COLUMBIA RIVER ESTUARY MARINA STUDY

CREST

COLUMBIA RIVER ESTUARY STUDY TASK FORCE

INFORMATION
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COLUMBIA RIVER ESTUARY MARINA STUDY

Prepared for

The Columbia River Estuary Study Taskforce

by

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March 1978

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The Columbia River Estuary Marina Study is part of CREST's effort to collect and disseminate information on subjects related to planning in the area. This study is classified as a CREST "Information Product" and was prepared by the author during his 1977 summer internship with the CREST organization. The report represents the views of the author and is not intended to represent the views of CREST or Oregon State University.

I. INTRODUCTION

The goal of this report is to develop information to benefit the planning and operation of marinas within the CREST area, as well as to generate data for use by local Chambers of Commerce, planners, regulatory agencies, Port Authorities and private developers. It is, however, the commercial, charter and recreational boaters who ultimately benefit from new or expanded moorage facilities and improved services.

The objectives of this report evolved through a series of meetings and correspondence with the CREST Director and marina operators and planners from Oregon and Washington. These meetings narrowed the scope of the internship to fit time and money constraints, while at the same time insuring that the final report would be beneficial to all those concerned with moorage facilities within the CREST area.

The objectives for the study are as follows:

1. to develop an inventory of existing and planned facilities, noting the timetable for expansion;
2. to develop registration forms and questionnaires, as needed by the marinas;
3. to develop information on the permit process for the development of new marinas and the expansion of existing facilities;
4. to develop criteria for marina site selection; and
5. to develop a demand analysis for current and future moorage.

II. INVENTORY OF EXISTING AND PLANNED FACILITIES

One of the major activities based in the Columbia River estuary is the charter, recreational and commercial fishing industry that utilizes moorage on both sides of the river. This section examines the current supply of moorages, launching ramps, boat rental facilities and emergency services that support boating activities. In addition to a narrative description of the facilities, a locational map and a summary table of moorage supply and expansion plans are presented.

These narrative descriptions are coded to correlate with the identification key, Figure 1 and the Skipanon River insert located at the end of this section.

A. MARINAS

These are descriptions of the major existing and planned marinas that are open to the public within the CREST area. Numerous private tie-ups and moorages, U.S.C.G. moorages, and certain commercial moorages closed to the general public are not included.

The marinas examined in this report differ widely in ownership, size, record keeping procedure, rate structure, operating procedure, and types of services available. However, one feature common to all the marinas is a main operating season from mid-May to mid-October.

Since the moorage supply situation is continually evolving, it is important that a prospective user of a facility make direct contact with the person responsible for operations, in order to obtain the most current information on the availability of moorage and the rate structure.

1 COUNTY: Clatsop

NAME: Hammond Boat Basin

CONTACT: Mr. Bob Fox, Harbormaster, 1-503-861-1461
Mr. Don Shaw, 1-503-861-1078

OWNERSHIP: Location is owned by the Corps of Engineers and leased to the Town of Hammond on a twenty-five year lease.

OPERATING RESPONSIBILITY: Hammond Parks and Recration Committee

ACCESS BY HIGHWAY: Drive west on Hwy 101 from Astoria, cross the Youngs Bay Bridge, turn right at Youngs Bay Plaza Shopping Center to downtown Warrenton, bear right past the Post Office on

Warrenton Drive, go 2 miles and turn right at the ARCO station in Hammond. The basin is 1/4 mile down the road just east of the Fort Steven's Historical area. If driving up Hwy 26 from Seaside, take the Ridge Road turnoff near Warrenton High School and drive north past Fort Steven's State Park to the basin, a distance of 4.5 miles.

ACCESS BY WATER: Entrance between the new breakwaters is near buoy 25 of the Columbia River just upriver of the Bar Pilot's Pier.

TYPE OF SERVICES: On site - pay telephone, diesel and gas, minor parts, restroom (no shower), ice, fish cleaning and storage, USCG Auxiliary. Off site - snacks, groceries, beverages, tackle, bait, propane, laundromat, repairs.

RAMP: Yes. Six lanes, paved, operational at low tide; $3 in/out maximum capacity 400 boats/day.

PARKING: 10 acres, mostly unpaved; adequate except for peak ramp use days.

MOORAGES: 178 available - most berths have electricity and water. These berths are for charter and recreation vessels only, due to terms of the lease. Space for deep draft and long vessels is limited. Currently all berths are leased by the year. There are over 300 applicants on the waiting list and the yearly turnover is only 4-6 boats.

RATES: 6¢/foot/day based on a 90 day season; may go up for the 1978 season.

EXPANSION PLANS: Plans anticipate sewer completion in 1979-80. Current priorities are as follows:

1. Install floats southwest of Floats D and E to provide 53 new berths for boats up to 21 feet in length.
2. Rip-rap (inside) basin perimeter.
3. Install additional moorage in the eastern section of basin to bring the total new moorage to 600-700; new floats to include 50-65 moorages for charter boats.
4. Finish grading and preparation of new parking areas; approximately 20 acres.
5. Landscape and construct lawns and parking areas for two (2) viewpoint parks.

6. Construct new ramp facility at northwest area of basin, and new alignment of existing road to entire facility.
7. Install additional customer services as necessary; new restrooms, sewage pumpout station, additional lighting, etc.

2 COUNTY: Clatsop

NAME: Warrenton City Boat Basin

CONTACT: Mr. Wm. Hartley, Harbormaster, 1-503-861-2821

OWNERSHIP: Municipal

OPERATING RESPONSIBILITY: Municipal

ACCESS BY HIGHWAY: Turn off Hwy 101 onto E. Harbor Drive at the Youngs Bay Plaza intersection. Follow E. Harbor Drive to the west for .9 mile. Basin entrance is on right just before Skipanon River Bridge.

ACCESS BY WATER: The basin is located on the east bank of the Skipanon River just downstream from the Harbor Street Bridge.

TYPE OF SERVICES: On site - bait, soda, sandwiches, tackle, licenses, ice, fish bags and tags, restroom (no shower), pay telephone, fish cleaning and storage. Off site - major repairs, drug store, groceries, welding, machine shop, diesel and prop repairs, gifts and fuel.

RAMP: No. Nearest one is located at the Hammond Boat Basin.

PARKING: Adequate, but cramped on weekends and during the summer.

MOORAGE: 305 berths with electricity and water; 16 charter, 200 recreation, 3 sailboat, and 86 commercial. There is a definite trend towards longer moorage leases, since turnover rate in 1976 was 50% of the 1972 rate.

RATES: $5.00/foot/year. Minimum $125 for one year's moorage. Three month fee equals yearly fee.

EXPANSION PLANS:

1. Pier with finger floats for 30 commercial boats up to 100', also a hoist for nets, gear, engines (not boats). All permits are in; final specifications are being drawn up, and bids will be accepted in the fall of 1977. Estimated cost including dreding 8,000 cu. yds, is $110,000. No rate increase is expected.
2. See 14.

3 COUNTY: Clatsop

NAME: West End Mooring Basin/Fisherman's Dock

CONTACT: Mr. Howard Lovvold, 1-503-325-4521

OWNERSHIP: Port of Astoria

OPERATING RESPONSIBILITY: Port of Astoria

ACCESS BY HIGHWAY: In Astoria, turn north off Marine Drive (Hwy 30). The basin is just east of the Thunderbird Inn.

ACCESS BY WATER: 1/2 mile downriver from the Astoria-Megler Bridge on the south bank.

TYPE OF SERVICES: On site - charters, electric hoist for engines, six covered moorages, transient moorage for 45 boats (no water or electricity), restroom with shower, fuel, minor parts, restaurant, motel, laundromat, workboat, tackle, bait, fish cleaning.

RAMP: No. Nearest is at the East End Mooring Basin.

PARKING: Adequate, with additional parking 1/4 mile away.

MOORAGE: 412 berths; 11 charter, 15 sailboats, 193 recreation and 193 commercial. Peak use is during gillnet season when gillnet boats are often six deep by the breakwater. Winter use - 225 boats, 75% are commercial (shrimp and trawlers) and 25% recreation.

RATES: Check with facility. Last increase was 10% in February, 1977, due to inflation.

EXPANSION PLANS:

1. In February, 1978 - remove Phillips Oil Tanks and put in more long-term parking; dredge the basin.
2. New 40' x 60' machine shop just east of existing building for gas, diesel, fiberglass, controls, welding, prop and hydraulics work.
3. 120 berths planned for 3 acre site just east of existing basin. Berths will be 30-60 feet long, permits will be applied for in the winter of 1977, and the bulkheads will be realigned.

4 COUNTY; Clatsop

NAME: East End Mooring Basin

CONTACT: Mr. Howard Lovvold, 1-503-325-4521

OWNERSHIP: Port of Astoria

OPERATING RESPONSIBILITY: Port of Astoria

ACCESS BY HIGHWAY: Located between Astoria and Tongue Point, just off Hwy 30.

ACCESS BY WATER: Basin has two entrances; one on each of the east and west sides of the breakwater. Facility is upriver from the Astoria-Megler Bridge on the south bank.

TYPE OF SERVICES: Gillnet drying, no restroom or shower.

RAMP: Yes. Single paved lane, vulnerable at low tide.

PARKING: Unpaved, adequate.

MOORAGE: 65 berths, mostly large commercial and gillnet; basin is vulnerable to storms.

RATES: Check with operator.

EXPANSION PLANS: Realignment of the breakwaters is being discussed with the Corps of Engineers. Such a realignment would expand the East End Basin potential capacity by an estimated 700 berths.

5 COUNTY: Clatsop

NAME: Skipanon Charters Moorage

CONTACT: Mr. Al Oakley, 1-503-861-2221

OWNERSHIP: Private

OPERATING RESPONSIBILITY: Private

ACCESS BY HIGHWAY: Turn off Hwy 101 onto E. Harbor Drive at the Youngs Bay Plaza intersection. Follow E. Harbor Drive west 1.1 mile. Then head north along N.E. Skipanon Drive for 1/4 mile.

ACCESS BY WATER: Located on the Skipanon River west bank, just south of Port Warren.

TYPE OF SERVICES: On site - restaurant, charters, tackle, bait, ice, minor parts, gifts, gas and diesel, restroom (no shower), pay telephone, no special transient area. No waiting list.

RAMP: No. Nearest one is located at the Hammond Boat Basin.

PARKING: Crowded on busy charter days.

MOORAGE: 231 berths; peak use pattern - 36 commercial, 30 charter, balance recreational.

RATES: $1.50/foot/month for 5 month season

$1.50/foot/month for 10 months (yearly rate)

Operator reserves the right to charge for electricity and water.

EXPANSION PLANS: Possible options (no timetable available):

1. Rebuild the bar and restaurant.
2. Install a do-it-yourself repair facility with haulout.
3. Install a dry storage system with storage racks.

6 COUNTY: Clatsop

NAME: Warrenton Deep Sea Inc.

CONTACT: Mr. Bud Charlton, 1-503-861-1233

OWNERSHIP: Private

OPERATING RESPONSIBILITY: Private

ACCESS BY HIGHWAY: Turn off Hwy 101 onto E. Harbor Drive at Youngs Bay Plaza intersection. Follow E. Harbor Drive west for 1 mile. Turn right just after crossing Skipanon River Bridge.

ACCESS BY WATER: On the Skipanon River west bank just south of Skipanon Charters.

TYPE OF SERVICES: On site - tackle, charters, licenses, restroom on sewer (no shower), no special transient area. Off site - fuel, repairs, restaurant, drugstore, groceries.

RAMP: Yes. Small, 1 lane-gravel for friends and emergencies only.

PARKING: Limited to 35 cars.

MOORAGE: 35 berths with electricity and water; current mix is 12 charter (2 do crab fishing in winter), 6 commercial, and 17 recreational.

RATES: 6¢/foot/day based on a 90 day season.

EXPANSION PLANS: None

7 COUNTY: Clatsop

NAME: Port Warren (operational 1 October 1977)

CONTACT: Mr. Keith Cook, 1-503-861-1802

OWNERSHIP: Private

OPERATING RESPONSIBILITY: Owner's Marina Association

ACCESS BY HIGHWAY: Turn off Hwy 101 onto E. Harbor Drive at the Youngs Bay Plaza intersection. Follow E. Harbor Drive to the west 1.1 mile. Turn right onto N.E. Skipanon Drive. Proceed north .3 mile. Marina adjacent to condominiums.

ACCESS BY WATER: Enter the Skipanon River; moorage is on the west bank just south of the Union 76 Fuel Dock at Grant's Marina.

TYPE OF SERVICES: On site - moorage only. Off site - restaurant, charters, bait, tackle, restrooms, fuel, repairs, pay telephone.

MOORAGE: 55 berths; 32 had been sold by 1 September 1977. All berths have electricity, water and lights. The mix of berths is:

17 - 24'
12 - 30'
14 - 36'
6 - 42'
6 - 55'
55 Total

RATES: To be established

PARKING: Limited

RAMP: No

EXPANSION PLANS: None

8 COUNTY: Clatsop

NAME: Proposed Marina has no name

CONTACT: Mr. Dave Palmberg, 1-503-861-1141

OWNERSHIP: Private

OPERATING RESPONSIBILITY: Private

ACCESS BY HIGHWAY: Turn off Hwy 101 at Youngs Bay Plaza. Follow E. Harbor Drive west 1.1 mile. Turn right onto N.E. Skipanon Drive. Proceed north .3 mile. Follow paved New England Fish access road to river.

ACCESS BY WATER: RM 2.2 on the Skipanon River.

TYPE OF SERVICES: Restrooms, major repair facilities, dry storage, bait, tackle, ice; no fuel or special transient areas are planned.

RAMP: A ramp similar to Hammond's is planned.

PARKING: +6 acres paved (planned).

MOORAGE: 600 to 800 berths are planned.

RATES: No estimate

TIMETABLE FOR CONSTRUCTION: Depends upon outcome of the Harbor Street Bridge issue.

STATUS: No permits have been applied for.

9 COUNTY: Pacific

NAME: Port of Ilwaco

CONTACT: Mr. Bob Petersen, Manager, 1-206-642-3144

OWNERSHIP: Port of Ilwaco

OPERATING RESPONSIBILITY: Port of Ilwaco

ACCESS BY HIGHWAY: Facility is in the town of Ilwaco, 11.2 miles west of the Washington side of the Astoria-Megler Bridge.

ACCESS BY WATER: Turn north by buoy 11, keeping the buoy to port and the Sand Island pile dike to starboard. The channel is 3 miles long, congested and has shoaling problems in the first 1/2 mile past buoy 11.

TYPE OF SERVICES: On site - charters, restaurants, restroom on sewer (no shower), workboat with pump, special transient area, 2 fuel docks, ice, bait, tackle, major boat repair.

RAMP: No. Nearest is Ft. Canby; Ilwaco has two 7 ton hoists and a new 50 ton hoist is planned for the repair facility.

PARKING: Adequate

MOORAGE: 1,000 berths; 300 charter, 300 commercial and 400 recreational.

RATES: Variety of rates - contact the facility. 1973 rates increased 20-25%; 1976 rates increased 10%, 1977 same rates as 1976.

EXPANSION PLANS:

1. Considering a sewage pumpout station.
2. Additional lighting, landscaping, paving in the area of the hoists. Consultants are developing a master plan for this area.
3. An additional basin south of the existing breakwater is being considered for expansion.

10 COUNTY: Pacific

NAME: Port of Chinook

CONTACT: Mr. Glen Eager, Manager, 1-206-777-8797 between 8-9 A.M. only

OWNERSHIP: Port of Chinook

OPERATING RESPONSIBILITY: Port of Chinook

ACCESS BY HIGHWAY: 4-1/4 miles west of the Astoria-Megler Bridge; turn south on Portland Street and drive one block to the basin.

ACCESS BY WATER: 1-1/4 mile channel to the Columbia River main channel.

TYPE OF SERVICES: On site - restroom on septic field (no showers), fish scale, fuel. Repairs must be done in Astoria or Ilwaco.

RAMP: Yes. $3.00 in/out; also a 5 ton hoist. Ramp has 3 lanes paved, with corrugated concrete at the bottom; it is vulnerable at low tide.

PARKING: Overflows on peak use days

MOORAGE: 323 berths and about half have electricity and water; 162 commercial (many small boats have these licenses); 161 recreational. There is space for 20 boats over 40'; during winter about 40 boats stay (mostly commecial and over 35' long). Peak demand is during gillnet season when 50-60 gillnetters want moorage.

RATES: Check with facility. Daily, monthly and yearly rates available.

EXPANSION PLANS: Long range plans (less than 5 years in the future) may include removing the existing breakwater and building a new one south of the existing breakwater location to expand the basin.

11 COUNTY: Wahkiakum

NAME: Elochoman Slough Marina (Cathlamet)

CONTACT: Mr. Dale Rhoades, Manager, 1-206-795-3501

OWNERSHIP: Port District #1, Wahkiakum County

OPERATING RESPONSIBILITY: Port District #1

ACCESS BY HIGHWAY: This marina is located off Washington SR 4 in Cathlamet, approximately 45 miles east of the Astoria-Megler Bridge. If approached from Oregon, take Hwy 30 to Westport, take the ferry to Puget Island, and cross the bridge over the north channel into Cathlamet.

ACCESS BY WATER: 1/2 mile downriver from the Puget Island Bridge, then head north up the channel that is east of Hunting Island.

TYPE OF SERVICES: On site - picnic tables, restroom (no showers), grocery delivery, 2 covered moorages, no charter. Off site - drugstore, restaurant, bar, repairs.

RAMP: Yes. Solid concrete, 3 lanes do-it-yourself, $1.00 in/out. 1500 launched in 1976. Not vulnerable to low tide.

PARKING: Gravel, with room for an estimated 100 car/trailer units.

MOORAGE: 75 berths plus 2 covered; 37 are small commercial, 35 recreational and 3 sailboats. Basin is rock-lined and so no

dredging is required. Winter use - 15 commercial vessels and 15 recreation. This facility gets swamped by heavy transient demand.

RATES: Check with facility.

EXPANSION PLANS:

1. Add a gas and diesel fuel dock in 1977.
2. Add 4 showers in 1978 and increase moorage by 50 berths.
3. The feasibility of a sewage pumpout station is being discussed.
4. A service center and motel are also being planned.

12 COUNTY: Clatsop

NAME: Proposed marina to be located just west of the existing Warrenton City Basin

CONTACT: Mr. Keith Cook, 1-503-861-1802

OWNERSHIP: Private

OPERATING RESPONSIBILITY: Private

ACCESS BY HIGHWAY: Entrance planned just east of Harbor Street Bridge

ACCESS BY WATER: RM 1.9 Skipanon River

TYPE OF SERVICES: Moorage only

RAMP: No

PARKING: Limited

MOORAGE: 35 berths planned for small, recreational vessels

RATES: Not yet determined

EXPANSION PLANS: Plan to start construction in March, 1978

STATUS: No permits have been issued yet.

13 COUNTY: Clatsop

NAME: John Day River Marina

CONTACT: Mr. Don Stewart, 1-503-325-6422

OWNERSHIP: Private

OPERATING RESPONSIBILITY: Private

ACCESS BY HIGHWAY: Take Hwy 30 east of Astoria. Proposed site is on the west bank of the John Day River just south of where Hwy 30 crosses the river.

ACCESS BY WATER: Enter the John Day River, proposed site is upstream on the west bank just past Hwy 30 bridge.

TYPE OF SERVICES: None at present

RAMP: Not planned, nearest is John Day River ramp.

PARKING: Not established yet

EXPANSION PLANS: This planned facility will have 20-40 moorages for small recreation vessels and gillnet boats (26' limit). Additional covered moorage is planned.

14 COUNTY: Clatsop

NAME: New Warrenton City Boat Basin

CONTACT: Mr. Wm. Hartley, Harbormaster, 1-503-861-2821

OWNERSHIP: Municipal

OPERATING RESPONSIBILITY: Municipal

ACCESS BY HIGHWAY: Turn off to Warrenton from Hwy 101 at Youngs Bay Plaza and drive north .9 mile. The basin is on the right just before crossing the Harbor Street Bridge.

ACCESS BY WATER: The basin is located on the east bank of the Skipanon River just downstream from the Harbor Street Bridge.

TYPE OF SERVICES: On site - bait, soda, sandwiches, tackle, licenses, ice, fish bags and tags, restroom (no shower), pay telephone, fish cleaning and storage. Off site - major repairs, drugstore, groceries, welding, machine shop, diesel and prop repairs, gifts, and fuel.

RAMP: No. Nearest one is located at the Hammond Boat Basin.

EXPANSION PLANS: Long range plans include a new basin on a 15 acre site with a separate entrance just to the northeast of the existing basin. It will include 300-400 berths for recreation and charter boats, space for parking and restrooms.

STATUS: No permits have been applied for since construction is not expected for at least 5 years.

15 COUNTY: Clatsop

NAME: Grant's Marina/Fuel Dock

CONTACT: Mr. Gordon Grant, 1-503-861-1821

OWNERSHIP: Private

OPERATING RESPONSIBILITY: Private

ACCESS BY HIGHWAY: Take the turnoff to Warrenton from Hwy 101 near Youngs Bay Plaza; turn right after crossing the Harbor Street Bridge in

Warrenton and drive past Port Warren on the gravel road; the facility is located just west of New England Fish Company.

ACCESS BY WATER: West bank of the Skipanon River near the mouth.

TYPE OF SERVICES: On site - parts, repairs, ice, tackle, diesel, gas.

MOORAGE: 20 berths

RATES: Check with facility

PARKING: Limited

RAMP: No. Nearest one is at Hammond

EXPANSION PLANS: None

B. PUBLIC SHORELINE ACCESS WITH RAMPS OR DOCKS

The following existing and planned facilities do not have moorage associated with them. Most are do-it-yourself, unmanned facilities with either no charge or a token fee for use. The major restraints on ramp usage are the lack of adequate parking and the vulnerability of the ramps to low tide. Public usage of these facilities varies with the location and fishing season. Peak use is on the public ramps nearest the Columbia River bar during gillnet season. At other times from May to October, the weekends and evenings are the heavy-use periods.

1

COUNTY: Clatsop

NAME: Ft. Stevens State Park (Coffenbury and Crabapple Lakes)

CONTACT: Mr. Bob Franklin, 1-503-861-1092

OWNERSHIP: State of Oregon

OPERATING RESPONSIBILITY: State of Oregon, Department of Transportation, State Parks Division

ACCESS BY HIGHWAY: Take Hwy 101 to the Ridge Road turnoff near the Warrenton High School and drive north for 3-1/2 miles to the overnight camp entrance. Drive west past the registration booth and follow the signs.

TYPE OF SERVICES: Both lakes allow only shallow draft vessels because the water table is low during the summer. Coffenbury Lake has a 2 lane paved ramp with restrooms (showers), picnic tables, swimming, fishing dock, pay telephone, water, electricity and 2 parking areas nearby. Crabapple Lake has 2 single lane gravel ramps that are inoperable during low water in the summer. No services on site. Park at Coffenbury Lake. In addition, Ft.

Stevens has a full range of camping, hiking, bike riding, jetty fishing, and other activities to offer the visitor.

RATES: No charge to launch or recover vessels.

EXPANSION PLANS: No new ramps are planned, as use rate is low. The park plans to connect to the new Hammond-Warrenton sewer system (1979-81), and to build a new visitor's center and a service yard to sell gas.

2

COUNTY: Clatsop

NAME: Private ramp near Youngs River Falls

CONTACT: Mr. F. Ginoroz

OWNERSHIP: Private

OPERATING RESPONSIBILITY: Private

ACCESS BY HIGHWAY: 12 miles south of Youngs Bay Bridge on Hwy 202, just across small bridge on Youngs River Loop.

TYPE OF SERVICES: 1 lane gravel ramp

PARKING: 4 cars maximum

RATES: No charge, obtain owner's permission

EXPANSION PLANS: None

3

COUNTY: Clatsop

NAME: Yacht Club

CONTACT: Astoria City Park Department

OWNERSHIP: Municipal

OPERATING RESPONSIBILITY: City Park Department

ACCESS BY HIGHWAY: Drive south on Hwy 202 from Youngs Bay Bridge; ramp is located just south of old Hwy 101 bridge on the east bank of the bay.

TYPE OF SERVICES: 1 lane ramp with corrugated concrete expansion blocks, no public restrooms, moorage for Clatsop Community College Oceanography vessels; ramp is vulnerable at low tide.

PARKING: Limited

RATES: No charge

EXPANSION PLANS: None

4

COUNTY: Clatsop

NAME: John Day Boat Ramp

OWNERSHIP: Clatsop County

OPERATING RESPONSIBILITY: Clatsop County

ACCESS BY HIGHWAY: Located just east of Tongue Point, 6 miles east of Astoria off Hwy 30.

TYPE OF SERVICES: On site - 2 lane ramp, corrugated concrete; portable chemical toilet. Off site - gas, auto repair, welding.

PARKING: Gravel; capacity 15 car/trailers and 10 cars.

RATES: No charge

EXPANSION PLANS: None

5

COUNTY: Clatsop

NAME: Knappa Dock

OWNERSHIP: Crown Zellerbach

OPERATING RESPONSIBILITY: Crown Zellerbach

ACCESS BY HIGHWAY: Drive north through Knappa off Hwy 30, the dock is 2 miles from Hwy 30.

TYPE OF SERVICES: On site - dock, no ramp or public restrooms. Off site - gas, groceries, outboard motor repair and parts.

PARKING: Capacity - 10 cars maximum

EXPANSION PLANS: None

6

COUNTY: Clatsop

NAME: Aldrich Point Boat Ramp

OWNERSHIP: Clatsop County

OPERATING RESPONSIBILITY: Clatsop County

ACCESS BY HIGHWAY: Take the Brownsmead turnoff from Hwy 30 east of Astoria, drive north 1.1 miles, turn east across bridge, then drive north 4.3 miles on Aldrich Point Road. Road narrows.

TYPE OF SERVICES: 1 lane ramp, corrugated concrete; portable chemical toilet available.

PARKING: Gravel, capacity - 25 car/trailer units

RATES: No charge

EXPANSION PLANS: None

7

COUNTY: Clatsop

NAME: Westport Ramp

OWNERSHIP: Private

OPERATING RESPONSIBILITY: Clatsop County

ACCESS BY HIGHWAY: 27 miles east of Astoria on Hwy 30, turn north at the sign for the ferry then take the first right.

TYPE OF SERVICES: On site - 2 lane ramp, corrugated concrete, portable chemical toilet. Off site - tavern, motel, gas, laundry, groceries, picnic area.

PARKING: Gravel, capacity - 50 car/trailer units

RATES: No charge

EXPANSION PLANS: None

8

COUNTY: Pacific

NAME: Ft. Canby Boat Launch

OWNERSHIP: Federal

OPERATING RESPONSIBILITY: Federal

ACCESS BY HIGHWAY: Drive west of Ilwaco towards the camping and interpretive center areas. Ramp is located on the Ilwaco channel.

TYPE OF SERVICES: The ramp has two lanes of corrugated concrete separated by a pier. The ramp is vulnerable to wakes. There is a restroom (no shower) and ice, biat, tackle nearby. In addition, Ft. Canby offers a full range of visitor services and attractions including beach access, overnight camping, and a visitor's center.

PARKING: Gravel, room for 50 car/trailers with a nearby lot for 70 more.

RATES: No charge

EXPANSION PLANS: None

9

COUNTY: Wahkiakum

NAME: Oneida Boat Launch

OWNERSHIP: Private

OPERATING RESPONSIBILITY: Private

ACCESS BY HIGHWAY: Take the Oneida Road turnoff from Washington SR 4 west of the bridge over the Deep River.

TYPE OF SERVICES: 1 lane ramp. Access by water is restricted by the low bridge.

PARKING: Limited

RATES: Small fee

EXPANSION PLANS: None

10 COUNTY: Wahkiakum

NAME: Brooks Slough Ramp

OWNERSHIP: Washington Department of Game

OPERATING RESPONSIBILITY: Washington Department of Game

ACCESS BY HIGHWAY: 40 miles east of Astoria-Megler Bridge on SR 4, just east of Skamokawa.

TYPE OF SERVICES: 1 lane ramp of corrugated concrete sections, no restrooms; ramp is vulnerable at low tide.

PARKING: Gravel, 20 car/trailers

RATES: No charge

EXPANSION PLANS: None

11 COUNTY: Wahkiakum

NAME: Skamokawa Park

CONTACT: Mr. Greg Fisher, 1-206-795-3651

OWNERSHIP: Wahkiakum Port District #2

OPERATING RESPONSIBILITY: Wahkiakum Port District #2

ACCESS BY HIGHWAY: Located on the old school site in Skamokawa off SR 4.

TYPE OF SERVICES: This planned facility will include a do-it-yourself boat launch, ball park, day-use and overnight facilities and, possibly, an interpretive center.

PARKING: Adequate parking is being planned.

RATES: A small fee will be charged to use the ramp

STATUS: Construction is expected to commence spring, 1978

12 COUNTY: Wahkiakum

NAME: Net Rack Slough Ramp

This facility is planned for Puget Island by Wahkiakum Port District #2. No additional information, but the ramp will not be built in the near future.

C. DRY STORAGE (COVERED)

This section catalogs only the covered dry storage within the CREST area. Location plays a key role for these types of facilities, as covered dry storage must be located within easy driving distance of a launching ramp, must offer excellent security, and must charge a reasonably low rate to compete with storage at the boat owner's home.

(1) COUNTY: Pacific

NAME: Paul's Adult Trailer Park: Boat and Trailer Storage

CONTACT: Mr. Paul Luethe, 1-206-642-3566

OWNERSHIP: Private

OPERATING RESPONSIBILITY: Private

ACCESS BY HIGHWAY: Located off Hwy 101, just east of Ilwaco.

TYPE OF SERVICES: Trailer park, covered dry moorage, open dry moorage, restrooms with showers. Covered storage for 11 stalls, 27' limit.

NEAREST RAMP: Hoists in Ilwaco; ramp and hoist in Chinook.

RATES: Covered dry storage $175/year; open dry storage $12/year; next year (1978) will increase to $15/year.

EXPANSION PLANS: None

(2) COUNTY: Pacific

NAME: Dry storage near Chinook Cannery

CONTACT: Mr. Ben Macy (owner - lives next door)

OWNERSHIP: Private

OPERATING RESPONSIBILITY: Private

ACCESS BY HIGHWAY: Drive west on Hwy 101 from the Astoria-Megler Bridge to Chinook. Facility is the brown building next door to the Chinook Cannery.

TYPE OF SERVICES: Covered dry storage only; 7 stalls limited to 26' boats.

NEAREST RAMP: Port of Chinook

RATES: Check with facility

EXPANSION PLANS: None

(3) COUNTY: Clatsop

NAME: Boat and Trailer Storage

CONTACT: Mr. Bob Wilson, 1-503-861-2853 after 5 P.M.

OWNERSHIP: Private

OPERATING RESPONSIBILITY: Private

ACCESS BY HIGHWAY: Take the Warrenton turnoff from Hwy 101 at Youngs Bay Plaza; drive through Warrenton towards Hammond, and the facility is .7 miles from the Harbor Street Bridge in Warrenton.

TYPE OF SERVICES: Covered dry storage in a 70' x 100' building; 20 stalls 16' high and 28' deep; go-kart available for maneuvering

trailers. Ten stalls have boats in them and the remainder are filled with furniture or cars.

NEAREST RAMP: Hammond Boat Basin.

RATES: $25/month; $1/day; $250/year

EXPANSION PLANS: Facility stays full and could be expanded 25% easily. However, at present, there are no plans to expand.

(4) COUNTY: Clatsop

NAME: Covered dry storage under construction

CONTACT: Mr. Dave Palmberg, 1-503-861-1141

This facility will be located just off Hwy 101 in Warrenton and is under construction. No additional information is available on rates or type of services.

(5) Covered dry storage facility on the John Day River is discussed as part of the expansion plans for the proposed marina on the John Day River.

D. BOAT RENTALS

Facilities for renting boats within the CREST area are not well developed. There is one facility planned; there are no existing ones. This is generally attributed to the danger of crossing the Columbia River Bar and the requisite high level of seamanship.

COUNTY: Clatsop

NAME: Jim Ritchie RV Sales and Boat/Trailer Rental

CONTACT: Mr. Jim Ritchie, 1-503-325-5814

OWNERSHIP: Private

OPERATING RESPONSIBILITY: Private

ACCESS BY HIGHWAY: .8 miles south on Hwy 202 from the east end of the Youngs Bay Bridge

NEAREST RAMP: Yacht Club

TYPE OF SERVICES: On site - RV sales, boat and trailer rental, 20 room motel, propane, boat repair, welding, gas engine work, pay telephone. Off site - laundromat, restaurant, groceries.

PARKING: 80 cars

RATES: Check with facility.

EXPANSION PLANS: Planning to rent 6 motorboats from 25-35' long beginning in 1978.

E. EMERGENCY SERVICES

The following facilities offer emergency search and rescue, towing and firefighting services.

1 COUNTY: Clatsop

NAME: Clatsop County Rescue Boats

CONTACT: Clatsop County Sheriff's Department, 1-503-325-2001

OWNERSHIP: Clatsop County

OPERATING RESPONSIBILITY: Sheriff's Department

TYPE OF SERVICES: 3 vessels: 1 - 52' landing craft with fire pump;
1 - 23' patrol boat with pump
1 - 40' patrol boat with pump

Boats are dispatched by telephone or radio, to fight fires, tow, execute underwater salvage (divers available), and execute emergency search and rescue.

2 COUNTY: Pacific

NAME: Cape Disappointment Coast Guard Station

CONTACT: 1-206-642-2381; 1-206-642-2382; station also monitors station 16 CB radio

OWNERSHIP: U.S. Government

OPERATING RESPONSIBILITY: U.S. Coast Guard

TYPE OF SERVICES: 8 vessels: 1 - 52'
4 - 44'
2 - 41'
1 - 25'

Vessels offer firefighting, towing and search and rescue services.

3 There is also a Coast Guard Search and Rescue facility at Tongue Point.

An additional U.S.C.G. emergency number is for the Air Station at Clatsop Airport.

1-503-861-2242 for Marine and Air Emergencies

F. EXISTING SUPPLY OF MOORAGES, EXPANSION PLANS

A summary of data on the existing moorage supply, use patterns, and expansion plans for existing marina facilities is presented in Table 1.

Please note the minimum current use of moorages by sailboats, as well as the expansion plans of various publicly operated facilities.

As can be seen in the columns summarizing moorage supply and expansion plans, the CREST area marinas operate at full capacity during the peak summer season. The waiting lists are so large and turnover rates so low that most facilities no longer accept written applications for their waiting lists. A chronic undersupply of moorages definitely exists.

The existing facilities have a total of 80-145 berths planned for construction within the next 2 years, an additional 173 berths between 2 and 3 years in the future, and 630 berths from between 3 and 5 years in the future. The three new planned marinas offer from 655 to 875 berths in the medium future (2-3 years). None of the new facilities have received their permit approvals yet, however.

It is useful to note the distribution of existing facilities relative to the mouth of the Columbia River. In 1977, 49% of the CREST area permanent moorage capacity was located within 5 river miles of the mouth. By river mile (RM) eleven, 79.5% of capacity is accounted for. Only 2.8% of the capacity was located upriver from RM 16, beyond the East End Mooring Basin. This dependence on and preference for location near the river mouth is understandable (ease of access to the ocean fish resources) and is also significant for evaluating the economic viability of new marinas (see section V-A).

TABLE 1

Summary of Existing and Planned Moorage in the Lower Columbia Estuary (note C)

Existing Facilities	Capacity[A]	Current[B] Usage	Commercial	Charter	Recreation	Sailboats	Waiting List	Moorage Expansion Planned
1. Hammond Boat Basin (OR)	178	Full	3	38	137	3 or 4/yr Transients not in total	300	1. 50-65 Charter Boats[1] 2. 53 sp. for 20 rec. 3. Others to toal 400
2. Grant's Marina (OR)	20	Full	2	--	18	--	--	--
3. Skipanon Charters (OR)	231	200	36	30	130	4	200	--
4. Warrenton Boat Basin (OR)	305	Full	86	16	200	3	100	30 commercial[2] 350 in new basin
5. Fisherman's Dock & Marina (OR)	412	Full	193	11	193	15	255	Approximately 120 berths from 30-60'[3]
6. East End Mooring Basin (OR)	65	Full	63	--	2	--	--	--
7. Port Warren (OR)	55	32	--	--	32	--	--	--
8. Warrenton Deep Sea Charters (OR)	35	Full	6	12	16	1	11	--[4]
9. Port of Ilwaco (WA)	1,000	Full	300	300	399	1	500	--
10. Port of Chinook (WA)	323	Full	162	--	161	--	280	--
11. Elochoman Slough Marina (Cathlamet) (WA)	75	Full	37	--	35	3	--	50 slips[5]
TOTALS[E]	2,699	2,645	888	407	1,323	27	1,635	950[6]

Planned New Facilities (7)

12. Palmberg Marina (berths planned 600-800) no permits.

13. Small basin on peninsula (35 berths planned) west of Warrenton City Basin - no permits; on drawing boards; hope to start construction March, 1978.

14. Small mooring basin on John Day River - 20-40 berths; 26' upper limit; no permits; hope to start spring, 1978. Some dry storage, if possible.

A. Reader should keep in mind that two or more small boats can go in one large slip. So capacity refers to the approximate number of boats in current use pattern with current lengths.

B. Summer 1977 - Even when full, the basins may be able to handle some transients due to temporarily vacated berths or special transient areas. Winter demand drops to 20-50% of capacity and shifts to larger commercial and charter vessels.

C. Data was collected during a period from 5 July 1977 to 12 August 1977 from site inspections, review of records and interviews with harbormasters, port managers and other knowledgeable parties. Data for marina moorages excludes houseboats; private tie-ups in the sloughs and nearby rivers; Coast Guard moorages; Tongue Point; and several commercial moorages not open to the public.

D. Waiting lists include both written and verbal requests.

E. Estimated margin of error in total figures is less than five percent (except for waiting lists, see later discussion, Section III-E).

NOTE:

1. Hammond is postponing all expansion of new facilities until the new sewer system is completed. The sewer's estimated completion date is 1979-1980.

2. Warrenton's new commercial dock will handle approximately 30 large commercial vessels. According to their waiting list, four vessels want to transfer from the existing basin and twenty-three of remaining berths have requests for moorage. Bids are being let this fall as the permit process is complete. The new basin (about 350 boats) is on the drawing boards.

3. West End Mooring Basin is planning approximately 120 additional berths to the east of the existing basin. The permit application process will commence this winter. New moorage will have a mixture of 30' to 60' long berths. The final mixture of berth lengths has not been decided.

4. Limited public moorage.

5. The planned moorage is for recreational, small commercial vessels and gillnetters. A fuel dock, service center and motel are also planned.

6. Total expansion plans for existing facilities:

Short-range (1-2 years)	80-145 berths
Medium-range (2-3 years)	173
Long-range (3-5 years)	630
Total of	950 new berths

7. Total expansion for new facilities: 655-875 berths.

G. IDENTIFICATION KEY FOR FIGURE 1 AND INSERT

Hazardous Areas (vicinity of the Columbia River Mouth)

A. Peacock Spit

B. Clatsop Spit

C. Dangerous current area

D. Pile dikes and spurs extending into the river

● Airports

1. Clatsop Airport
2. Karpen Airport
3. Small airport near Ilwaco

■ Boat Rentals

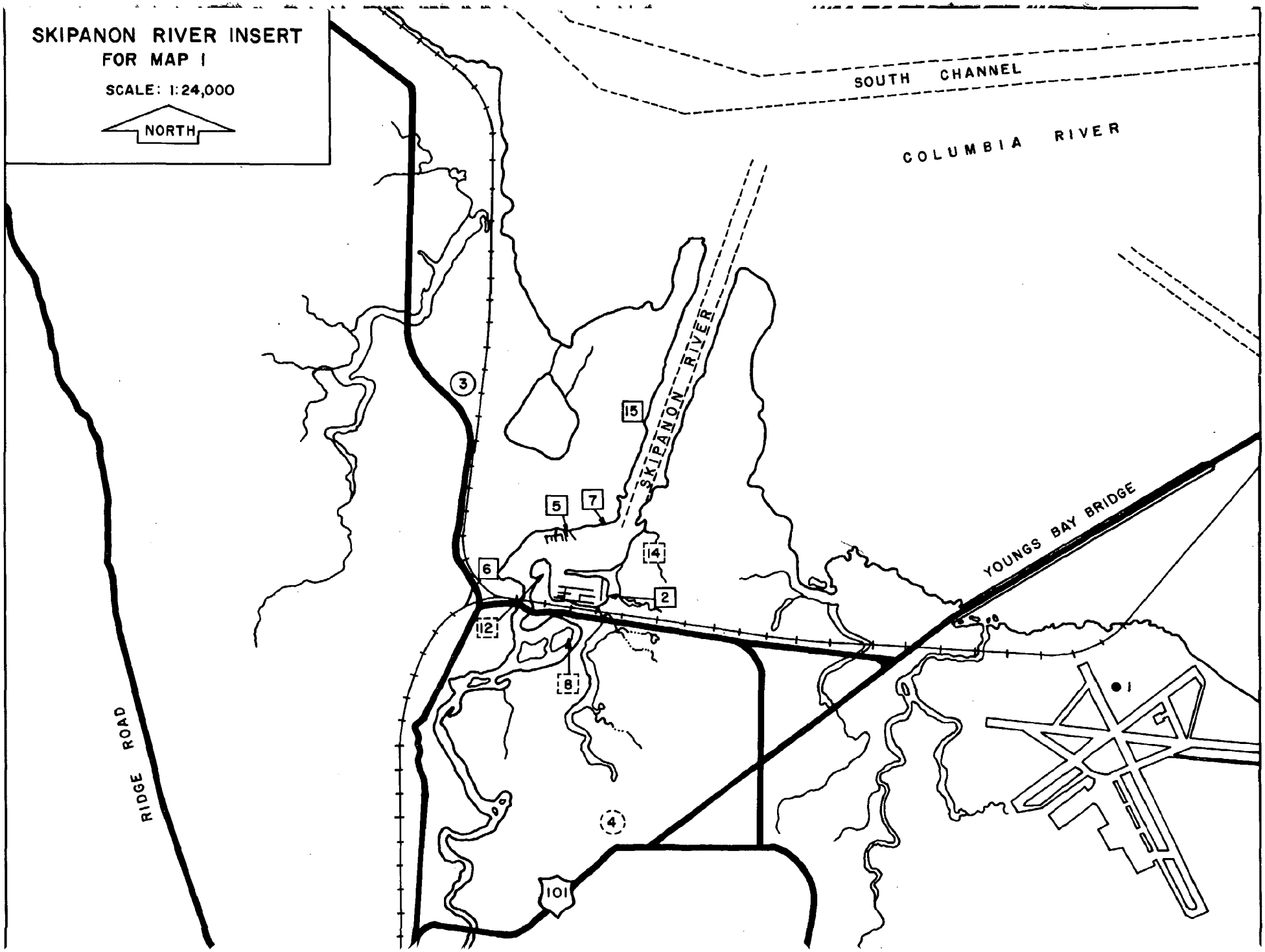
Jim Ritchie Boat/Trailer Rentals (Planned)

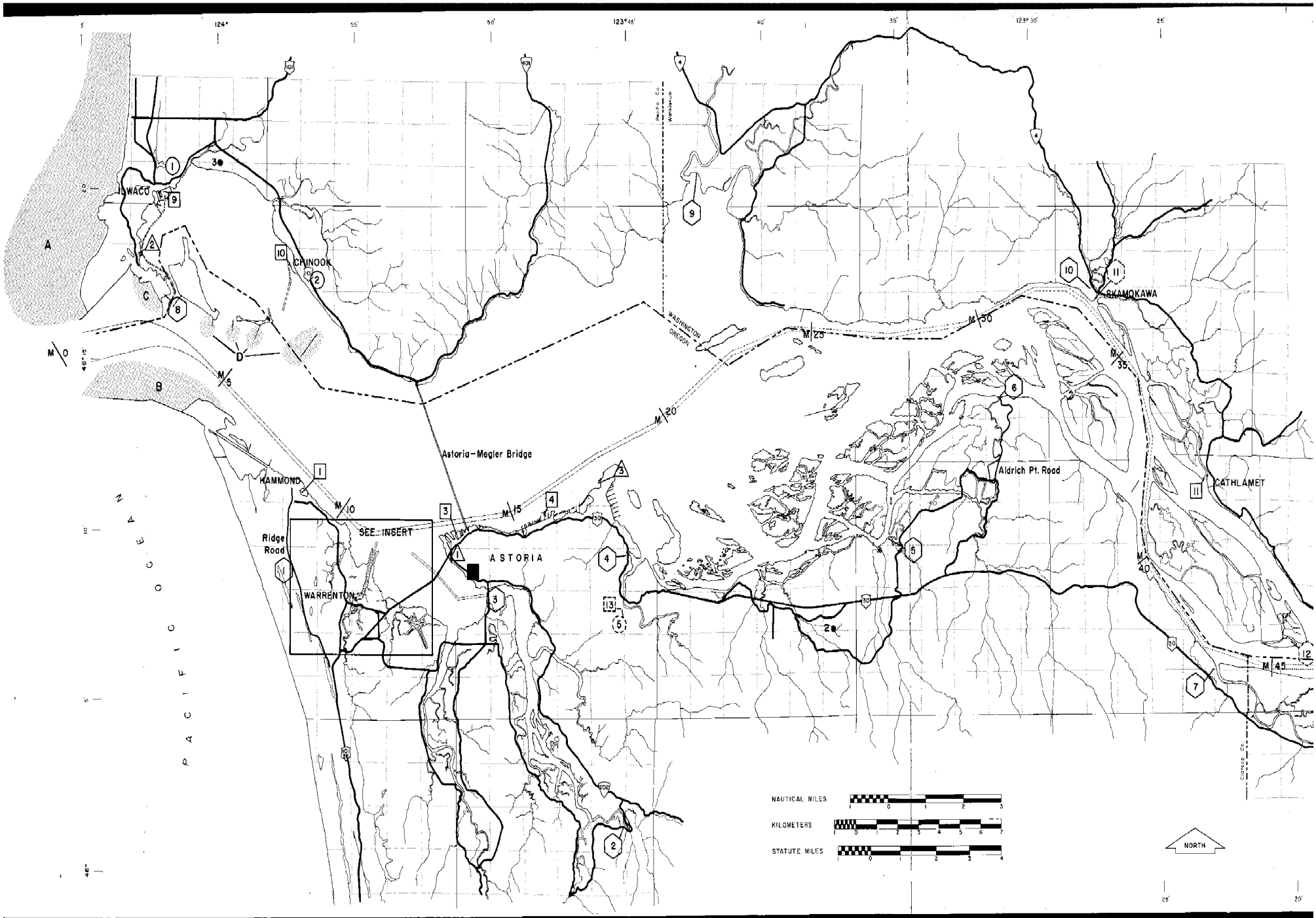
○ Dry Storage (covered)

1. Paul's Adult Trailer Park/Boat and Trailer Storage
2. Private facilities near the Chinook Cannery
3. Boat and Trailer Storage
4. Palmberg's Dry Storage (under construction)
5. John Day Dry Storage (planned expansion)

□ Marinas

1. Hammond Boat Basin
2. Warrenton Boat Basin
3. West End Mooring Basin (Fisherman's Dock and Marina)
4. East End Mooring Basin
5. Skipanon Charter Moorage
6. Warrenton Deep Sea Charters
7. Port Warren
8. Palmberg Marina
9. Port of Ilwaco
10. Port of Chinook
11. Elochoman Slough Marina (Cathlamet)
12. Proposed marina west of the existing Warrenton City Basin


SKIPANON RIVER INSERT
FOR MAP I
SCALE: 1:24,000
NORTH
SOUTH CHANNEL
COLUMBIA RIVER
SKIPANON RIVER
YOUNGS BAY BRIDGE
RIDGE ROAD
3
15
5
7
14
6
2
12
8
4
101
1



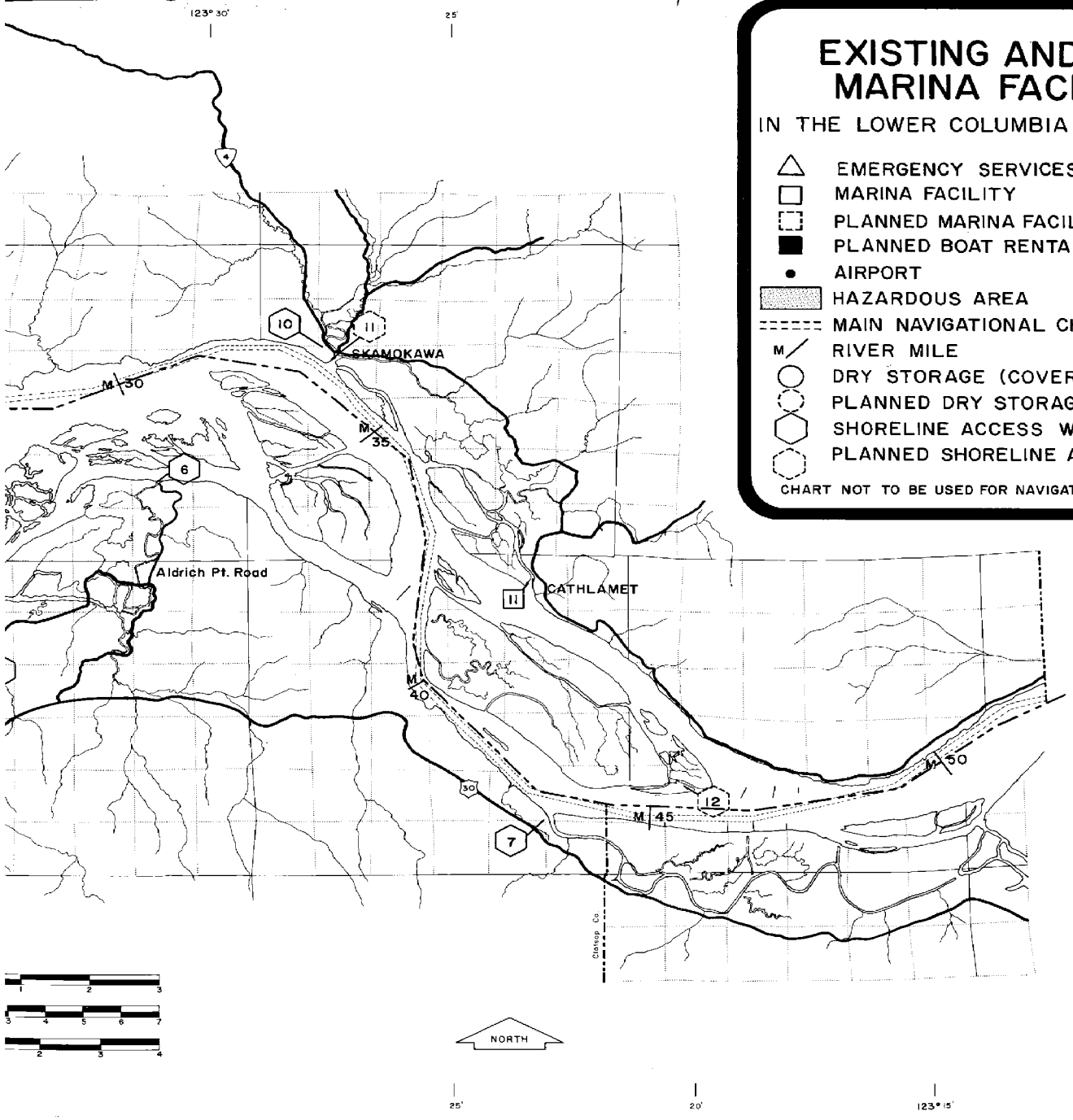
124°
55'
50'
123°45'
40'
35'
123°30'
25'
20'
48°15'
46°
WACO
CHINOOK
SKAMOKAWA
HAMMOND
Ridge Road
SEE INSERT
WARRENTON
ASTORIA
Astoria-Megler Bridge
Aldrich Pt. Road
CATHLAMET
WASHINGTON
OREGON
Pacific Co.
Wahkiakum
Clatsop Co.
PACIFIC OCEAN
A
B
C
D
M 0
M 5
M 10
M 15
M 20
M 25
M 30
M 35
M 40
M 45
NAUTICAL MILES
KILOMETERS
STATUTE MILES
NORTH

EXISTING AND PLANNED MARINA FACILITIES

IN THE LOWER COLUMBIA RIVER ESTUARY

- EMERGENCY SERVICES
- MARINA FACILITY
- PLANNED MARINA FACILITY
- PLANNED BOAT RENTAL
- AIRPORT
- HAZARDOUS AREA
- MAIN NAVIGATIONAL CHANNELS
- M/ RIVER MILE
- DRY STORAGE (COVERED)
- PLANNED DRY STORAGE (COVERED)
- SHORELINE ACCESS W/RAMP
- PLANNED SHORELINE ACCESS W/RAMP

CHART NOT TO BE USED FOR NAVIGATION



CREST

COLUMBIA RIVER ESTUARY STUDY TASK FORCE

FIGURE

1

13. Proposed marina on the John Day River
14. Proposed new Warrenton City Basin
15. Grant's Marina/Fuel Dock

Public Shoreline Access (with ramps or tie-up dock)

1. Fort Stevens
2. Private ramp near Young's River Falls
3. Yacht Club
4. John Day Boat Ramp
5. Knappa Dock (no ramp)
6. Aldrich Point Boat Ramp
7. Westport Boat Ramp
8. Fort Canby Boat Ramp
9. Oneida Boat Ramp
10. Brooks Slough Ramp
11. Skamokawa Park (ramp planned)
12. Net Rack Slough (ramp planned)

Emergency Services

1. Clatsop County Rescue Boats
2. U.S.C.G. - Cape Disappointment
3. U.S.C.G. - Tongue Point

III. BASIC OPERATING FORMS AND MANAGEMENT TECHNIQUES

This section of the marina study provides information on record keeping techniques and certain basin management techniques; it also includes a proposed do-it-yourself questionnaire for assessing the expenditures by marina customers.

All of the marinas within the CREST area have established record keeping systems that are adequate for their purposes. However, with certain modifications, more detailed and a greater variety of information could be collected to facilitate planning efforts by both the marinas and local and state agencies. The information presented here has been selected from established techniques. This information is for the benefit of the newer facilities and had been modified to serve the long-range needs of the marinas more effectively. Criteria for suggested formats include:

1. usefulness of information generated;
2. ease of collection;
3. ease of information storage and retrieval.

The topics examined are float plans, registration forms, launching records (ramps and hoists), lease agreements, waiting lists, wall maps and the economic impact assessment questionnaire.

A. FLOAT PLAN

A sample form for a float plan on the following page is available from the Oregon State Marine Board. It is basically a common sense, customer-convenience service that seems under-utilized by the boating community within the CREST area. Although certain aspects of boating safety cannot be forced upon uncooperative boaters, the availability of these forms in a local marina office may provide the extra peace of mind that encourages repeat customers or, in case of an emergency, the extra information necessary to prevent a boating disaster.

B. REGISTRATION FORMS

The type of forms used within the CREST area vary widely. Some of the facilities have minimum paperwork; some combine the registration form with a rental or lease agreement and have either a separate waiting list or none at all; others have separate forms for each of the above categories. Some

Sample Float Plan

GOING SOMEWHERE?

Leave a float plan with a friend, relative or marina operator. Should disaster strike, a few minutes could mean a lifetime of difference. Here's a sample plan:

Name of boat operator _____

Home phone number _____ Business phone number _____

Boat type _____ Color of hull _____

Color of trim _____ Registration Number _____

Name _____ Make _____ Length _____ Other _____

Engine: Type _____ Horsepower _____ Normal Fuel (gallons) _____

Number of persons aboard (including operator) _____

Name	Age	Address/Phone Number

Survival Equipment:

Lifejackets (number) _____ flares _____ mirror _____

Flashlight _____ food _____ paddles _____

Water _____ cushions _____

Radio _____ Frequencies _____

Itinerary:

Depart _____ from _____ on _____ (time, date)

Going to _____ or _____

Expect to return by _____(time, date) and in no event later than _____

Other information _____

Auto license number _____ Trailer license number _____

If not returned by _____ call the Coast Guard or local authority at

_____

* Upon return, notify the person to whom the float plan was given.
* If you were reported to the Coast Guard as overdue, notify them of your arrival.

From: Oregon State Marine Board

distinguish between transient and permanent moorage, while others combine the two. Information storage systems include notebooks, rolladex cards, filing boxes and cabinets.

Clearly, certain types of information are essential for billing, planning, management, and legal purposes. For convenience, there is much to be said for a standard multi-purpose form such as those on the following pages.

On one side, the standard form could have the information requests and, on the other, it could have both a signature space for the rental agreement and the history of user charges. Rules and regulations in the bylaws and tariffs could be posted or available on a handout, along with any updated special conditions or rules.

Such a format standardizes records, is useful for transient and permanent moorage and for waiting lists, and serves as a registration form, a rental agreement and billing record. Also, if forms are completed conscientiously, more detailed and vital information is collected. This enables the marinas to detect trends in moorage demand, to plan for future expansion more effectively, and to develop background information for soliciting funds from state and federal sources.

C. LAUNCH RECORDS

Within the CREST area, facilities are diverse: ramps may be single lane, gravel or multi-lane paved; there are hoists capable of lifting only engines and gear and the planned 50 ton hoist in Ilwaco. The county and state facilities tend to be free of charge, while the port, private and municipal facilities generally have user fees. Some hoists and ramps may be operated by concessionnaires as in Chinook or by the marina itself, as in Ilwaco, Astoria and Hammond.

These facilities can contribute significantly to the cash flow of an operation, but they tend to create heavy demands for parking space and associated congestion problems. Nevertheless, the operation of ramps and hoists offer the opportunity to generate excellent records concerning: users, especially out-of-staters; the number of days that a certain boat was launched; the number of passengers; peak use periods by day and month, and long range trends in trailerable boat lengths. Such records are useful to the marina management. The sample form is modeled after the launch form utilized at Hammond.

Sample Multi-purpose Form

Instructions: Please check (✓) appropriate space or fill in information requested.

Current Status: (use dates, pencil) Date filed: _____

Waiting List: _____ Fee Paid: _____

Transient: _____

Permanent: _____

Name: _____ Telephone: _____

Home Address: _____ ZIP: _____

Name of Employer: _____ Telephone: _____

Business Address: _____ ZIP: _____

Owner of Boat (if different from above):

Name: _____ Telephone: _____

Address: _____ ZIP: _____

Boat Name: _____ REG. #: _____

Length: _____ Beam: _____ Draft: _____

Vertical Clearance: _____ Color: _____ Hull: _____

TYPE:

Charter: _____ Type License: _____

Commercial: _____ Gillnet: _____ Shrimper: _____ Troller: _____

Trawler: _____ Tuna: _____ Other: _____

Recreation: _____ Inboard: _____ Outboard: _____ I/O: _____

Sailboat: _____ Motor Assisted: _____

Engine Size: _____ Diesel: _____ Gas: _____

Number of Screws: _____

Type of Marine Sanitation Device: None _____

Type I _____

Type II _____

Type III _____

Request Electrical Hookup: _____

Other Special Requests: _____

Sample Ramp and Hoist Launch Form

License number of vehicle: _____ Date: _____

Boat license number: _____ Ticket number: _____

Name of boat: _____

Length: _____

Number of passengers: _____ Fee paid: _____

D. LEASE AGREEMENT

The recommended approach for the lease agreement is to post a copy of all rules, regulations, rates, special conditions and tariffs and to provide the same information in a handout. The statement on the back of the multi-purpose form should say, in effect, that the signature indicates that the signee has read and agrees to abide by all rules, regulations, special conditions and tariffs.

In addition to signing the rental agreement, several topics must be clearly addressed within the rules and regulations:

1. The consequences of nonpayment must be identified.
2. The financial responsibility for all spills and waste cleanup must be addressed.
3. A statement that all efforts by the facility staff for emergency services such as firefighting, towing, and pumping do not obligate the facility for damages or additional services.

To simplify implementation of the suggestions and to eliminate possible misunderstandings with the customers, proper legal advice on phrasing these concerns is highly recommended.

E. WAITING LIST

Waiting lists often provide misunderstood and misused information. Accurate lists, however, can serve many vital planning purposes such as: assisting in the planning of the number and sizes for new moorages; filling vacated berths; and, if the waiting list deposit technique is used, the list gives a more accurate identification of unfilled demand

(at current prices) for a specific facility. This again emphasizes the potential usefulness of detailed information collected on a multi-purpose form.

The CREST area marinas collect verbal and written waiting lists. The marinas have no definite information about either how serious the requests are or how much overlap exists between facilities. It is common for a recreational boater to request moorage or a place on lists at four or five facilities. Limited comparisons of lists revealed a 20 to 70 percent overlap. This overlap tends to invalidate most conclusions from existing waiting lists.

Because of the undersupply of moorages within the CREST area (see supply and demand section), overlapping lists, and the detailed planning needs for expansion of moorage facilities, it is recommended that the marinas use a technique found effective by a marina in the Puget Sound.

That marina required a $25 fee to remain on the waiting list. The net effect was that roughly two-thirds of the applicants with earlier moorage requests withdrew their applications. The marina then had a reliable list of moorage requests with which to plan its moorage expansion.

The process used to implement the technique was basically this: a two month moratorium on moorage requests was declared at a convenient time during the off season. Approximately 1600 names on an existing waiting list were then informed by mail of the facility's expansion plans and annual turnover in moorages. This gave the boaters information to determine the chances of obtaining moorage in the near future (three years). Next, a deadline for return-by-mail of a completed form and $25 check or money order, was set for those who wanted to be included on the new waiting list. Previous seniority on the waiting list was preserved among those returning the forms. With the information on the multi-purpose form, the waiting list identified moorage needs according to boat length, type, draft, beam and vertical clearance, to fit special moorage conditions.

The new waiting list was finalized, the moratorium was lifted, and when moorage opened it was offered to those on the list. If they accepted, the $25 went towards the first bill for moorage and/or services.

An alternative approach might be to deduct $5 from the deposit for administrative services or to use a $50 fee and return all but $10. Balances could be kept in a special fund for planning and development of new moorage facilities.

Such a technique has many advantages for improving the usefulness and reliability of waiting list information.

F. WALL MAP

Numerous facilities have discovered the usefulness of a wall map in the marina office. A simple, black ink outline of the mooring basin, docks and facilities with berth and float numbers is adequate. This not only assists in giving directions to boaters unfamiliar with the facility, but it also facilitates the identification of areas for repair work or for use in cases of emergency. In addition, it is a tool that indicates, on a daily basis, which slips are available for rental to transients besides any special transient-only moorage areas. It is useful then, to cover the wall map with clear acetate which can be easily marked with grease pencil and wiped off. Finally, the map provides a quick visual summary for the harbormaster about the actual use of his facility each day.

This map also provides a way to maintain a running daily total of types of moorages used. The information can be recorded into a permanent form to help detect long term trends in moorage demand. This would save having to search all the individual boat moorage records. Example:

Date: _____

Permanent moorages:	Commercial	_____
	Charter	_____
	Recreational	_____
	Sailboats	_____
Transient moorages:	Commercial	_____
	Recreational	_____
	Sailboats	_____

Lengths: (for Transients) Code C - Commercial; Ch - Charter;
R - Recreational; S - Sailboats; G - Gillnet

15-19 - R,R,R
20-24 -
25-29 - G,G,Ch
30-34 - S.G.G.G.G
35-39 - Ch,Ch
40-44 -
45-49 - C
50-54 -
55-59 -
60-64 -
65 - C,C,C,C

NOTES: 12 new Tuna boats and
25 gillnetters came in today.

Such information could be picked off the wall map at the end of each day. The detailed information is valuable for planning new berth lengths in order to maximize revenue from available space.

G. RECORD STORAGE

Adequate attention needs to be paid to the storage and protection of these records. Clearly, they must have locked protection from theft or vandalism, but there is sometimes greater risk from damage by fire or water. In this case, overnight storage in an elevated, fireproof filing cabinet would serve the purpose. Records should certainly be kept on file in a fireproof file for the amount of time required to meet any state or federal time requirements (such as for tax purposes).

H. ECONOMIC IMPACT QUESTIONNAIRE

Quite often in the negotiations for funding from various state and federal agencies, it is useful for a marina to have a quantitative awareness of the economic impact of their facility. This information can also be beneficial to community public relations.

The following sample questionnaire is offered for the consideration of marina operators within the CREST area. It is designed to be either part of a do-it-yourself assessment, or it can be part of a larger, more regional approach supervised by a consultant or representative from

one of the Washington or Oregon Universities familiar with field research techniques.

A key element to the implementation of this questionnaire is a statistically reliable approach to random sampling that lowers the costs without invalidating research results. As a very general example, individual marinas might collect questionnaires from every boat, every other boat, or every fourth boat that uses a facility for a week (Monday-Sunday) during the early season (late May or early June). Then, a similar sample might be collected during the last weekend of August, or early September (Labor Day), to contrast the two extremes of marina facility-use during the summer; this could also be done one week in January, to get a perspective on winter usage. Obviously, a more sophisticated approach could be developed, but that necessitates outside assistance and more money for the study. Charter offices and skippers could help to distribute and collect a one page questionnaire (printed on both sides); and an employee could distribute them to the recreational and commercial vessels.

The cover sheet need not be more than one paragraph. To encourage cooperation, it could explain in the marina's own terms, how this information would be used (such as to provide background for grant requests to expand or improve facilities and services). Also, it is important to assure customers that the data are confidential and will be made public only as totals.

Additional questions could be added to suit the marina management's purposes. Large boxes at the charter offices, marina office and fuel dock are good collection points for the questionnaires. The questions generate detailed data related to: types of activities, age and sex distribution, income brackets, size of market area served, the types of secondary or supporting industry used, and the amount of money spent on activities related to marina use. Finally, the form establishes a feed-back loop for opinions and suggestions for current and future operations (see following questionnaire).

Sample Questionnaire for Survey of Marina Users

(If you have already filled one of these forms out this week please do not do so again.)

Date: _____

1. What activity brings you to this marina?

   Commercial Fishing _____

   Charter Fishing _____

   Recreation _____ Sailing _____ Cruising _____ Sports Fishing ____

   Sightseeing _____

   To enjoy the view _____

   To eat at restaurant _____

2. How many people in your group? _____

3. Your age and sex? Male _____ Female _____

10 years _____	35-40 years _____	60-65 years _____
10-15 years _____	40-45 years _____	65-70 years _____
15-20 years _____	45-50 years _____	70-75 years _____
20-25 years _____	50-55 years _____	75-80 years _____
25-30 years _____	55-60 years _____	80-85 years _____
30-35 years _____		

4. Approximately, what was your income last year (before taxes)? (This is important to help evaluate who benefits from fishing enhancement and improvement of facilities.)

$ 0- 5,000 ___	15,000-20,000 ___	30,000-40,000 ___
$ 5,000-10,000 ___	20,000-25,000 ___	over 40,000 ___
$10,000-15,000 ___	25,000-30,000 ___	

5. How far did you drive to reach this facility? _____ miles.

6. If staying overnight, what are your accomodations? (check one)

   Friends/relatives _____ Motel _____ Camper _____

   Private campground _____ Public campground _____

7. Number of consecutive days that you utilized marina facilities on this trip? _____

8. What were your expenditures for this trip either at the marina or within 5 miles?

Moorage facilities and services _____

Repairs _____

Boat parts _____

Food (restaurant) _____

Food (grocery store) _____

Ice, tackle, bait _____

Overnight accomodations _____

Gas/oil for trip here _____

Gas/oil/diesel for boat _____

Charter fees _____

Licenses _____

Laundry _____

Gifts/souveniers _____

Other _____

This is important information to help this marina plan new facilities and services. If you can't remember exactly, please estimate to the best of your ability.

9. How many days, weeks or months each year do you utilize this facility? _____

10. What services or facilities do you like about this marina?

_____

_____

_____

_____

_____

11. Which services or facilities would you like to see improved or added?

_____

_____

_____

_____

_____

IV. PERMIT INFORMATION

This section of the marina study presents information on the permit process for the expansion of marina facilities or development of new ones for both the Oregon and Washington portions of the CREST area. The processes in the two states differ. In addition, the role of CREST in the permit process will be clarified.

A. CREST'S ROLE (This information applies to both the Washington and Oregon portions of the CREST area)

CREST's role within the permit process is basically two-fold: first, to provide information about the process, and second, to review and comment on permit applications. However, CREST does not and will not require any permits for the expansion or development of marina facilities within its boundaries. CREST also provides information and assistance for other water-related development project permit requirements at the local, state and federal levels. In order to avoid duplication of the well established permit information services that exist for both Washington and Oregon at the federal level, CREST will only provide the contacts and information to help applicants get started on the process. It is felt that this is the proper role for CREST because it does not have any authority or operating responsibility within the permit process; consequently, the public would be more efficiently and accurately served by dealing directly by those responsible for issuing the permits.

In addition to this information, CREST has prepared and the member governments have adopted the CREST Regional Policies. These policies are specific methods of action to guide present and future decisions toward established CREST goals. They act as guidelines until the estuary plan is accepted and until the local zoning ordinances have been modified in accordance with the plan. The policies will need to be consulted for guidance on the expansion or development of marina facilities.

For example, the CREST permissible-use matrix in the Regional Policies reveals that a water related development classification is preferred for all sites that involve expansion of existing facilities or the development

of new marinas. The developer should insure that his proposed site is classified as water-related development in the CREST management unit plan (and ultimately in the complete estuary land and water management plan that CREST is developing). The following page provides excerpts from the matrix.

B. OREGON

1. County

The portions of the CREST area in Oregon are also part of Clatsop County. This means that all new marinas and expansions must coordinate their efforts with the local city planners (if within their jurisdiction) or with the Clatsop County Planning Department. At this time, the county zoning ordinance is being modified with regard to marinas, so it is important to obtain the most current information from the Clatsop County Office of Planning and Development at 503-325-7441, ext. 71 in Astoria.

2. State

On a state level, Oregon has a three-part permit coordination program:

a. Information Service - For information about any State of Oregon permits, licenses, or certifications, call 1-800-452-0347 (toll free).

b. "One-Stop" Review Process - For large, complex projects, applicants may submit a master application form. (CREST maintains a copy of this on file for the public's use). Master applications are circulated to each regulatory agency. Each agency then has 30 days to determine if the project requires permits. The applicant is mailed the specific application forms required.

c. Consolidated Hearings - To save time and money, hearings required by several agencies for one project may be consolidated at the request of the applicant or affected agencies.

Additional information can be obtained by visiting or writing: Permit Coordination Center, 306 State Library Building, Salem, Oregon 97310.

Excerpts from the CREST Permissible-Use Matrix

	Natural			Conservation			Rural			Development			
	Water	Wetland	Shoreland	Water	Wetland	Shoreland	Water	Wetland	Shoreland	Water	Wetland	H_2O Related	Non H_2O Related
Shallow water port/marina facilities	N	N	N	N	N	N	C	C	C	P	P	P	N
Deep water port facilities	N	N	N	N	N	N	N	N	N	P	P	P	N
Private individual docks	N	N	-	C	C	-	C	C	-	C	C	-	-

P: Permitted: Subject to standard in local ordinances and federal regulations, site design changes may be required to minimize specific adverse effects.

C: Conditional: Permitted only after case-by-case examination of the merits of the processed activity.

N: Not Allowed: Not permitted except under special conditions when a waiver is granted. In such cases, the use of the activity must be in accordance with the CREST Regional Policies, state and federal policies, not preempt other higher priority uses, and not substantially degrade natural resources.

From: CREST Regional Policies, 1977

While the agencies at various levels of government provide as much information and assistance as possible during the permit process, it remains the applicant's responsibility to supervise the permit process. Oregon's state agencies have concerns for the impacts on water quality, fish migrations, land use, sewage disposal and impacts on state tidelands. A useful reference for Oregon applicants is the Waterway Development Handbook prepared by Montagne-Bierly Associates, Inc. for the Oregon Department of Economic Development.

C. WASHINGTON

1. County

The CREST area includes those parts of Pacific and Wahkiakum Counties that border the Columbia River. The CREST office in Astoria maintains information for Washington residents who desire assistance with the permit process for expanding or developing marina facilities.

In addition to the CREST office, permit information can be obtained from the following contacts:

a. Permit information office -

(1) Pacific County - Mr. Ken Kimura, Department of Public Works, P.O. Box 66, South Bend, Washington 98586 1-206-875-5591.

(2) Wahkiakum County - Wahkiakum County Planning Office, Courthouse, Cathlamet, Washington 98612 1-206-795-3543.

b. DOE Regional Office - Southwest Regional Office, 7272 Clearwater Lane, Olympia, Washington 98504 1-206-753-2892
ATTN: Permit Coordinator

c, ECPA Master Application Center in Olympia 1-206-753-2800

2. State

The Washington State Legislature passed the Environmental Coordination Procedures Act (ECPA) in 1973. This act established a program to facilitate the permit process for all projects that affect the state's land, air or water resources and that may therefore require environmental permits or approval. The Department of Ecology (DOE) is the coordinator for this process.

The information contacts listed above will identify requirements and

and types of permits needed for the planned expansion or development of marina facilities. For example, a substantial development permit (Shoreline Permit) may be required for any construction activity or project with value over $1,000 or one that may interfere with the public's use of the water.

A local permit coordinator guides the permit application process, schedules project review with involved agencies and if needed, the coordinator provides public notices and arranges organizational matters such as location, a hearing officer, and agency participation.

Local decisions may be appealed directly through local commissions, and state decisions may be appealed through one proceeding held by the Pollution Control Hearings Board and the Shoreline Hearings Board.

The permit coordinator will aid in assuring that all State Environmental Policy Act (SEPA) requirements are met, since they are integrated into the ECPA procedures.

Local governments have the option of including any applications for rezoning, variance and conditional uses into the ECPA processes. Federal agencies may also participate in the ECPA process but in any case, the information officers will advise applicants on the appropriate federal requirements and contacts such as the Corps of Engineers or the Coast Guard.

It is impossible to list all permits and requirements for expansion or development of a new marina within the CREST area, without having a specific site in mind. However, some permits and requirements for each state and federal level can be examined.

In the State of Washington, for example, an environmental impact statement may be required for a project after an initial review of an environmental checklist (a Threshold Determination) indicates a need. A large project definitely would require an SMA (Shoreline Management Act) substantial development permit from a county or city. Unless the tidelands are privately owned (none have been sold by the state since 1969) the owner would have to lease the tidelands and any bedlands either from DNR (Department of Natural Resources) or from a public port district. By statute, DNR cannot sign the lease until the applicant has received

appropriate Army Corps of Engineers permits. Such permit applications trigger a full review of the project (coordinated by DOE) by state agencies. The Department of Fisheries and Game generally look closely at marina proposals to see if natural fish runs are affected (particularly in the mouths of streams and rivers), or if activities such as dredging, bulkheading, or landfills are harmful to fish or bird or waterfowl habitat. Both agencies would have to approve a hydraulic permit.

In addition to coordinating the necessary Corps of Engineers permits and reviewing the appropriate substantial development permits, DOE could be called upon to issue a state water quality permit if a package sewage disposal system with effluent discharge directly to the adjacent waters was needed. Also, a water rights permit would be issued, if a domestic water supply system hook-up was not available. Noise regulations, established by DOE and enforced by local governments, would be applicable to boating activities.

The Department of Social and Health Services has established a set of guidelines relating to marina construction and has delegated authority to local health agencies to enforce them. The guidelines stipulate provisions for public water supplies and sewage systems, sewage pumpout stations for boats, portable water supply for boats, and other sanitary facilities and procedures.

It is quite possible that the proper zoning does not exist for marina development, the proposed development might be required to obtain a rezone from the appropriate city or county jurisdiction. Also, if the development were in a flood control zone, as identified by either DOE or the local government, the appropriate flood control permit would be needed if the development were allowed to occur at all.

D. FEDERAL

The Corps of Engineers has been designated the lead agency for the water related development permit process. They require permits for construction and maintenance of piers, wharfs, dolphins, breakwaters, bulkheads, mooring buoys, and for work such as dredging in navigable waters. Under administrative procedures established by the Corps in compliance with the Federal Water Pollution Control Act, applicants must obtain all required state approvals prior to the granting of a Section

10* or Section 404** permit. Questions should be directed to the U.S. Army Corps of Engineers, Portland District, Permit Division at 1-221-6997.

In addition, the Coast Guard is concerned about any navigational aids that may be installed, as well as causeways, overhead cables and pipelines affecting waterways.

E. SUMMARY

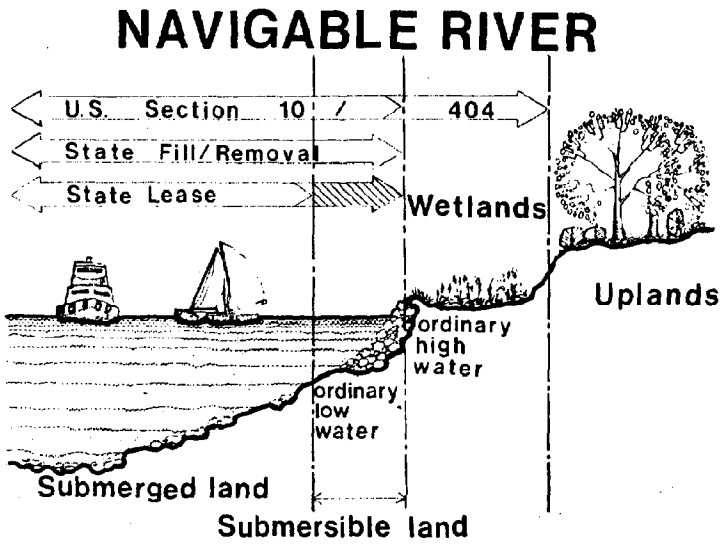
Applicants for expansion or development permits for marina facilities should have the proper zoning classification, should have the site classified properly in the CREST management plan, and should receive the appropriate state and federal permits relevant to the development.

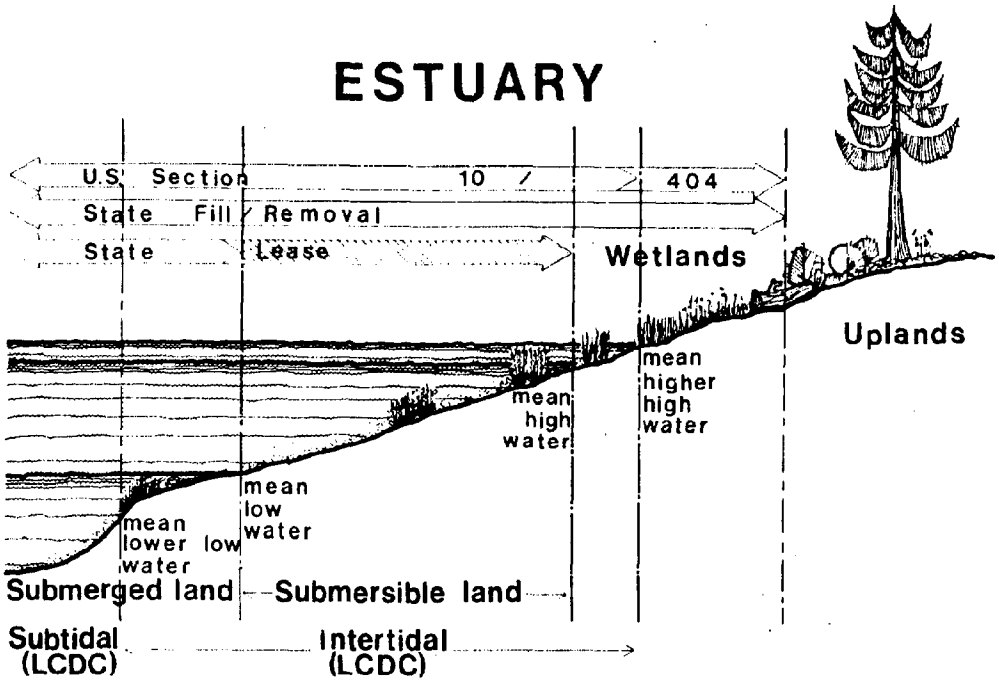
Typical jurisdictions of permit-granting agencies are depicted in Figures 2 and 3.

* Refers to Section 10 of the River and Harbors Act of 1899.

**Refers to Section 404 of the Federal Water Pollution Control Act Amendments of 1972.

FIGURE 2



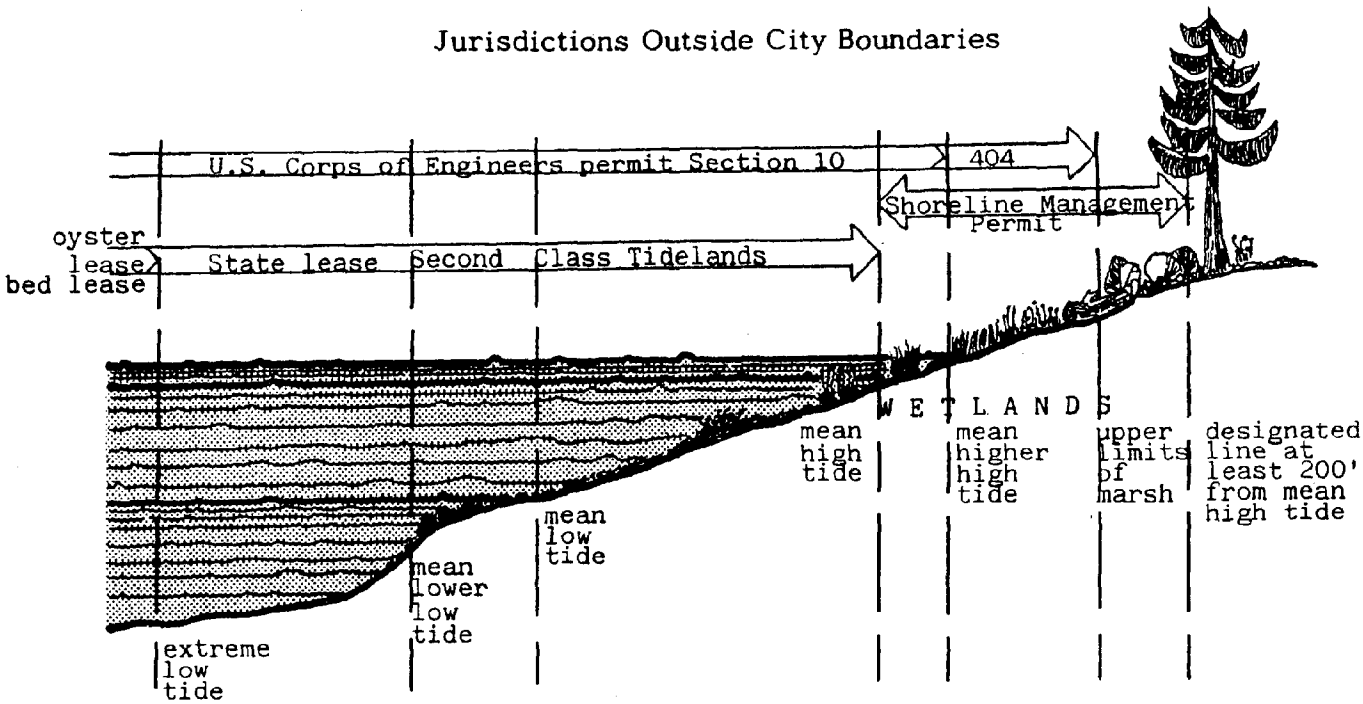


Typical Jurisdictions for Permits in Oregon

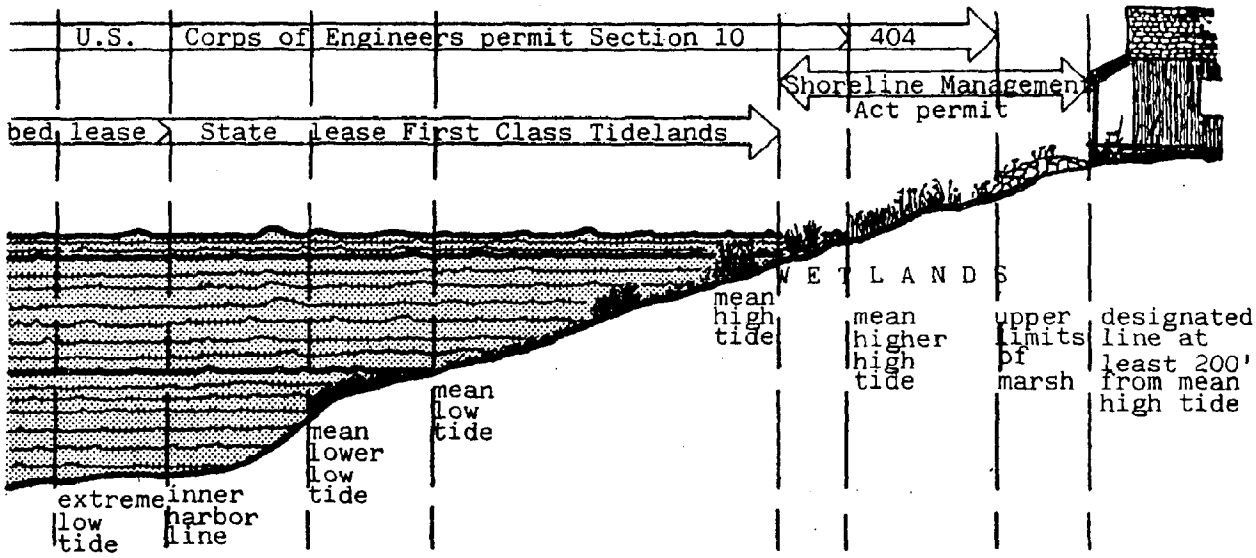
From: Montagne-Bierly Associates, Inc., Waterway Development Handbook, 1977

FIGURE 3

Jurisdictions Outside City Boundaries



Jurisdictions Within City Boundaries



Typical Jurisdictions for Permits in Washington

From: Montagne-Bierly Associates, Inc., Grays Harbor Estuary Management Program, Governmental Jurisdictions, 1977

V. CRITERIA AND PLANNING GUIDELINES

The first part of this section develops legal, social, economic and environmental criteria to identify and evaluate potential marina sites. The second part presents guidelines for the design, construction and financial planning of a marina facility. Included are: a sample format for financial planning; a sample format and data for planning new slip sizes, so as to maximize revenue from available space; and an evaluation of the need and location recommendations for the installation of sewage pumpout stations.

A. SUGGESTED MARINA SITE EVALUATION CRITERIA

To identify a location suitable for the development of a new marina facility or to evaluate a site proposed for expansion of an existing marina requires consideration of a number of factors. These factors include the ownership of the site, designation in the comprehensive plans, impacts on other land uses, impacts on water quality, public access, vessel protection, view enhancement, access to and congestion in the navigation channels, and other environmental concerns. The following criteria are offered to guide evaluation of a potential site.

1. Legal, Social and Economic Aspects of Site Identification

a. Land Ownership - This is the key to development. If outright ownership is not possible or is too costly, alternatives such as leasing, easements, or condemnation procedures should be considered. Private developers may prefer ownership or long term leasing, while governmental groups may prefer acquiring easements or using condemnation procedures. The goal is for the marina developers to obtain control of as much land adjacent to the water as possible at the lowest cost, in order to maintain policy and rate flexibility.

b. Alternative Uses - Each potential site should be evaluated for potential alternative uses such as industrial park, scenic view, or fish and wildlife feeding, breeding or nesting areas. In general, wetlands, critical habitat, archeological and historical sites, the wildlife refuges and predominately rural areas should be avoided (see CREST permissible use matrix).

c. Land/Water Use Comprehensive Plans - Potential sites within the CREST area should be classified as water dependent/related development in

the CREST land and water use plan.

d. Marine Traffic Impacts - Potential sites should be evaluated for their expected impact on marine traffic. The question of whether the additional moorages and resulting increased marine traffic might add to congestion in existing navigational channels or increase the risks of collision must be examined. Sites should be selected to minimize the negative impacts.

e. Location - The location of a proposed site is of utmost importance. It governs access by land and by water; it also determines the types of vessels that will use the facility and subsequently, the types of services that will be needed, the rates and the economic feasibility of the project. In general, the closer a proposed site is to the mouth of the Columbia River, the better. Few commercial fishermen, charter boat operators or recreational boaters consider moorage east of Astoria unless they are cruising the river or deliberately fishing for sturgeon. Good highway and water access are desirable. Long, narrow access channels with shoaling problems are less desirable than sites with fast access to deep water. Nearby services for fire protection, water and sewage disposal are also desirable. The proximity of recreational support facilities such as restaurants, drugstores, grocery stores, repair services, canneries, and sources of ice and fuel are also considerations. The availability of such services reduces the initial investments required to develop a marina and avoids an unnecessary duplication of services in the community.

f. Dredging Requirements - Sites should be chosen to minimize maintenance dredging requirements because of both the rising cost and the lack of suitable spoil disposal sites.

g. Substratum - The geological structure and the land composition underlying the proposed marina site have important links to the marina site's productivity, water quality, ease of construction with pilings and geological stability. Developers should avoid sites with near-surface stratum, regions of geological instability (high risk of slides or nearby faults) or areas that already have water quality problems from excess organic debris or sewage outfalls.

h. Size Preference - Expansion of facilities or the development of new, large marina projects is preferred over a multitude of small scale new projects.

2. Environmental Factors

a. Exclusionary Criteria - Avoid wetlands, critical habitat, wildlife refuges.

b. Tides - The tidal range affects the use of launching ramps, the types of construction, the ability of the basin to flush, and the habitat of marine organisms. Proposed sites should allow a minimum depth of 3 feet at the bottom of a launching ramp at low tide, a minimum depth of 6 feet at low tide for most charter and recreational vessel moorage, and a minimum depth of 8-10 feet for larger commercial vessel moorage. To maintain water quality, the basin should flush completely within 2 tidal cycles.

c. Currents - New breakwaters, pilings and other construction may modify the water circulation pattern in the marina vacinity. An evaluation of this impact on basin flushing capability is recommended.

d. Water Quality - Potential impacts of the construction and operation of the new marina on the turbidity, dissolved oxygen, acidity, temperature, and salinity of the water should also be considered. If sound waste disposal practices are followed and flushing characteristics maintained, however, the negative impacts on water quality should be minimized.

e. Waves, Winds, and Storms - Sites must be located in areas where natural or man-made protection from wakes, turbulent water, storm waves and strong, prevailing winds is available.

All of the above legal, social, economic and environmental criteria may not be met by a proposed site; however, it is important to consider them in the initial site screening. Thus, the criteria serve to narrow the field of potential sites for a more detailed economic feasibility study. Ultimately though, the economic feasibility determines the desirability of a site.

B. PLANNING GUIDELINES

1. Minimum Values and Topics for Consideration

These guidelines serve as a checklist of minimum values and topics required for consideration in planning a new or expanded marina. Naturally, all of these guidelines are subject to the site specific requirements of each marina. The Chaney text and Isard text are useful references and are the source of most of the following guidelines.

a. Bulkhead Construction - For calculating the height of bulkheads, the formula below can be used.

Add for total height

$$\text{above DD} = \text{EHT} + \text{DD} + \text{OM}$$

$$\text{below DD} = \frac{\text{EHT} + \text{DD} + \text{OM}}{2}$$

DD = Dredged Depth
EHT = Extreme High Tide
OM = Overtop Margin

Then add $10^{o}/_{o}$ for sinking. A reference calculation for Overtop Margin is 1 ft. plus wave height above high tide during storms. The Corps of Engineers, consultants, ocean engineering or oceanography schools could provide assistance on these calculations.

Consult with the Corps of Engineers, the States' Departments of Fisheries, DSL or DNR to assure that the breakwater designs allow sufficient water circulation, flushing action and moorage protection.

Potential marina developers are encouraged to utilize floating breakwaters and/or open pile work in lieu of some of the present construction methods in marina waters to minimize damage to fish and/or shell fish resources.

b. Courtesy Float - Provide a courtesy float on a first come first serve basis. This transient area is especially critical during peak use times. Each facility should also consider additional temporary facilities (with no services) within or near the moorage, to handle peak overflow. Such temporary facilities do not require extensive capital investment. Examples are portable toilets that could be rented from June 15 to September 15 and temporary tieups behind a log boom or breakwater.

c. View Protection - Be sensitive to the need for view protection. In relatively undeveloped or heavy recreation areas, open moorages are preferred. Covered moorage may be considered desirable in highly developed or commercial locations. Enclosed moorage should be confined to areas of industrial character where there is a minimum of aesthetic concern. In general, open moorage is preferred to covered, and covered is preferred to enclosed moorage.

d. Concentration of Facilities - Marina facilities should be concentrated to minimize impact of moorage demand on natural shorelines. Hence, one large marina is preferred to numerous small marinas.

e. Design for Future Expansion - Plans for marinas should address the expected demand for the future. This means leaving room for substantial expansion of the facility.

f. Entrance - Two openings to a basin are preferred, one entrance, and one exit; otherwise a single opening should be centrally located. Entrance should be located to permit speedy and safe passage of boats in times of storms, fire, fog, darkness and other emergencies. The entrance should be designed (offset or aligned) to shield the moorage from the effects of storms, passing ships' wakes, high waves and other disturbances. A minimum entrance width of 60 feet or 4 times the beam of the widest boat berthed is recommended. The maximum width should not be significantly larger than the minimum recommended value, in order to protect the moorage from turbulent water.

g. Approach Channel - The approach channel leading to the marina should be at least twice the entrance width, with a minimum of 100 feet.

h. Turning Clearances - Additional maneuvering area increases construction and maintenance costs, the possibility of rough water and safety requirements. Decreased area creates problems in moving and turning boats and makes the marina less desirable by restricting its use. A marina plan must allow sufficient space to permit motorboats to turn within the basin. Double screws require less maneuvering room than a single screw. So, for average conditions, channel width for turning, entering and leaving slips should be equal to 2-1/4 times the length of the longest boat. If a large portion of the fleet is single screw, use 2-1/2 times; if a large portion of the fleet is twin screw, use 2 times the length of the longest boat.

i. Sailboat Moorage - Sailboat moorage should be near the basin entrance and away from congested channels. Since sailboat moorage requests within the CREST area are predominately for transient moorage, they could share an area with gillnetters and other transients and not need special berths.

j. Restrooms - Marinas should plan one toilet for each sex for every 25 berths. If a marina has a large transient trade, developers should consider public showers; they should also have users pay to help defray costs and to reduce hot water waste. Restrooms should be connected to sewer lines, but marinas might consider rented portable toilets from June

15 - September 15 to alleviate pressure on the sewer lines and reduce investment costs.

k. Other Wastes - Marinas should establish adequate facilities to collect and dispose of domestic sewage, waste grease, oil, gas, diesel fuel, solid wastes and storm drainage.

Sample Oil and Grease Procedures -

(1) Provide a waste oil reservoir at repair facilities to collect oil and grease from repair activities;

(2) Provide covered waste oil containers at strategic locations in the marina;

(3) Post signs prohibiting disposal of oil or greasy rags in the water;

(4) If septic tank method of sewage disposal is being used, grease traps should be installed at kitchens or similar access points to the septic system;

(5) Arrange for collection of such wastes for reuse or recycling.

l. Potable Water - An adequate potable water supply for sanitation, commercial use, and firefighting should be available from either municipal or privately owned services. It should be pure enough for cooking and drinking, and of sufficient volume and pressure for firefighting and commercial uses.

m. Firefighting - Some sample procedures include:

(1) Set up an alarm system or use a watchman;

(2) Have on site firefighting capabilities;

(3) Arrange for off site backup support;

(4) Have a pay telephone available 24 hours a day to report emergencies;

(5) Have a patrol or workboat available to facilitate water access to a fire or for towing a burning vessel.

n. Water Hook-ups - Locate water hook-ups at all medium and large slips, and at every other slip for small boats (under 21 feet). The fuel dock should also have a freshwater supply.

o. Other Safety - Marinas should install nonslip pads on ramps, hand rails, and life rings where needed.

p. Flushing Times - An unpublished EPA recommendation is that the total mixing and diffusion times should not be more than one day if a marina is to flush adequately and maintain ambient water quality. If a marina doesn't flush properly, not only does that destroy estuary habitat, but also it can turn the site into a stagnant sewage trap. In such a case, the mixing and circulation may be improved by providing a flushing mechanism to facilitate circulation. Both the University of Washington and Oregon State University Schools of Oceanography are available to advise on this matter.

q. Concessions - (Examples: fuel dock, fish cleaning station, restaurants, bait, tackle). The use of a concession arrangement may relieve a facility of certain problems associated with operating expenses and labor requirements. A lease arrangement that clearly indicates operation guidelines, payment schedules and liability responsibilities is recommended.

r. Planning the Slip Sizes - It is considered good planning practice to provide slip sizes that are indicated by the accumulated percentage method for the fleet within the area. (See an example for the CREST area at the end of this section.)

s. Master Plan - All marinas should develop a Master Plan. Such a plan should be based on a study of moorage within the area. That study should examine demand analysis and trends in lengths, draft and beams. The plan should be designed so that the facilities can be built in stages. Each stage should provide adequate buildings, parking and accessory facilities to conduct the business of the marina.

t. Parking - To calculate parking requirements, plan for 1¼ spaces per berth, 2½ per charter boat berth. If the facility has a ramp, calculate the maximum daily use of the ramp and double it, since each car/trailer unit requires 2 spaces. For example, if the estimated daily use is 500 launches per day, then 500 x 2 = 1000 parking spaces. Parking plans should consider an off-load loop at the docks like at airports. Recommended minimum width of maneuvering and approach strips is 23 ft. for auto and 35 ft. for auto with trailer. One parking space with maneuvering room = 435 square feet. To save on paving costs, marinas should consider paving only the heavy use areas like roads and

maneuvering areas.

u. Financial - When choosing between alternative sites, a detailed comparative cost analysis is useful. If evaluating a single site, a plan detailing the phases of development, time tables, capacity, types of services, rate structure and expected usage would help determine if a reasonable return on an investment is possible. (See sample format at end of section.)

v. Grounds Development - There are numerous construction and landscaping options available to a marina. Marinas may want to hire an architect to plan the overall design. At a minimum, one acre of land is needed for each acre of water in the basin. This permits planning for most of the usual onshore facilities without undue congestion. The addition of such features as a motel, swimming pool, tennis court, or lawn will increase the required land area to 1¼ or 1½ times the water area.

w. Float Design - The design should be based on a 20-25 lbs/sq ft live load, plus the estimated dead load from construction materials. This provides support for normal concentrations of equipment, luggage, food, or ice deposited on a float by a boat owner or attendants. The minimum width should be 4' for a floating pier or walk, in order to maintain stability. For walking access to slips, an 8' width is recommended. Floats for public landings should be a minimum of 15' wide, for both convenience and psychological effects.

x. Boat Removal - Each marina needs adequate arrangements to move boats in and out of the water, even if it is just in case of emergencies. This enables a facility to remove disabled or sinking vessels, and facilitates various shaft, rudder, hull and engine repairs and inspections.

y. Launching Ramps - If a launching ramp is utilized, it is important for it to be physically seperated from other operational areas to avoid congestion. Common slope for a ramp is 12-13$^{o}/_{o}$.

z. Lighting - All turns, steep grades and service areas of a marina should have lighting for safety. All ramps and moorage should also be lit sufficiently at night to facilitate security, firefighting and nocturnal operations.

aa. Electric Power - Adequate and dependable power should be available under adverse conditions such as dampness, periodic flooding or immersion, corrosion and temperature extremes. Marinas may want to consider a gas or diesel emergency power source with either an automatic or manual start to provide a backup for the most urgent marina electrical needs.

bb. Fueling Station - This facility should be located to minimize danger to piers, boats and other property in case of fire or any other emergency. The preferred location is near an entrance to the basin or at the head of a pier so that if a boat catches on fire, it can be quickly removed to protect other boats. It is important to have a highly visible emergency switch to shut down the pumps so that non-attendants can do it. Approved foam or carbon dioxide fire extinguishers should be on hand. A copper grounding bar should be installed and used during all refuelings.

cc. Sewage Pumpout Stations - Within the CREST area, planning should commence now for the later installation of sewage pumpout stations at the larger marinas. For convenience, preferred locations are near the fueling dock or the launching ramp. Alternatively, a location where maximum flushing capability is maintained may be preferred to minimize the damage from a spill.

dd. Recommended Minimum Space Requirements - (based on a 400 boat marina)

Engine showroom - 750 square feet

Marine equipment sales - 750 square feet

Marina office - 110 square feet per employee using the space

Sales of packaged food, bait - 550 square feet

Restrooms - 15 square feet per toilet; 24 square feet per shower; 200 square feet for lavatories and passageways for 20 toilets; lounge should be 1½ times the restroom size.

Ramps - For two lanes, plan 48,000 square feet for ramp and maneuvering room

Repair yard - Assume 5 days repair per boat per year, 3.6 square feet per boat day or repair. Total will depend on fleet size.

2. <u>Sample Designs</u>

Marina designers must consider the advantages and the limitations of

a specific site. This section examines alternative functional layouts and sample boat basin designs for in water and onshore portions of a marina.

Alternative One groups service and transient-oriented activities near the channel entrance; this minimizes service/transient circulation within the marina basin. At the channel entrance, seasonal boating traffic is diverted to a separate docking area.

Alternative Two reverses the relationship of channel entrance to boating activity areas outlined by Alternative One. The service and transient-oriented activities are placed at the channel entrance area and near the larger seasonal docking and mooring area. Access to the service and transient-oriented activities is by way of an extended maneuvering area used by all boats in the marina. Illustrations of these two alternatives appear in Figure 4.

The sample basin designs are intended to depict alternatives for marina planning. The usefulness of such approaches depends on the specific site selected and the types of boats using a facility. Figures 5 and 6 provide suggestions for layout of commercial and social activities and on-shore facilities for a typical pleasure boat basin. The designs also suggest services a marina developer might include in a facility.

3. Financial Planning

a. Marina Cost Estimate Checklist

The following checklist is provided as a guide to the type of costs that should be included in a marina cost analysis.

(1) Land purchase or lease;

(2) Dredging and spoil disposal;

(3) Bulkhead walls, pilings, main walks, catwalks, breakwater;

(4) Sales and service buildings, boat storage sheds, social activities building, bathhouses, lockers, restrooms, motels and other buildings;

(5) Boat handling equipment or ramp;

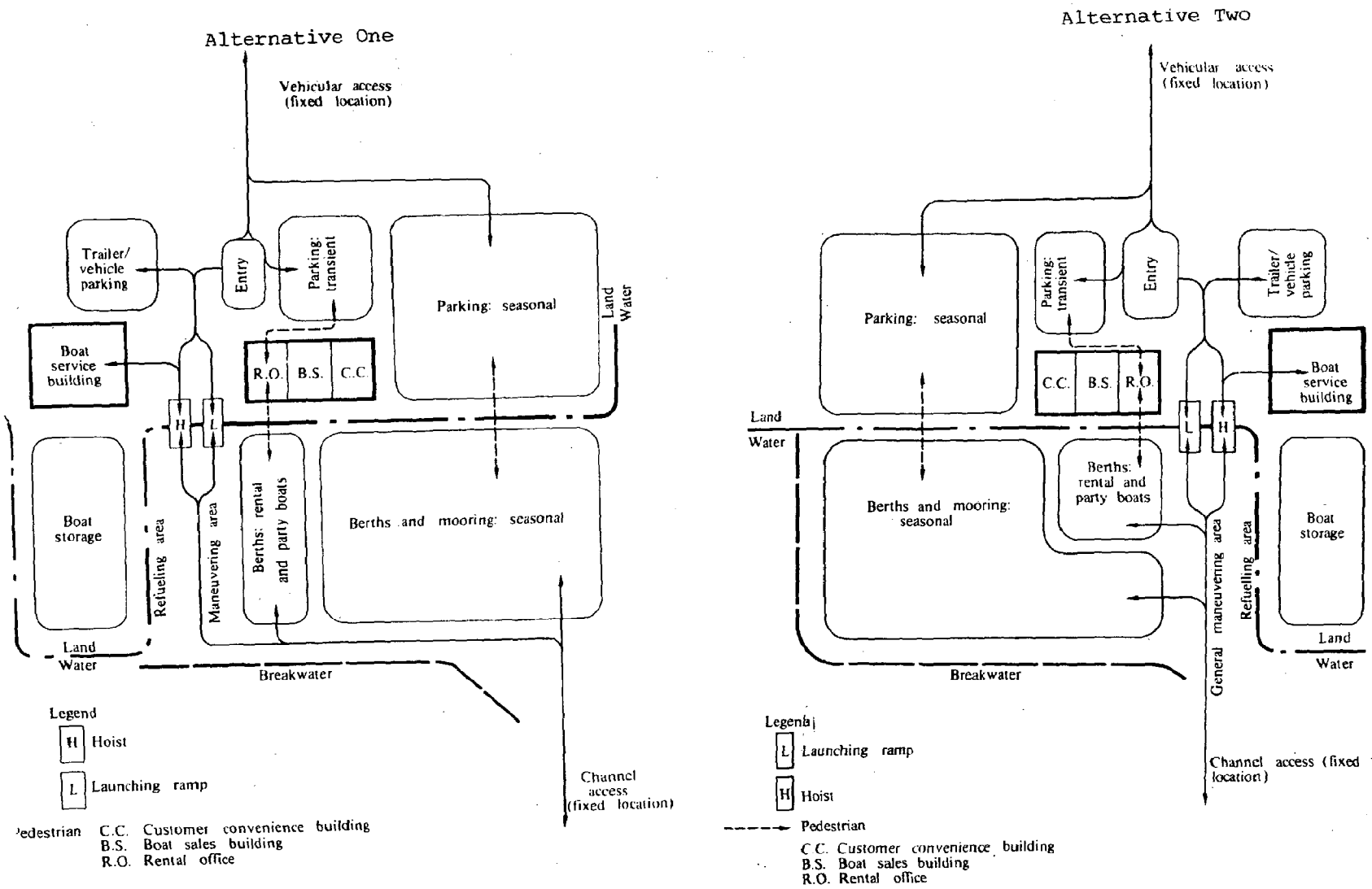
(6) Onshore recreational facilities;

(7) Fueling facilities;

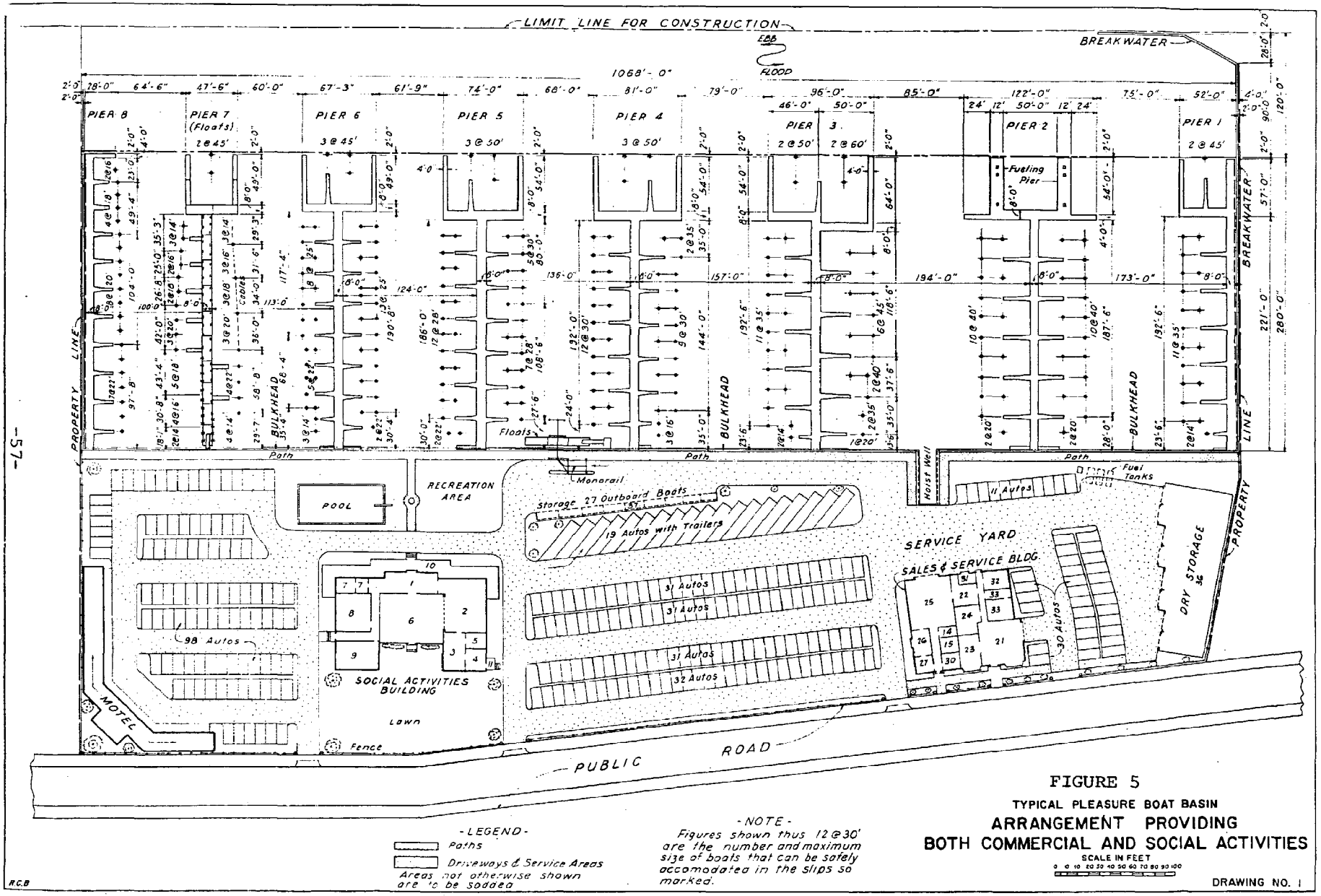
(8) Utilities onshore and afloat, including domestic water, fire-fighting system, electric power and lighting, sanitation and storm sewer and disposal systems;

FIGURE 4

Alternative Functional Layouts



From: Isard, 1972



-LEGEND-

Paths

Driveways & Service Areas

Areas not otherwise shown are to be sodded

-NOTE-

Figures shown thus 12@30' are the number and maximum size of boats that can be safely accomodated in the slips so marked.

FIGURE 5

TYPICAL PLEASURE BOAT BASIN

ARRANGEMENT PROVIDING BOTH COMMERCIAL AND SOCIAL ACTIVITIES

SCALE IN FEET

0 10 20 30 40 50 60 70 80 90 100

R.C.B

DRAWING NO. 1

From: Chaney, 1961

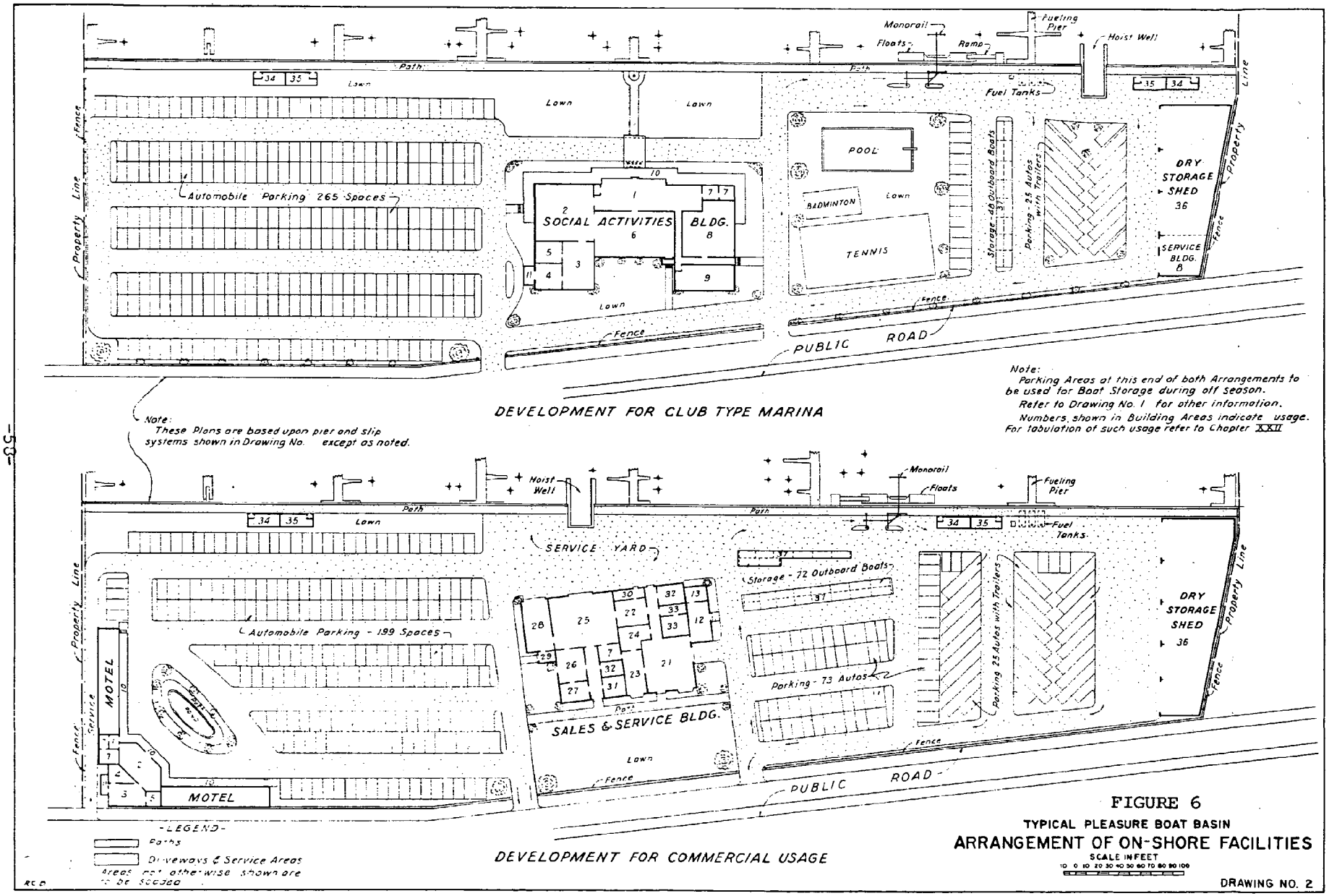


FIGURE 6

TYPICAL PLEASURE BOAT BASIN

ARRANGEMENT OF ON-SHORE FACILITIES

From: Chaney, 1961

(9) Grounds improvement including grading, roads, walls, parking areas, landscaping, guard rails and fences;

(10) Planning costs;

(11) Costs of repaying bonds or loans.

Cost estimates should be sufficiently broad to include the physical material costs, contractors' profit and overhead, and the owner's planning and overhead costs (Chaney, 1961).

b. Analysis of Sample Revenues and Costs

This section presents selected data from a 1974 study by the National Association of Engine and Boat Manufacturers. The data detail the percentage of income from different revenue sources, the percentage breakdown of indirect operating costs, and a percentage breakdown of direct costs for eleven marinas (chargeable against the various sources of revenue and the gross profit obtained from each source).

These data are useful to the CREST area marinas because they provide a format for the financial analysis and the relative percentage shares of both revenue sources and costs. Each marina can compare its own revenue sources, cost sources and profit, to determine if it might change the mix of types of services offered to increase the profit from its operations. For example, if skilled, reasonably priced boat repairmen are difficult to find or keep on the job, then the marina might phase down its labor intensive repair services and build up the sales of food, ice, bait and tackle; this shift in mix might contribute a greater percentage to gross profits per unit of labor effort. Tables 2 and 3 detail sources of revenue and operating costs a developer might consider.

c. Sample Format for Financial Planning

This section presents a sample format for evaluating the financial feasibility of a potential marina site. If more than one site is being considered, a comparative cost technique should be used to eliminate all costs that will be the same, regardless of the site chosen; the study should analyze only the costs that are site-dependent. It is also possible to evaluate the preferred scale of operations by using scaling factors on the different costs, but such techniques really involve a site specific analysis (see the Isard text for an example of the technique).

TABLE 2

ANALYSIS OF REVENUES AND COSTS

SOURCES OF REVENUE

A breakdown of the income reported by 75 companies: 7 boatyards, and 37 combined marina/boatyard operations

REVENUE SOURCES:	Boat Yards		Marinas		Combination Boat Yard/Marina		All Reporting Companies	
Sale of new boats & engines...	$ 744,544	33.89%	$ 7,137,193	46.25%	$ 5,219,616	36.94%	$ 13,101,433	41.26%
Sale of used boats & engines..	54,417	2.48	3,032,331	19.65	1,486,414	10.50	4,573,162	14.40
Sale of hardware & paints.....	425,657	19.38	913,625	5.92	1,466,991	10.38	2,806,273	8.84
Sale of fuel and lubricants.....	177,224	8.07	640,455	4.14	943,754	6.80	1,761,433	5.55
Service & repairs, etc.....	539,269	24.55	946,846	6.13	2,166,393	15.32	3,652,508	11.50
Rental of slips & moorings.....	63,176	2.88	1,319,931	8.55	1,370,913	9.70	2,754,010	8.67
Dry land storage (seasonal).....	------	----	81,222	0.57	100,401	0.70	181,623	0.57
Winter storage.....	130,261	5.93	408,300	2.64	865,841	6.12	1,404,402	4.42
Boat rental.....	18,500	0.84	38,555	0.25	332,351	2.34	389,306	1.23
Food.....	1,500	0.07	732,116	4.73	21,000	0.14	784,616	2.38
Other (ice, bait, fish tackle)...	43,116	1.91	182,522	1.17	151,108	1.06	375,746	1.18
TOTAL.....	$2,196,664	100.00%	$15,433,096	100.00%	$ 14,124,782	100.00%	$ 31,754,512	100.00%

INDIRECT OPERATING COSTS

A breakdown of the indirect operating costs reported by the same 75 companies

INDIRECT COSTS:	Boat Yards		Marinas		Combination Boat Yard/Marina		All Reporting Companies	
Payments to management.....	$ 153,992	28.80%	$ 451,000	27.44%	$ 693,766	26.22%	$ 1,298,758	26.83%
Taxes.....	60,523	11.32	202,345	12.31	346,188	13.08	610,256	12.60
Rent.....	37,500	7.01	87,458	5.32	177,451	6.71	310,409	6.41
Utilities.....	36,474	6.82	171,669	10.44	210,874	7.97	419,817	8.67
Insurance.....	64,664	12.09	163,642	9.96	235,240	8.89	468,846	9.68
Interest on loans.....	59,486	11.12	279,884	17.03	351,217	13.27	692,587	14.31
Advertising & promotion.....	14,288	2.67	154,381	9.39	177,616	6.72	346,285	7.15
Other.....	107,889	20.17	133,334	8.11	453,337	17.14	694,600	14.35
TOTAL.....	$543,316	100.00%	$1,643,713	100.00%	$ 2,645,689	100.00%	$ 4,841,558	100.00%

From: National Association of Engine and Boat Manufacturers, 1974

TABLE 3

COST-TO-REVENUE ANALYSIS

An analysis of the income of 11 marinas, indicating the direct costs chargeable against the various sources of revenue, and the gross profit obtained from each.

REVENUE SOURCES	% LABOR	% MATERIALS, MERCHANDISE, MAINTENANCE	% GROSS PROFITS
Sale of new boats & engines.....	3.6	82.0	14.4
Sale of used boats & engines.....	7.5	79.2	13.3
Sale of hardware, paints & engines	13.4	69.6	17.0
Sale of fuel & lubricants.....	11.0	78.4	10.6
Service & repairs, etc.....	43.3	32.9	23.8
Rental of slips and moorings.....	11.3	17.4	71.3
Dry land storage (seasonal).....	20.0	30.0	50.0
Winter storage.....	25.2	12.6	62.2
Boat rentals.....	4.3	84.5	11.2
Food.....	23.9	41.4	34.7
Other (ice, bait, fishing tackle).	18.1	43.4	38.5

Total direct costs:

Materials, merchandise, etc.....58.8%

Labor.....16.1%

Total.....74.9%

Gross Profits.....25.1%

Total indirect costs.....19.3%

Net earnings before taxes..... 5.8%

From: National Association of Engine and Boat Manufacturers, 1974

The format discussed is based on information presented in Walter Isard's analysis of potential marina sites in the New England area, but it has been generalized for use in the CREST area.

Generally, the costs are linked to initial capital costs, associated maintenance costs, annual operating cost, and planning costs. It is also possible to include a rough estimate of ecological costs linked primarily to the damage from the dredging operations and spoil disposal. There will definitely be a cost tradeoff in this area because often the least environmentally damaging spoil disposal techniques and locations are significantly more expensive to utilize. The following is a step-by-step guide for financial planning:

(1) Calculate capital costs, depreciation rates and annual depreciation (see example).

(2) Calculate planning costs (see example).

(3) Calculate annual taxes based on local tax rate.

(4) Calculate annual insurance costs to the marina (examples: fire insurance on buildings, ship repairing liability, motor vehicle coverage, personal and indemnity, boat dealer's and commercial hull policies).

(5) Calculate annual expense for advertising and promotional activities.

(6) Calculate annual labor costs.

(7) Calculate cost of utilities, maintenance and supplies and revenues by revenue yielding operation (see example).

(8) A calculation of ecological cost could also be made.

Then items 1, 3, 4, 5, 6, 7 (exclude revenue) and 8 are included in an annual cost table. Tables 4, 5 and 6 suggest a more detailed breakdown for calculating the costs in this guide, and Table 7 is a sample for recording annual costs.

Next, a table could be set up for calculating the rate of return. For example, the developer should consider:

(1) Total annual revenues;

(2) Total ecological costs;

(3) Total fixed and operating costs (see sample table);

(4) Total annual costs (2 + 3)

TABLE 4

Capital Cost, Depreciation Rate, and
Annual Depreciation by Item

Item	Capital Cost	Depreciation Rate	Annual Depreciation
Moorings		7%	
Shore protection		6	
Dredging		7	
Docks		6	
Breakwaters		5	
Ramps		7	
Site improvement			
Fill		0	
Paving		10	
Utility		6	
Drainage			
Landscaping		0	
Access road		6	
Sewage system		6	
Fueling facilities		12	
Equipment and boats			
Boat-handling equipment		10	
Work and party boats		7	
Rental boats		10	
Land		0	
Building construction			
Boat and motor sales			
Marine accessory sales			
Restrooms and lounge			
Gear storage			
Administration			
Transient and rental office		6	
Fuel sales			
Boat and packaged food sales			
Indoor storage-single level			
Indoor storage-triple level			
Repair services			
Grand Total			

TABLE 5

Sample Planning Costs
(One-Time Only)

Planning costs are estimated as follows:

Topographic surveys, at $50/acre	$ 675
Soil-borings, involving 5 days work at $583/day	2,915
Hydrographic surveys, with reference to 11 acres of water basin and channel area, at $40/acre	440
Meteorological consultation, 3 days at $160/day	480
Building permits at standard rates	1,019
Master planning at approximately 5 percent of construction and improvement cost (excluding boats, equipment, and land)	68,000
Total	$73,529

TABLE 6

Sample Tabulation of Costs of Utilities, Costs of Maintenance and Supplies, and Revenues, by Revenue-Yielding Operation

Revenue-Yielding Operation	Cost of Utilities	Costs of Maintenance and Supplies	Revenue
Slip rentals	$ 3,000	$13,760	$ 86,040
Moorings	---	533	4,050
Dry-land berthing rentals	500	4,300	26,880
Boat storage			
Indoor	500	4,320	27,000
Outdoor	---	2,688	16,800
Wet	---	---	---
Boat handling			
Hauling and launching		1,152	7,200
Trailer rental	500	813	4,650
Ramp use		441	8,820
Boat rental	250	12,560	60,264
Boat, motor and trailer sales, new	2,000	6,000	99,844
Boat, motor and trailer sales, used	---	2,500	12,000
Party-boat fishing	300	7,000	56,000
Marine accessory supplies	1,000	4,000	36,000
Repair and outfitting services	3,000	5,000	60,000
Packaged food and bait sales	500	1,000	27,000
Fuel and other product sales	100	500	11,270
Snack bar and laundry service	---	---	3,000
Gear storage rent	---	---	5,000
Totals	$11,650	$66,567	$551,818

TABLE 7

Sample Annual Cost Table Format

Annual Costs for 395-Boat Marina Complex

Fixed		
Depreciation		_____
Taxes on land and structures		_____
Insurance		_____
Public relations		_____
	Total Fixed Costs	_____
Operating		
Labor		_____
Utilities		_____
Maintenance and supplies		_____
	Total Operating Costs	_____
TOTAL	Fixed Plus Operating	_____

(5) Annual surplus (1 minus 4);

(6) Total capital costs (see sample table);

(7) Planning costs (see sample table);

(8) Rate of return (5 ÷ (6 + 7) x 100

This calculation of rate of return deals with the first year only. Another approach would be to include a share of the planning costs in the first 5 or 10 years. This would obviously improve the rate of return. Another factor to keep in mind is that new facilities may take several years to reach peak operating capacity. The author estimates that in the CREST area this delay will be minimal for the next 5 years, due to the chronic undersupply of moorages.

4. Sample Format and Baseline Data for Calculating New Moorage Slip Sizes

This section of the report develops baseline information to help local marinas and planners decide on the appropriate mix of new slip lengths. This is an important process for the economic success of a marina. The mix must be appropriate to maximize the use of space, meet the moorage demand, and minimize wasted space.

The first group of data (Figure 7) reflects the length and beam relationships of representative users of marinas within the CREST area. This includes permanent and transient, commercial, charter, and recreational vessels. These beam requirements are useful for planning the spacing between berths. For vessels longer than 50 feet, estimate beam at slightly less than 1/3 of length, except for special purpose large vessels. Their beams cannot be estimated without knowing the type of vessel.

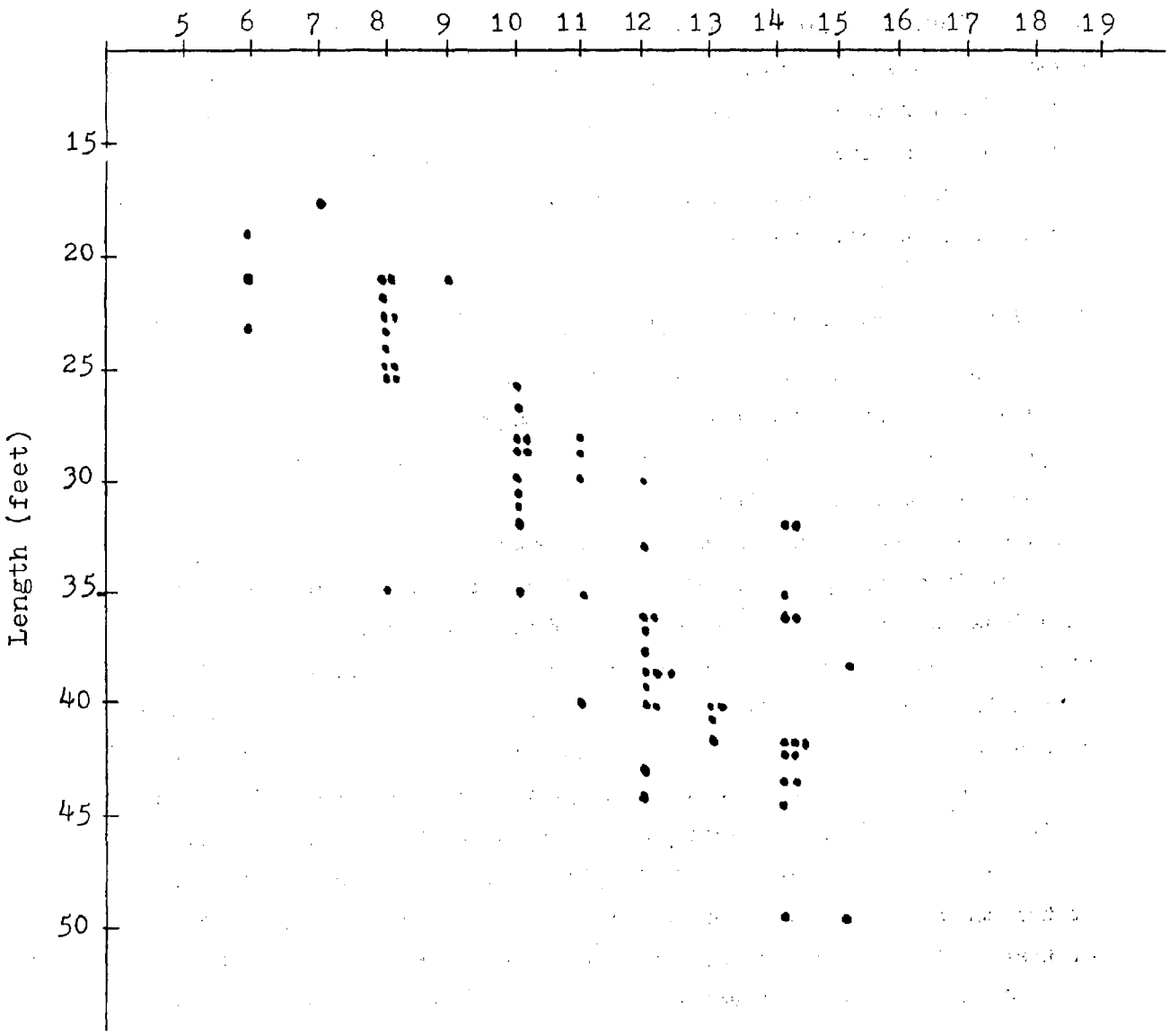
The second group of data (Table 8) reflects the length distribution of the seasonal gillnet fleet in Astoria. Since Astoria becomes the center of that activity on the lower river during gillnet season, the data are assumed to be representative of the Lower Columbia River gillnet fleet.

The third group of data (Table 9) reflects the length distribution of the 1977 commercial and recreational transients for Ilwaco and Astoria. These two marinas had data that can be regarded as representative of distribution patterns of the CREST area marinas. Data on the trends in sailboat registration in Oregon and length distribution are presented in Table 10.

FIGURE 7

Length and Beam Relationship

from Astoria (West and East End Basins) and Ilwaco



Ranges

20 - 26' = beam of 8'
28 - 33' = beam clustered around 10' - 11'
35 - 42' = beam clustered around 12' - 13'
42 - 50' = beam clustered around 14' - 15'

These ranges can be used for planning slip sizes.

TABLE 8

Astoria Gillnet Size Distribution (West and East End)

1977 Season

(Assumed to be Representative of Lower River)

Number	Percentage of Fleet (rounded to nearest ½%)	Accumulated Percentage
22 - none	0	100
23 - none	0	100
24 - 5	4	100
25 - 4	3	96
26 - 12	10	93
27 - 18	15	83
28 - 51	42.5	68
29 - 9	7.5	25.5
30 - 16	13	18.0
31 - 1	1	5
32 - none	0	4
33 - 1	1	4
34 - none	0	3
35 - 1	1	3
36 - 1	1	2
37 - none	0	1
38 - none	0	1
39 - none	0	1
40 - 1	1	1
TOTAL = 120	100%	0

TABLE 9

1977 TRANSIENTS

1977 Commercial Transients Size Distribution for Ilwaco and Astoria (West and East End)

Length	Number	Percentage of Combined Commercial Transient Fleet (rounded to nearest %)	Accumulated Percentage
less than 30'	5	1	100
30 - 39'	107	20	99
40 - 49'	217	40	79
50 - 59'	144	26	39
60 - 69'	55	10	13
70 - 79'	13	2	3
80' or larger	4	1	1
	545	100%	0

1977 Recreation Transients Size Distribution for Ilwaco and Astoria

Length	Number	Percentage of Combined Recreation Transient Fleet (rounded to nearest %)	Accumulated Percentage
13 - 15'	3	.4	100
16 - 19'	219	34	99.6
20 - 24'	251	39	65.6
25 - 29'	105	16	26.6
30 - 34'	27	4	10.6
35 - 39'	13	2	6.6
40 - 44'	12	2	4.6
45 - 49'	4	.6	2.6
50 - 54'	5	.8	2.0
55 - 59'	0	0	1.2
60' or greater	1	.2	1.2
Total	640	* 99.9%	* 1.0

Data collected after Labor Day 1977 for entire season.
* error due to rounding

TABLE 10

Sailboats Greater than 16' Length
(% to nearest tenth)

Length	1973	%	1974	%	1975	%	1976	%	1977	%
17-20	434	46	461	40.3	499	38.4	531	34.4	568	33.6
21-24	253	26.8	361	31.6	434	33.4	538	34.8	377	34
25-28	157	16.6	192	16.8	234	18.0	306	19.8	352	20.8
29-32	39	4.1	55	4.8	65	5.0	83	5.4	106	6.3
33-36	37	3.9	44	3.9	45	3.5	49	3.2	55	3.3
37-40	11	1.2	13	1.1	10	0.8	21	1.4	17	1.0
41-44	5	0.5	7	0.6	6	0.5	8	0.5	6	0.4
45-48	6	0.6	10	0.9	5	0.4	7	0.5	4	0.2
49-52	2	0.1	0	0	2	0.1	2	0.1	3	0.1
53-56	0	0	0	0	2	0.1	2	0.1	1	0.1
TOTALS	943	98.8*	1143	100.0	1301	100.2*	1545	100.2*	1689	99.8*
Percentage of Total Recreational Vessels:					1.2%		1.3%		1.425%	

*Rounding error

In Table 10 please note that the bulk of all registered Oregon sailboats longer than 16 feet are still under 29 feet in length (88.4% in 1977). Also note that sailboats are representing a slightly increasing share of total recreational vessels (still under 2% of total). The percentage figures for the length distribution also reveal a trend towards longer sailboats. These trends need to be considered in the planning for sailboat moorage.

From: Oregon State Marine Board,
Computer Records

TABLE 11

Summary of Boat Length Survey for Hammond, Warrenton, Ilwaco and Astoria

1977 Permanent Moorage Only

Length of Boats	Hammond			Warrenton			Ilwaco		
	Number of Boats	Percentage Group	Accumulated Percentage	Number of Boats	Percentage Group	Accumulated Percentage	Number of Boats	Percentage Group	Accumulated Percentage
16 - 19	12	6.66	100.00	9	2.98	100.00	82	7.55	100.00
20 - 24	55	30.55	93.34	85	28.14	97.02	403	37.11	92.45
25 - 29	26	14.44	62.79	88	29.14	68.88	231	21.27	55.34
30 - 34	25	13.88	48.35	59	19.54	39.74	152	14.00	34.07
35 - 39	16	8.88	34.47	19	6.29	20.20	75	6.91	20.07
40 - 44	25	13.88	25.59	10	3.31	13.91	92	8.47	13.16
45 - 49	9	5.00	11.71	4	1.32	10.60	25	2.30	4.69
50 - 54	6	3.33	6.71	10	3.31	9.28	15	1.38	2.39
55 - 59	1	.55	3.38	2	.66	5.97	10	.92	1.01
60 - 64	2	1.11	2.83	1	.33	5.31	1	.09	.09
65 - 69	1	.55	1.72	8	2.65	4.98	--	--	--
70 - 74	--	0	1.17	1	.33	2.33	--	--	--
75	2	*1.11	*1.17	6 at 85'	*1.99	*2.00	--	--	--
TOTALS	180	100%	0	302	100.00	0	1086	100.00	0

(279 w/o new commercial moorage) Includes new basin moorage requests (23) 4 in existing basin want to transfer

* error due to rounding

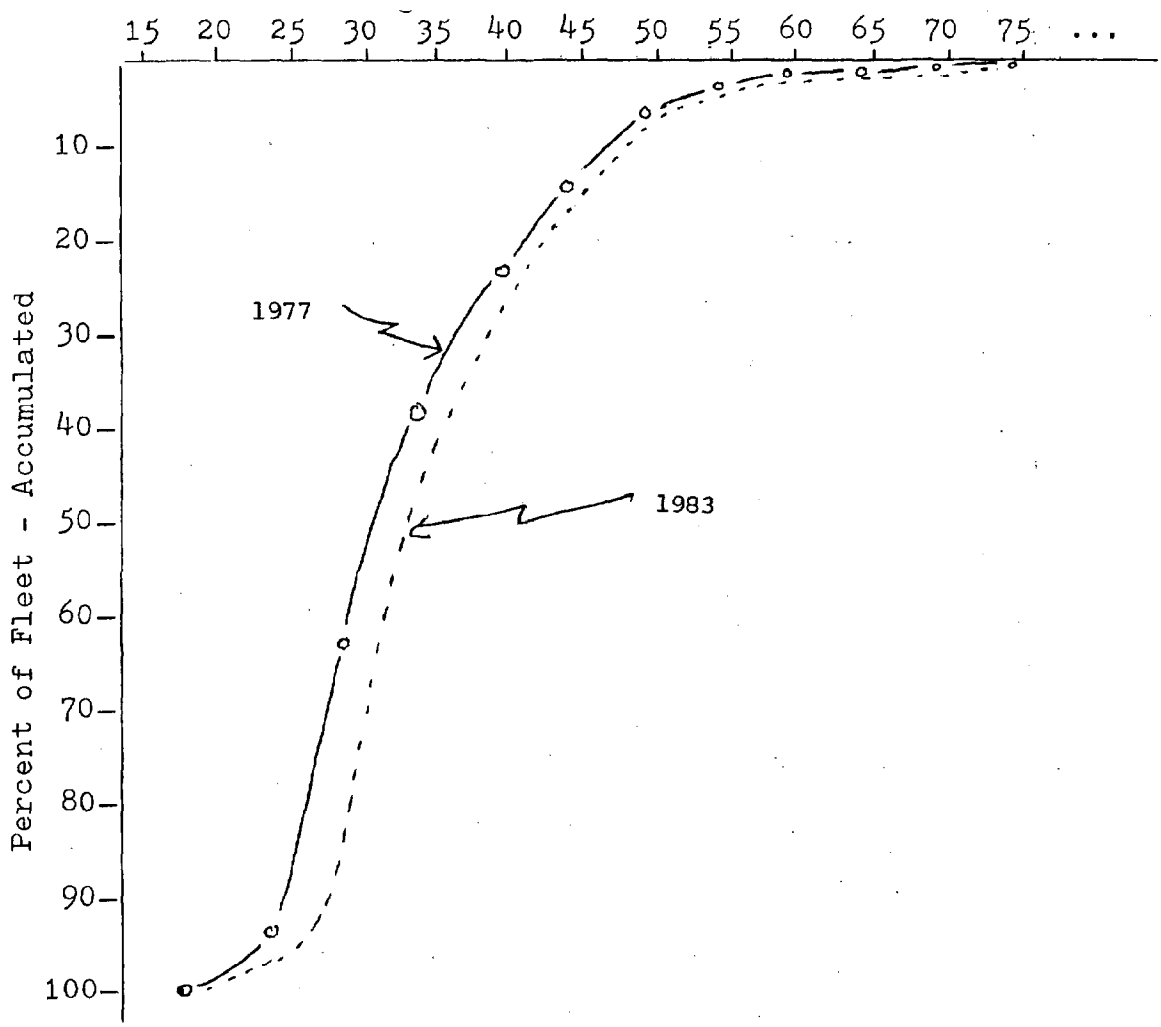
Length of Boats	Astoria (West End) Number of Boats	Percentage Group	Accumulated Percentage	Astoria (East End) Number of Boats	Percentage Group	Accumulated Percentage	Totals for CREST area Number of Boats	Percentage Group	Accumulated Percentage
16 - 19	3	1.15	100.00	--	--	--	106	5.70	100.00
20 - 24	45	17.27	98.85	1	3.13	100.00	589	31.65	94.30
25 - 29	106	40.61	81.61	11	34.38	96.87	462	24.83	62.65
30 - 34	38	14.56	41.00	4	12.50	62.49	278	14.94	37.82
35 - 39	24	9.20	26.44	2	6.25	49.99	136	7.31	22.88
40 - 44	22	8.43	17.24	--	--	--	149	8.00	15.57
45 - 49	7	2.68	8.81	--	--	--	45	2.42	7.57
50 - 54	5	1.92	6.13	1	3.13	43.74	37	1.99	5.15
55 - 59	8	3.07	4.21	1	3.13	40.61	22	1.18	3.16
60 - 64	1	.38	1.14	3	9.38	37.48	8	.43	1.98
65 - 69	2	.77	.76	1	3.13	28.10	12	.64	1.55
70 - 74	--	0	--	2	6.25	24.97	3	.16	.91
75	--	0	0	6#	*18.75	*18.72	14	.75	.75
TOTALS	261	100.00	0	32	100.00	0	1861	100.00	0

#notes: 1 at 83'
3 at 88'
1 at 193'
1 at 228'

* error due to rounding

FIGURE 8

Study of Boat Length Distribution
by Accumulative Curve Method



Date points are placed on the largest value of the ranges since all members of that range could use such a berth.

The fourth group of data (Table 11) summarizes the boat length distribution for permanent moorage at Hammond, Warrenton, Ilwaco, and Astoria, plus for the combined fleets. The graph of boat length distribution then uses the accumulation curve method to chart the data from Table 11 (see Figure 8).

Marina operators or developers in the CREST area should keep in mind then, that if new slips are being planned, the mix of lengths should be apportioned according to the accumulative percentage curve from the existing fleet.

For new permanent moorage then:

37% should handle up to 24'
25% should handle between 24 and 29'
15% should handle between 30 and 34'
7% should handle between 35 and 39'
8% should handle between 40 and 44'
2½% should handle between 45 and 49'
2% should handle between 50 and 54'
3% should handle over 55' length

It is possible to combine ranges, but while it may simplify construction and operations, it wastes space and will lower the maximum possible revenue if every other factor in the rate determination is constant.

This distribution represents good planning practice based on the current fleet size distribution. However, the mix should be modified to account for trends towards longer boats and individual basin and fleet characteristics. After the mix of berths has been modified to suit the basin's needs, the beams associated with those lengths can be read off the length-beam relationship curve to plan the spacing for the slips.

In a similar manner, the mix of slips for the transient commercial and transient recreational vessels can be calculated.

It is important to note that the mix of slips changes and depends on the type of boats that the moorage will support. This is a policy decision for each marina; it relates to how much of a new marina will go to permanent moorage, transient commercial or recreational vessels.

(See demand section for predictions of moorage demand by each of these types of vessels.) Transients do not have the same distribution patterns as permanent moorage length distributions, so it is not the best policy to plan only for permanent moorage length distribution. Also, the range of boat length for charter, commercial and recreation vessels needs to be considered.

An assumption was made to use data from the marinas previously described for length distribution; those data were assumed to be representative of the fleet in the CREST area. (Hammond, Warrenton, Astoria, Ilwaco were included. Cathlamet and Chinook data were difficult to obtain.) All other marinas are thus assumed to have similar length distributions. The longer vessels are at Warrenton, Ilwaco and Astoria. The fleet stored on land is presumed to be trailerable (less than 28'), so the data for boats above 30' lengths would not be affected by their presence. There were sufficient data available for the trailerable boats so that it was assumed that the fleet on land would share the same length distribution as the less than 28 ft permanent and transient moorage requests in Ilwaco and Astoria.

The accumulated percentage curve for the CREST fleet is shown in Figure 8 and is labeled for the 1977 and 1983 season. Notice that the 1983 curve is predicted to shift outward and down to reflect the trend towards longer vessels.

5. Marine Sanitation Devices and Sewage Pumpout Stations

In this section, the new legal requirements for marine sanitation devices (MSD) are reviewed and information on sewage pumpout station capabilities, installation procedures, and site recommendations within the CREST area is examined.

This information is presented to facilitate marina planning for the study area. Although now there is little pressure for pumpout facilities, they are expected to be needed within 3 years.

Further information on performance and types of pumpout stations, and contacts with various manufacturers is available in a file in the CREST library. Additionally, there is a functioning pumpout station (coin operated) at the Port of Kalama Marina, Kalama, Washington, that is available for exploration. If there are any questions about which MSD's are certified or function properly, contact the 13th Coast Guard District Boating Safety Office in Seattle (1-206-442-7355).

a. Scope of MSD Requirements

The term MSD includes any equipment intended for installation onboard a vessel which receives, retains, treats or discharges sewage and any process which treats such sewage. It does not include "portable devices" which can be carried on and off the vessel. Requirements apply to all foreign vessels and all domestic, commercial, charter, and recreational vessels operating within the territorial waters (including the CREST area) of the United States.

According to Coast Guard public information releases, the Environmental Protection Agency (EPA) issued regulations on 29 January 1976 to revise Federal standards for performance of marine sanitatation devices. The regulations apply to all vessels with toilet facilities, but they do not require the installation of toilet facilties on vessels which do not have them. The Coast Guard issued implementation procedures for these standards on 12 April 1976. The regulations are effective after 30 January 1977 for new vessels and 30 January 1980 for existing vessels; boat owners may comply earlier. After the effective date of the regulations (or the date of compliance for those vessels which comply early), vessels are exempt from state and local regulation of MSD's, with one exception.

A state may prohibit sewage discharge (treated and untreated) into some or all of the waters within the state. The state does so by making written application to the Administrator, Environmental Protection Agency, and by receiving the Administrator's affirmative determination that adequate facilities for safe and sanitary removal and treatment of sewage from all vessels are reasonably available for such waters to which the prohibition would apply. In such waters, flow-through devices must be secured to prevent any discharge to the receiving waters. The new standards of performance, definitions of new and existing vessels, and the timetable for early and regular compliance are set forth later in this discussion.

b. Coast Guard Certification of MSD's

If a unit was built before 30 January 1976, it is considered an "existing device". This equipment, except no-discharge devices built before 30 January 1975, was certified by official letter from the Coast

Guard. No-discharge devices built before 30 January 1975 were certified by regulation without a letter, however some manufacturers applied for and received letters certifying their devices. An owner should obtain a copy of this letter from the manufacturer or distributor as a record that the equipment is Coast Guard certified. If the unit was manufactured on or after 30 January 1976, and is Coast Guard certified, except certain no-discharge devices, it will have a label on it. No-discharge devices being used solely for the storage of sewage and flush-water at ambient pressure and temperature may be certified by definition. Such devices certified in this manner cannot be labeled. However, manufacturers may apply for certification on such devices and thereby label them as Coast Guard certified. That label gives the certification number and indicates whether the equipment has been type approved for inspected or uninspected vessels.

c. Flow-through and No-discharge Devices

There are two varieties of marine sanitation equipment. One variety treats the waste and then discharges it into the water (Type I or Type II). Type I is similar to a macerator-chlorinator and has a limited life expectancy. Type II MSD's are more thorough and basically similar to a chloride secondary treatment plant. The second retains the waste onboard or treats it in a manner which does not result in any discharge into the water (Type III). This includes holding tanks, recirculators and incinerators. Investigation should determine whether the operating area is a no-discharge or discharge area, and then a decision on discharge or no-discharge equipment can be made. There are two types of no-discharge areas: federal or state and local. Federal regulations prohibiting discharges apply either to a class of waters (see note on timetable) or to specific waters [contact the regional (Seattle) EPA office for exact areas]. State and local prohibition areas are controlled by the state boating authority or local police. If operation occurs in a no-discharge area, check on the availability of pumpout facilities; a decision can then be made on either retention equipment which will require periodic pumpout, or incineration equipment which does not. If operation occurs in both discharge and no-discharge zones, a combination Type I or Type II unit with Type III equipment might be desirable for maximum flexibility.

d. Capacity

Selected equipment should have adequate capacity; that capacity can be estimated by determining the maximum number of persons that will be aboard a vessel, including guests. Retention or recirculating devices should provide sufficient capacity between pumpouts for cruising needs; it is illegal to pump the contents of a holding tank overboard in U.S. waters.

e. Other Considerations

Considerations involved in selecting equipment for a vessel should include the space needed, the vessel's electrical system capability and the freshwater supply storage capacity.

Planning before purchase can result in years of trouble-free, safe operation of a vessel's marine sanitation system.

f. Implications to CREST Area Marinas

The implication of these legal requirements for marinas is that more boats utilizing moorage space will require sewage pumpout capabilities for their Type III MSD's. Manufacturers make a variety of sewage pumpout stations suitable for use in the CREST area. Stations can be shipped by air freight or parcel post and installed by local electricians and plumbers to meet local building codes. Units can be explosion-proof and are therefore suitable for installation on a fuel dock for one-stop servicing. Other options include a pumpout/freshwater combination unit, coin/token operations, card-operated, extra plumbing heads designed to meet specific needs, and spring loaded hose take-up reels. The pumpout units are designed to withstand corrosive chemicals, survive the salt air environment and function all year. They can pump into municipal sewage systems, holding tanks, leach and drain fields and septic tanks. Typical units have 2" connections to the pump discharge and either a 110 or 220 volts electrical source.

Design variables for evaluating discharge performance for a typical manufactured unit depends on the length of the discharge pipe (distance), the size and type of pipe used, and the height the fluid must be lifted before it discharges under atmospheric pressure into a sewerline, wet well or storage tank. Figure 9 shows how the suitability of a typical pumpout station can be evaluated in the design stage.

Sewage pumpout facilities are neat, servicable and potential revenue producers for marinas. Marina operators express concern about the lack of standard fittings on holding tanks; this lack of standardization can be overcome with a hard-rubber, tapored male fitting on the end of the suction hose. The universal nozzle eliminates the risk of spillage while the pumpout station is in operation.

FIGURE 9

Sample Data for Planning a Sewage Pumpout Station

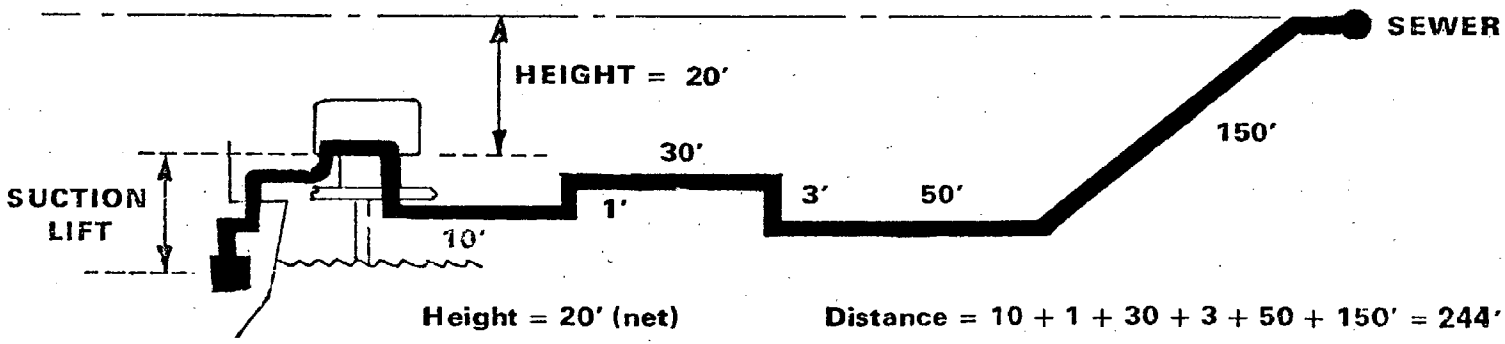
SUCTION PERFORMANCE — The Pump-A-Head will lift fluid a maximum height of 25 feet, providing there are no air leaks in the suction system. The time necessary to draw the fluid from the holding tank to the pump will increase as suction height increases.

Height	Max. Allowable Distance
40 ft	300 ft
30 ft	900 ft
20 ft	1500 ft
10 ft	2100 ft

Note: The height-distance table is correct for most types of 1 ½" pipe. If 2" pipe is used, multiply the distance in the table by 3. Discharge pipe size below 1 ½" is not recommended.

EXAMPLE

Referring to the table, the closest listed distance is 300 ft with a corresponding maximum height of 40 ft. Since only 20 ft. of lift is required, the Pump-A-Head's performance is well within the requirements.



Height = 20' (net) **Distance = 10 + 1 + 30 + 3 + 50 + 150' = 244'**

From: Pump-A-Head, public information release

Pump-A-Head is a brand name for a sewage pumpout station. This information is used as an example and does not represent an endorsement.

g. Location Recommendations

Recommended locations for sewage pumpout facilities within the CREST area are based on considerations of both the size of a marina and its location. Preferred locations in a facility are on the fuel dock, using explosion proof installations, or near a launching ramp, for a coin-operated facility. The pumpout stations should be located as near the entrance to a basin as possible, to facilitate flushing in the event of a spill.

Recommended Locations:

- West end mooring basin in Astoria
- Ilwaco
- Skipanon River near Grant's 76 dock--perhaps a facility could be cooperatively funded by all of the marinas on the river
- Hammond
- Cathlamet
- Chinook

The need for pumpout facilities is not critical at this time, but plans should be made now for locating such facilities; sewer lines or drainfield connections could be installed and capped so that when demand for sewage pumpout does increase, installation of the service can proceed without unnecessary delay.

6. Recommended Rate Structure Procedure

As one would expect from the diversity in size and ownership of CREST area marinas, rate structures vary, as well. Some adjust their rates annually or biannually to compensate for inflation, some set their rates according to the going rate used by other marinas, some adjust their rates according to demand (highest during peak use season), and others have different rates for commercial and recreational moorages. Due to the variety of operating conditions, legal jurisdictions and policies for each marina, the existing rate structure is not examined here. For up-to-date information, contact the marina of the user's choice. This section does, however, examine various approaches to rate structure.

Because of the chronic undersupply of moorages in the estuary area, existing marinas could probably raise their moorage fees yearly and still

fill their slips. To cover inflation costs, an increase of 10% yearly is the recommended minimum, and an increase of 25% per year would not be unreasonable for at least the next 3 years. There are benefits associated with such a rate increase as additional funds become available for planning and construction of new facilities. Also, if the publicly operated facilities raise their rates by such an amount, it increases the possibility for private facilities to expand or enter into the moorage supply business. New facilities not only benefit the boating public, but they also reduce pressure on existing facilities. (This assumes that adequate sites for private development exist in an economically viable location.)

Within the CREST area, most moorage prices are based on boat length; this is because the method is easily applied. The main drawback is that larger boats do not pay their fair share of the costs of providing moorages. The longer boats require a wider turning radius and deeper dredging; consequently, moorage for larger boats on a set price per foot generates less income for the marina than is possible with other rate structures.

Moorage space is the basis of a marina's operations. All other revenue producing services depend on the moorage. It is logical then, to base the rate structure on the primary function of the marina, that is the actual moorage area occupied by each boat. This is not a new idea, and marina designers and economists have discussed and used it for years, (see Chaney and Vars). Generally, each boat is charged a single rate per square foot of moorage space. (Moorage space is defined, in this case, as length times (x) the beam of the vessel.) So a rate for the CREST area might be $0.13636 x length x beam sq. ft. per month. Yearly rates then could continue to be some number of months x the rate per month. Each marina then could vary the number of months it considers to be a boating year. In the CREST area, for example, seasons range from 3 months to 10 months (for a yearly rate). Such an approach of using moorage space instead of length alone as the basis for rates not only can yield increased annual income from moorages but can also shift the burden from the trailerable boats to the larger boats, so that they share a more equitable part of the costs of providing moorage space.

A sample method for calculating the appropriate rate for generating identical gross income from rates based on rent per sq. ft. and $/linear foot/month is presented in Table 12. Although such a method is interesting, it does not adequately address either revenue maximization criteria or equity questions. A variation then, is to use a different rate x a different concept of moorage space to determine monthly rate. Yearly rates remain a multiple of monthly rates. The new rate is the long-run replacement cost of providing moorage (so many $/sq. ft.); the cost of moorage space includes the area computed by multiplying length x beam as well as portions of both the dredged channel and turning area. Such calculation is based on the actual space that is used and the space that is precluded from use by other vessels; this is revenue that is otherwise lost.

Long-run replacement cost is the cost per square foot to obtain ownership, materials and labor for piers or walks, provide water and electricity, build breakwaters or dredge. If a marina has material donations, volunteer labor, etc., the actual cost might be low, but for conceptual soundness, costs should be calculated as if the moorage had to be built from scratch. This approach disregards modifications to rate structures due to political or policy considerations and argues only from a revenue maximization point of view.

Moorage space can be calculated by taking the maximum beam of the boat moored x its length, plus area used for maneuvering (that cannot be used for moorage). Each berth then shares a portion of the common channel costs. Then, the rates per month are the long-run replacement costs/sq. ft. x moorage space (sq. ft.) = the rate per month. The seasonal cost is the number of months/season x the rate/month.

In 1975, the long-run replacement costs for moorage at Hammond, for example, were conservatively estimated at $0.54/sq. ft. (Vars); they have gone up since. It is recommended the long-range replacement costs be calculated as an alternative approach to existing rate setting procedures within the CREST area; that would increase the revenues from marina operations. Other recommendations for rate structures include the following:

a. Consider extending the annual rates from a 3 or 4 month season (common in the CREST area) to a 5 month season. Not only does this increase

TABLE 12

Sample Format for Determining Rate/Sq. Ft. Area to Generate the Same Revenue as Rate/Ft. of Boat Length

Rental on Linear Foot Basis				Rental on a Sq. Ft. Basis					
Boat Length (Feet) (1)	Number of Boats (2)	Rental Rate/Mo. (3)	Total $ per Month (4)	Beam (feet) (5)	Length & Beam (Sq. Ft. per Boat) (6)	Area - Sq. Ft. for Fleet (7)	Rent per Sq. Ft. (8)	Rent Rate Per Boat Per Month (9)	Total per Month (10)
TOTAL			Y			Z			

NOTES: Col. 6 = Col. 1 x Col. 5
Col. 7 = Col. 2 x Col. 6
Col. 8 = Y ÷ Z
Col. 9 = Col. 6 x Col. 8
Col.10 = Col. 2 x Col. 9

From: Chaney, 1961

revenue from annual moorage fees, but it also allows more extensive use of permanently leased berths by transients when the lessee's boat is absent.

b. Consider a set rate per foot and per boat for all vessels under 20 feet in length, since smaller vessels require approximately the same amount of time from marina operators.

c. Transient rates should be higher than the permanent rates.

d. Consider an annual flat rate increase of 10-25% per year for the next 3 years.

e. Consider modifying rates in the larger marinas by charging more for the prime berths (+10%) and slightly less (-10%) for the less desirably located berths.

VI. DEMAND ANALYSIS

This section develops information on the existing demand for moorage in the CREST area and on the anticipated direction and magnitude of demand growth rates for the next five years. Common external and internal factors that impact moorage demand are discussed, and current waiting lists, use patterns and demand for various types of moorage are examined. Throughout these discussions, the viewpoints of the marina industry are incorporated with current and historical data to develop predictions for future demand.

A. EXTERNAL FACTORS

Marinas within the CREST area must be regarded as regional resources. They provide moorage not only for local residents, but also, for the Seattle and Portland metropolitan areas, and other residents of Oregon and Washington. In addition, a substantial number of residents of California, Idaho, Montana, Utah and other out-of-staters seek moorage in the Columbia estuary. Such a market area is significant for both recreational and charter boat moorage demands.

Two natural phenomena also significantly impact aggregate moorage demand in the CREST area. Fish availability is the foundation for the fishing industry and much recreational boating. It contributes a seasonal component to moorage demand since the fish are only available in suitable locations, sizes and concentrations during certain times of their life cycle. Weather also impacts demand; it affects the quality of the recreational experience and actual operations on the Columbia River bar, in the boat basins, and on the river itself.

Besides the available market population and the complex natural phenomena, various legal and management schemes also impact moorage demand. Court decisions on distribution of fish runs between Indian and non-Indian fishermen, changes in season lengths, license moratoriums, and the new 200 mile limit all play a role in establishing the direction and the rate of growth of moorage demand.

B. INTERNAL FACTORS

Within the CREST area, location of the moorage relative to the Columbia River bar is the key variable affecting moorage demand. Since the focus of their

activity is across the bar, neither the commercial nor the charter boats prefer locating further east than Astoria.

Physical characteristics of the site are also significant. The maximum depth at low tide, the vertical clearance, ease of access to deep water, congestion in access channels, location of repair facilities, canneries and other recreational opportunities help determine the maximum size and types of moorage requested.

Furthermore, land ownership affects flexibility of policy and rate setting. Differences in rates between the facilities seem to have little impact on moorage demand when compared to the other external and internal factors.

C. CURRENT DEMAND

1. Waiting Lists

Historically, waiting lists have been used as indicators of unfilled demand at current prices. They are, however, only a rough indicator, due to the following problems. Within the CREST area, no deposit or "earnest" money is required with waiting list applications to determine the seriousness of the request. Boaters tend to register with multiple marinas to maximize their chances of obtaining moorage. Over time, boat ownership and boating patterns change, and this further undermines the validity of waiting list data.

In August 1977, marinas within the CREST area had a total of 1635 requests for permanent moorage. This includes both written and verbal applications. Some of these requests date as far back as the late 1960's. As a result, most marinas do not even accept waiting list applications anymore and make a point of explaining the situation to potential applicants. Consequently, there is a noticeable trend now for applicants to seek only permanent moorage, instead of seasonal or monthly; also, the annual turnover rate in leases drops as space becomes more difficult to obtain.

Due to the problems identified in the preceding paragraphs, a more realistic but conservative estimate of unfilled demand for permanent moorage at current prices is 800-900 moorages. This is an aggregate total and includes commercial, charter and recreational vessels, with the recreational vessels moorage requests representing over 90% of the requests.

The usefulness of waiting lists would be greatly enhanced by the requirement that a reasonable deposit be filed with an application for any waiting list. The procedures for this and a description of a case history of a Puget Sound Marina near Tacoma are presented in the section dealing with forms and operating procedures (see Section III-E).

The significance of the waiting list data is enhanced by a comparison with the expansion plans of existing facilities. For the CREST area, the expansion plans total:

Short range (1-2 years)	80-145 berths
Medium range (2-3 years)	173
Long range (3-5 years)	630
Maximum Total	948 berths

If all of these planned berths were built during the next two years, the current unfilled demand would be substantially addressed. However, the new moorage demands each year would not be addressed. Consequently, the current undersupply of moorages is expected to persist for the next five years, unless extensive additional new marina facilities are developed.

2. Current Use Patterns

Current use of moorage facilities within the CREST area varies dramatically between the summer and winter seasons. During the summer, facilities operate at 100% capacity. In fact, when gillnet season overlaps weekend users, facilities are strained to over-capacity. During the summer of 1977, the estimated capacity of 2699 moorages split in the following manner:

Commercial	888
Charter	407
Recreation	1323
Sailboats	+ 27
	2645
Unleased capacity at Port Warren and Skipanon Charters	+ 54
TOTAL CAPACITY	2699

In recent years, there is a definite trend toward requesting leases for permanent moorage, as opposed to seasonal or monthly periods. As a result, marina operators must shift the transients around into the

temporarily vacated permanent commercial and recreational berths.

Winter demand for moorage has a completely different magnitude and mix. Total moorage use drops to 20-50% of capacity, and the balance of the fleet shifts to the larger commercial vessels. Vessels cluster in the marinas for improved security, and demand for recreational and charter moorage drops to minimum levels (mostly just for non-trailerable size vessels, i.e. greater than 28 feet). Since the existing supply of moorages greatly exceeds winter use patterns, the minimal growth in demand for winter moorage presents no problems for existing marina operators. One special case is in the Hammond Boat Basin. Due to the increased protection provided by the new breakwater, Hammond may expect higher winter moorage demand for the larger recreation and charter boats than the historical use patterns. This growth is estimated to be in the range of a 2-5% increase over present levels for the next 5 years; it can be easily handled by existing capacity.

D. DISAGGREGATED FUTURE MOORAGE DEMAND

This section will discuss the direction and magnitudes for growth in moorage demand, and trends in boat length for charter boats; commercial vessels with gillnetters as a separate category. Various external and internal factors previously discussed will be mentioned if they have special significant impact.

1. Future Demand for Charter Boat Moorage

According to the supply inventory, almost 75% of the charter boat operations in the CREST area are based at the Port of Ilwaco. The remaining 25% is scattered among Hammond, Skipanon Charters in Warrenton, West End Mooring Basin in Astoria, and Warrenton Deep Sea Charters. The activity principally utilizes permanent moorage. In 1977, a moratorium on charter boat licenses went into effect in Washington. It is unclear how long this will last, but for a time, any growth in moorage requests will have to be handled on the Oregon side of the river. Waiting lists do not indicate any charter boat moorage requests at this time. Moorage operator opinion is that the charter industry is adequately developed and a minimal growth in the number of new charter boats is expected because there is some unused capacity. However, some of the smaller six-passenger vessels are being replaced by larger capacity vessels. As a result,

there are a few requests for larger charter boat berths. This shift to longer vessels is adding to the demand for the existing supply of large berths within the CREST area.

During the winter, the charter boats may sit idle; the smaller ones may get hauled out or the larger ones (30'-60') may shift to commercial fishing during the winter months. Winter moorage for charter boats is adequate for the next five years.

In summary, demand for charter boat moorage in the next 5 years is as shown on Table 13.

TABLE 13

Summary for Moorage Demands for Charter Boats *

Summer		Winter	
Permanent	Transient	Permanent	Transient
5%	None	2%	None

Growth concentrated on the Oregon side of the river, especially at Hammond's planned float "F" and Warrenton's new city basin.

Key Factors

Current idle capacity, the Washington license moratorium (1977), high dependence on fish availability and weather, preference for locations near the bar and facilities with ample parking.

*Note: In all summary tables, unless otherwise noted, the percentage growth rate is the growth of new moorage requests over the next 5 years as a percentage of the existing pattern of use by the CREST fleet.

2. Demand for Commercial Moorages (gillnet excluded)

In 1974, Washington declared a moratorium on commercial licenses, so the number has remained steady since then and is not expected to grow until the moratorium is removed. The legislature is considering implementing a state registration system; at this time the U.S. Coast Guard executes the registration. In 1976, Washington had 7301 commercial registrations:

4603	Commercial fishing
781	Commercial other
159	Commercial passengers
418	Dealers
1257	Livery (rentable)
+ 83	Manufacturers
7301	TOTAL

From: U.S.C.G. C.G.357, Boating Statistics

As reflected in Table 14, Oregon's commercial licenses have been remarkably steady until 1977. That year various state agencies started discussing a license moratorium on commercial licenses for Oregon and limited entry management schemes which spurred registration in order to get under any forthcoming deadline. A minimal part of this growth may be attributed to the 200 mile extended jurisdiction (see later discussion).

TABLE 14

Oregon Commercial Licenses

1969	1970	1971	1972	1973	1974	1975	1976	1977
5663	5584	6428	5989	6668	5556	5540	5590	*6812

Note: as of 1974 Oregon shifted to a combined commercial license that included gillnet boats.

* As of May 24, 1977, total represents estimated 97% of commercial license sales.

From: ODF & W, cited in Draft EIS for Salmon, ref. 12

In recent years, a modest increase in the number of shrimpers has occurred, but this growth has stabilized. According to Mr. Bob Hudson of the All Coast Fisherman's Marketing Association, the Oregon commercial fleet is adequately capitalized at present and for the next 5 years except for the bottom fishing vessels (personal comm.). Increased interests in hake, for example, will make use of fishing vessels in the 80-100 foot range. Most of this development is focused on the southern part of Oregon and outside the CREST area. A key here is the relative price for the different bottom fish. If the prices increase enough, U.S. fishermen will be attracted to the fishery especially if more restrictions are placed on harvesting other valuable species such as salmon.

To harvest all the quotas on the West Coast N.M.F.S. has estimated that 400 new boats are needed (at a cost of about $1 billion). Because of the varying price situation, time lags on construction and location of the fish, negligible growth is expected in permanent commercial moorage requests within the CREST area until current capacity is fully used. Boats may switch fisheries, however, and a slight increase in commercial transients may develop.

Like the charter boats, both permanent and transient commercial vessels are tending to be longer with deeper drafts. This presents obvious problems to existing marinas due to the shortage of berths that can adequately handle this size vessel. Another indication of the demand is that nearly all of Warrenton's new commercial moorage for larger vessels has already been spoken for even before construction has begun. (See Table 15.)

TABLE 15

Summary for Growth Rate for Commercial Moorage Demands

Summer		Winter	
Permanent	Transient	Permanent	Transient
< 3%	< 2%	< 1%	< 1%

Key Factors

Trend towards longer boats, existing shortage for deeper draft berths, more likely conversion of existing vessels, time lag in construction of new bottom fishing vessels.

The ability of American fishermen to increase their bottom fishing capabilities depends on available investment capital, economic incentives, technological developments, markets and labor. Because it is less expensive to convert existing vessels than to build new ones, conversion is more likely to occur, due to the significant cost differentials. For example, a new 100-110 foot trawling vessel, fully outfitted with efficient trawling gear and the latest equipment may cost from $1.25 million to $1.5 million. At the same time, fishermen have estimated that equipping and renovating limit seiners or shrimp and crab vessels for bottom fishing trawling is $25,000 per vessel. Some of the larger vessels conversion costs can range up to $250,000, depending on the nature of the renovation (hull extensions) and the sophistication of gear and electronic equipment installed (Jones, J. G. "Alaska Seas and Coasts", 1977).

3. Gillnet Moorage Demand

Demand for moorage for this special type of commercial vessel is perhaps the most vulnerable to fishery management schemes. Due to short seasons, minimal permanent moorage demand exists within the CREST area, except at the East End Mooring Basin in Astoria. Most gillnetters pull their boats, use private moorage up numerous sloughs and tributaries, or have combination gear boats such as gillnet-trollers and are included in the commercial category demand section. With current registration procedures, it is difficult to isolate gillnet registrations for Oregon. With the moratorium on commercial licenses in effect in Washington since 1974, and with current overcrowding during the reduced seasons (which reduces the catch per unit effort for each boat), the possibility of limited entry on this fishery is very real for the near future.

Neither the permanent or transient demand for gillnet moorage is expected to grow. In fact, the percentage of the fleet is expected to

drop slightly. However the gillnet seasons are such that certain marinas such as the West End Mooring Basin, and to a lessor extent Chinook and Ilwaco, will have significant periods of transient gillnet moorage requests. The problems arise when these requests overlap peak recreational demand periods. Only so many gillnet vessels can take over temporarily vacated commercial permanent moorage. Hence, the length distribution patterns (see section V-B-4) for gillnet boats need to be considered in the transient moorage berth length distribution for slip planning. In addition, provision for even more temporary facilities needs to be made. Such facilities might include tie-up pilings in sheltered areas; the facilities might be without services, but they need to be identified and established to handle overflow moorage requests during the summer. Table 16 summarizes future gillnet moorage demand, and Table 17 reports the number of Columbia River gillnet licenses issued by Oregon and Washington during the period 1938-1974.

TABLE 16

Summary for Future Gillnet Moorage Demands
(5 year growth rate)

Summer		Winter	
Permanent	Transient	Permanent	Transient
0%	0%	0%	None

0% growth rate means level of moorage requests will remain at current levels.

Key Factors

Impact of limited entry and other management schemes, transient demand will continue to impact certain marinas significantly during gillnet seasons.

TABLE 17

Numbers of Columbia River Gillnet Licenses Issued
1938-1974

Year	Oregon	Washington	Combined
1938	713	478	1,191
1939	680	473	1,153
1940	667	441	1,108
1941	629	389	1,018
1942	568	371	939
1943	542	389	931
1944	508	370	878
1945	524	392	916
1946	566	426	992
1947	582	416	998
1948	632	470	1,102
1949	629	490	1,119
1950	613	447	1,060
1951	585	421	1,006
1952	563	403	966
1953	533	386	919
1954	516	374	890
1955	474	338	812
1956	432	360	792
1957	526	292	818
1958	621	252	873
1959	640	229	869
1960	622	184	806
1961	627	164	791
1962	611	143	754
1963	582	158	740
1964	444	245	689
1965	446	237	683
1966	421	215	636
1967	570	208	778
1968	544	224	768
1969	416	181	597
1970	447	235	682
1971	647	369	1,016
1972	547	508	1,055
1973	541	563	1,104
1974	(500)1/	861	(1,361)1/

1/ The Oregon and combined values are estimates as Oregon now issues a general commercial fishing license applicable to all types of gear.

4. Demand for Recreational Moorages (sailboats excluded)

Many complex factors enter into calculations to predict and understand changes in recreational moorage demand. In addition to the external and internal factors previously discussed, the supply constraints, relative mobility, education, age and sex of the population, size of the market area, disposable income, leisure time philosophies, and shifts to four-day-work-weeks have impact. Rather than analyze the interrelationships between these factors and assess their relative impact, this section approaches the problem through observations of actual participation patterns, rather than dealing with why a recreational boater requests moorage.

While there is an increase in demand for recreational moorage, the rate of increase which has historically been much faster than population growth rates. In Oregon, for example:

> During the period 1966-1971 population in Oregon increased 8% while the number of registered recreational vessels increased 52%. (Oregon State Marine Board, Boating in Oregon, 1972) More recent data reveal that the number of recreational vessels per capita is stabilizing. (See Table 18.)

There are reasons for the slowing of the historical growth rates. For example, higher fuel costs combined with inflation rates leave lower per capita real disposable income and slow the growth rate and encourage a shift to sailboats or boat rental for recreation. Such trends are more easily detected on a state level than in the CREST area, due to the high seamanship requirements for crossing the bar and lack of CREST area data. Also, slower growth in population would contribute to a moorage request slowdown. In Oregon, where the bulk of population growth is due to migration into the state, the growth rates have been:

1973-74 Oregon population increased 1.85%

1975-76 Oregon population increased 1.86%

From: Portland State University Population Research Center, 1977

One must be cautious in drawing conclusions, however, as it is the highly urbanized areas of the state that grow faster than the state and also tend

TABLE 18

Oregon Recreation Registration

	1966	1971	1976	1977
Number of registrations for recreational vessels	58,871	89,740	115,880	118,485
Recreation boats per capita	.0298	.0422	.04948	.04947

From: Oregon State Marine Board

Washington Recreation Boat Registration

1972 - 89,000 out of total State registrations of 96,248

1974 - 125,000 out of total State registrations of 132,188

1976 - 138,266 out of total State registrations of 145,618

From: U.S.C.G., Boating Statistics
C.G. 357

to export more of their boaters to the recreational areas on the Coast including the CREST area. In 1972 for example, 70% of boating activity in Clatsop County (Oregon portion of CREST area) came from boats registered elsewhere in the state (1972, Oregon State Marine Board, Pleasure Boating in Oregon, 1972).

Another factor contributing to the slowdown of the growth rate for recreational moorage demands is the negative experience that recreational boaters have been experiencing related to overcrowded facilities and congested waterways. Also, restroom facilities and showers are often inadequate to meet the seasonal demand.

A key to participation data for recreational moorage is the time of the year. Within the Oregon portion of the CREST area, nearly 70% of the recreational boating occurs during the period from late May to mid-September. During the winter, recreational moorage drops to 10-50% of peak summer demand. Each year, in fact, peak demand is invariably linked to the Labor Day weekend and the fall salmon run.

An additional indicator of the use by fishermen of the Washington portion of the CREST area is as follows:

Ilwaco (Region 1)

	1973	1974	1975
Number of angler trips	165,044	167,172	202,795
Peak season (> 10,000/week)	Aug-Sept 15	Aug-Sept 15	July 20-Sept 20
Peak week	Sept 1-7	Sept 2-8	Sept 7-13

From: Washington Department of Fisheries, Washington State Sports Catch Reports, 1973-75

Another indicator of changes over time is the shift in recreational boat sizes in the State of Oregon.

	1972	1975
<16'	70%	59.4%
16-19'	23%	32.3%
20-23'	3%	5.2%
24' or greater	3%	3%

Such data is only a guideline for general boat length trends, since Clatsop County has historically had a substantially higher percentage of boats greater than 24 feet in length than the rest of the state. No similar data for Washington was obtained.

TABLE 19

Summary for Recreation Demand

Summer		Winter	
Permanent	Transient	Permanent	Transient
6-7% per year	2-3%	2%	0%
		Mostly non-trailerable sizes (28 feet) use protected basins, current capacity is okay.	

5. Future Demand for Sailboat Moorages

According to data collected by the Oregon State Marine Board, sailboat registrations in Oregon have been increasing significantly each year. (No similar data for Washington exists at this time, so a similar pattern of growth in sailboat registrations is assumed for the Washington residents who use the Columbia River moorages.)

The Oregon data is aggregated and not broken down for sailboat use in Clatsop County. Nevertheless, certain trends in registration and sailboat length on the state level are judged by members of the marina industry to yield representative patterns for sailboat users in the CREST area, regardless of state or county of registration.

First, a length of 17 feet minimum was chosen for a sailboat to operate in the lower river, and a minimum of 20 feet is assumed if the sailboat is to cross the bar. Even then, a sailboat must usually power across the bar with auxillary engine to avoid capsizing. If the table in section V-B-4 on Oregon sailboat registrations and length distribution is examined, various trends emerge. First, the number of sailboats is growing and represents a slowly growing percentage of total recreational vessel registration.

1975 - 1.2% of total recreational registrations in Oregon
1976 - 1.33%
1977 - 1.425%

From: Oregon State Marine Board

Second, while absolute numbers are increasing, the lengths of these sailboats are also increasing:

Percent of all Sailboats over 16 Feet in Length

	1973	1976	1977
17-24 feet	72.8%	69.2%	67.6%
25-32 feet	20.7%	25.2%	27%

Note the shift between 1973 for 17-24 (72.8%) to 1977 (67.6%) of total and for 25-32 feet; the 1973 total was 20.7%, while in 1977 this range of lengths had 27% of the total of all registered sailboats in Oregon over 16 feet.

These trends of increasing numbers of registrations and shifts to longer sailboats need to be considered when planning moorages. However, since the sailboat use within the CREST area occurs only during the period

from May to October, no component for sailboats is developed for the foul weather winter period.

During the summer of 1977, permanent moorage requests by sailboats was only one percent of the estimated 2,700 permanent capacity. Such minimal demand for permanent moorage by sailboats is expected to prevail for the next five years and can be attributed to recreational use patterns and the fact that the Columbia River mouth area has strong currents and winds that require high seamanship skills. Unless the sailboats are motor assisted, they cannot safely navigate long, narrow congested channels (Ilwaco) or rivers (Skipanon). The best estuary areas for sailing seem to be upriver of Tongue Point, in the various bays, and between the bar and the Hammond Boat Basin. The area between Hammond and Astoria becomes quite congested during the summer and poses safety problems for sailboats.

Due to recreation patterns however, there will continue to be high seasonal demand for transient sailboat moorage. Elochoman Slough Marina in Cathlamet and the West End Mooring Basin in Astoria will continue to be convenient ports for sailboat races such as the 1977 Six-Pac race, where approximately 70 sailboats sailed down the Columbia from Portland. Such infrequent races do not justify extensive permanent sailboat moorage; however, it does mean that planning for restroom facilities, showers, sizes of transient slips and location of such slips within the marina is important to meet the seasonal transient demand for sailboat moorage.

The recommended way to handle this demand is to have more transient moorage located near the main sailing areas and away from congested access channels. Then, that moorage could also be used for other recreational transients, gillnetters, and small commercial vessels when the sailboats are not around. Similarly, more permanent shower installations and temporary restroom facilities could be set up to handle the temporary excess demand.

TABLE 20

Summary for Sailboat Moorage Demand

Summer		Winter	
Permanent	Transient	Permanent	Transient
< 1%	Highly variable	0%	0%

The other special consideration besides hot showers is the problem with vertical clearance for the sailboat masts. At this time none of the permanent facilities with the CREST area have a problem, but certainly any new facility must consider vertical restrictions to sailboat uses. A recommended minimum vertical clearance for sailboat moorage is 50 feet for sailboats and small trollers.

6. Summary for Future Demand for Moorages

Overall, it is predicted that permanent moorage demands will increase 6-7% per year for the next 5 years. The largest proportion of this growth will be for recreational moorage, mostly in the range of 19-28 feet. The charter boats and commercial vessels are tending to be longer and deeper and will continue to strain the limited supply of deep draft moorage open to the public. The existing undersupply is predicted to continue for the next 5 years. This means increased pressure on the ramps with prime location from trailerable boats; it also suggests the possibility for yearly rate increases.

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