6, November 8, November 22, 1929; Table 4, "Freight Tonnages Through the Port of Coos Bay, 1920-1952;" North Bend (Oregon) Coos Bay Harbor, March 26, 1936; Conversations with Harold G. Savage, Coos Bay, 1978-1982.

4. Minutes of the Port of Coos Bay, Vol. II, pp. 113, 187, 190, 254; United States Congress, House, House Document No. 106, 76th Congress, 1st Session, pp. 80-81, 464-65, 945-46, 1191; _____, Senate, Senate Document No 253, 79th Congress, 2d Session, p. 17; Report of the Chief of Engineers, 1936, p. 1465; Report of the Chief of Engineers, 1937, pp. 1476-77; Report of the Chief of Engineers, 1938, pp. 1729-31.

5. Report of the Chief of Engineers, 1890, p. 2935; Report of the Chief of Engineers, 1901, p. 3475; Report of the Chief of Engineers, 1924, p. 1331; Report of the Chief of Engineers, 1932, p. 946; Report of the Chief of Engineers, 1935, p. 967; Report of the Chief of Engineers, 1936, p. 999; Report of the Chief of Engineers, 1938, p. 1083; Report of the Chief of Engineers, 1939, p. 1221; Report of the Chief of Engineers, 1940, p. 1237; Table 4, "Freight Tonnages Through the Port of Coos Bay, 1920-1952." Outbound tonnages would be much higher than those shown. Historically, less than ten percent of freight tonnage through the entrance was inbound; for instance the average outbound tonnage per vessel for the year 1922 was 1,215 tons, while the average inbound tonnage per vessel for the year was 48 tons.

6. North Bend (Oregon) Coos Bay Harbor, September 10, 1926, January 11, May 31, 1929, December 26, 1930, May 20, 1932 August 24, August 31, 1933, April 26, July 19, July 26, August 16, September 6, 1934, January 3, January 31, August 1, August 8, 1935, January 2, May 8, May 28, 1936, October 20, November 3, December 8, 1938, March 2, 1939, May 17, August 5, 1945; Marshfield and North Bend (Oregon) Coos Bay Times, December 6, 1935, June 1, 1936; Minutes of the Port of Coos Bay, Vol. II, pp. 255, 275; _____, Vol. III, pp. 3, 9; North Bend (Oregon) Coos Bay Harbor, January 12, January 19, February 2, February 23, 1939.

7. Report of the Chief of Engineers, 1933, p. 1124: Report of the Chief of Engineers, 1938, pp. 1729-30; Report of the Chief of Engineers, 1939, p. 1878; Report of the Chief of Engineers, 1941, p. 1864; Report of the Chief of Engineers, 1942, p. 1686; "Isaac Burpee Collection," MS 724, Oregon Historical Society Collection, Portland, Oregon; Minutes of the Port of Coos Bay, Vol. II, pp. 255, 275; _____, Vol. III, pp. 3, 9; North Bend (Oregon) Coos Bay Harbor, October 13, October 27, November 24 ,December 1, 1938, January 5, January 12, January 19, February 2, February 23, 1939.

8. Table 4, "Freight Tonnages Through the Port of Coos Bay, 1920-1952"; United States Congress, Senate, Senate Document No. 253, 79th Congress, 2d Session, pp. 2, 10, 17; Johnson, "Schooners Out of Coos Bay," pp. 109-117; Report of the Chief of Engineers, 1929, p. 856; Report of the Chief of Engineers, 1930, p. 876; Report of the Chief of Engineers, 1935, p. 965; Report of the Chief of Engineers, 1936, p. 998; Report of the Chief of Engineers, 1937, p. 1042; Report of the Chief of Engineers, 1938, p. 1082; Report of the Chief of Engineers, 1939, p. 1220; North Bend (Oregon) Coos Bay Harbor, March 26, 1936, March 2, 1939; Minutes of the Port of Coos Bay, Vol. III, pp. 22-23.

9. United States Congress, Senate, Senate Document No. 253, 79th Congress, 2d Session; North Bend (Oregon) Coos Bay Harbor, May 3, 1945; Report of the Chief of Engineers, 1947, p. 2473; Report of the Chief of Engineers, 1948, p. 2760; Report of the Chief of Engineers, 1949, p. 2453; Report of the Chief of Engineers, 1950, pp. 2514-15; Report of the Chief of Engineers, 1951, p. 2237. Marshfield became the City of Coos Bay in 1944.

10. Report of the Chief of Engineers, 1945, p. 2123; Report of the Chief of Engineers, 1937, p. 1043; Report of the Chief of Engineers, 1938, p. 1083; Report of the Chief of Engineers, 1939, p. 1221; Report of the Chief of Engineers, 1940, p. 1237; Report of the Chief of Engineers, 1941, p. 1864; Report of the Chief of Engineers, 1942, p. 1686; Report of the Chief of Engineers, 1943, p. 1619; Report of the Chief of Engineers, 1944, p. 1592; Report of the Chief of Engineers, 1946, p. 2386; Report of the Chief of Engineers, 1947, p. 2474; Report of the Chief of Engineers, 1948, p. 2761; Report of the Chief of Engineers, 1949, p. 2453; Report of the Chief of Engineers, 1950, p. 2515; Report of the Chief of Engineers, 1951, p. 2238; United States Congress, Senate Document No. 253, 79th Congress, 2d Session, pp. 6, 17, 31.

11. Table 4, "Freight Tonnages Through the Port of Coos Bay, 1920-1952"; North Bend (Oregon) Coos Bay Harbor, May 17, June 28, July 26, August 16, 1945; United States Congress, Senate, Senate Document No. 253, 79th Congress, 2d Session, p. 30; Coos Bay (Oregon) World, March 12, 1976; Allan H. Muir and Richard A. Searle, A Study of Industrial Development Possibilities for the Coos Bay Port District (Menlo Park, CA: Stanford Research Institute, 1956), pp. 77, 79.

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