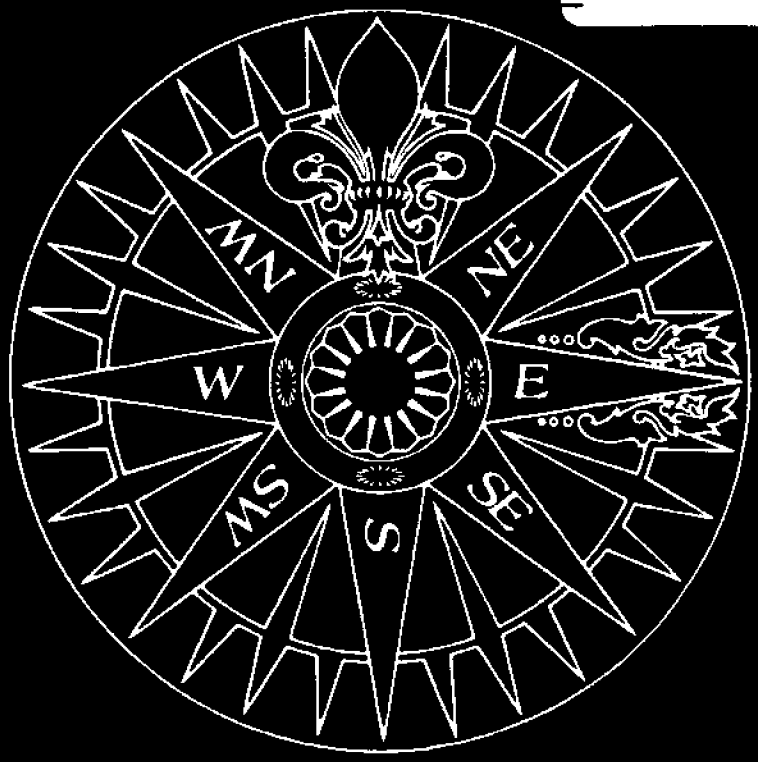

RECREATIONAL BOATING IN WASHINGTON'S COASTAL ZONE: THE MARKET FOR MOORAGE

Robert F. Goodwin
Coastal Management Specialist
Washington Sea Grant Marine Advisory Program
May, 1982

Institute for Marine Studies • University of Washington

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

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I. INTRODUCTION

A. Purpose of the Study

The most frequently asked question concerning recreational boating is: How many boats are there in Washington State? Or Puget Sound? The need behind that question usually relates to moorage. Typically, a marina consultant under contract to a public port authority or a private marina developer is attempting to estimate demand for a proposed marina somewhere in coastal Washington.

Investors, developers, and port officials need to know the state of the market in their service area, how many slips are likely to fill over what period of time, and at what rental rate. Municipal and county planning staff and their elected officials are similarly concerned about demand for moorage. These local government planning agencies must allocate scarce shoreline space among a number of competing land and water uses. State and federal resource management agencies, especially those with mandates to conserve fish and wildlife habitat and maintain or improve water quality, are understandably reluctant to permit displacement or deterioration of those resources where significant need for moorage facilities cannot be demonstrated. Other state and federal agencies administer land acquisition and development grants for public outdoor recreation facilities. The Interagency Committee for Outdoor Recreation (IAC) prepares the State-wide Comprehensive Outdoor Recreation Plan (SCORP), a document which is used to guide disbursements of federal and state outdoor recreation funds. Information on moorage demand at the level of the individual county can augment the more aggregated boating facilities needs analyses contained in the 1979 SCORP update.

Because users, managers, and stewards of Washington's coastal zone resources all share an interest in the future of the moorage industry, their representatives were asked to, and willingly did, participate in an ad hoc advisory committee convened to assist researchers in conducting the study reported here. The Smallcraft Harbors Research Advisory Group (SCHRAG) met frequently between 1977 and 1981 to help scope the project, critique interim products, and review draft reports. Their continued participation will assure dissemination of results and implementation of recommendations where appropriate.

B. Relationship to Other Studies

Several earlier published and unpublished reports have been prepared by Washington Sea Grant researchers, the Oceanographic Institute of Washington, and U.S. Army Corps of Engineers, Seattle District, which address various related aspects of marine recreation in Washington State. These reports and publications are asterisked (*) in the Bibliography (pp. 68).

Readers of this report would be well advised to refer to the U.S. Army Corps of Engineers, Seattle District, Recreational Small Boat Moorage Study, Puget Sound and Adjacent Waters, Washington, 1980. Additional

information on recreational boating activity is contained in the Corps' study. Preliminary assessments of 93 potential marina sites in Puget Sound and adjacent waters were made by the Corps in cooperation with other federal, state, and local government agencies. Of these sites, 39 received further design and environmental analyses; the remaining 54 were dropped from further consideration because of high environmental sensitivity to development. While none of the 39 sites retained for further study can be considered pre-authorized for marina development, they appear to exhibit fewer serious environmental problems than the other 54 sites. Environmental information collected at these sites will be useful to marina development proponents and their consultants.

C. Limitations of the Study

The absence of reliable, time series data on total fleet size and its composition limits the conclusions which can be made concerning the demand for moorage in future years. A severe economic downturn, evident in this state and nationally since 1979, shows no clear sign of reversal. Boat sales have plummeted to only half the constant dollar levels of 1978, but no clear data exist on the differential impact this reduced level of sales has had on the size of boats being purchased. Hence, the number of new boats entering the fleet and requiring wet moorage is unknown.

D. Organization of the Report

The report is organized as follows: first, Conclusions and Recommendations are presented in Chapter II. These findings are drawn from the body of Chapters III through VI and Appendices A through E. Chapter III describes the magnitude and characteristics of the Washington state recreational boating fleet. Chapter IV reports on the demands made by that fleet on public and private moorage facilities in Washington's coastal zone counties. The behavior and preference of boaters utilizing these facilities are documented in this chapter. Chapter V examines historical changes in the size of the recreational fleet at county, regional, and state levels. The causes of growth and change are identified, both descriptively and numerically. Where these causal factors can be quantified and forecasted, likely future fleet sizes are projected. Chapter VI assesses the state of the moorage market observed during the 1980-81 season on a county-by-county basis. Public and private rental rates, occupancy and vacancy rates, and their seasonal variations are documented. Based on these data, the likely upper rate limit which could be charged by new facilities' operators in each county is deduced. Changes in the stock of moorage and planned additions to the current inventory are compared with the likely future growth in fleet size. Opportunities for and constraints to investment in new moorage facilities are identified at the county level.

II. CONCLUSIONS AND RECOMMENDATIONS

A. Registration and Fleet Information

No accurate information is available on either the current size of, or historic trends in, the entire Washington State recreational boating fleet. Because Washington is one of only three states[1] without a state boating safety or registration statute, registering smallcraft remains a federal responsibility under the federal Boating Safety Act of 1971.[2] The agency responsible for maintaining data on vessel ownership in Washington State is the U.S. Coast Guard (USCG). A computer analysis of the USCG registration files revealed that, in Spring, 1979, 65% of the vessels on file had expired registrations. Most observers conclude that this statistic reflects failure to register recreational smallcraft operating outside federal navigable waters and failure to enforce reregistration of boats upon expiration of current registration. In contrast, boat trailer information has been available until recently from the State Department of Licensing[3] and is believed to be accurate.

Thus, the most commonly asked question: "How many boats are there in Washington State?" cannot be answered with great reliability. The USCG had 134,354 undocumented, motorized, pleasure smallcraft on file.[4] The author believes this number is seriously underestimated and that in 1978 it should be approximately 203,000.[5]

In separate bills before committees in both House and Senate the 1980 legislature began to address the need for boat registration in Washington State. Neither bill came to the floor for a vote during the first 60-day regular annual session of Washington State Legislature. Similar measures were introduced in the 1981 ordinary and special legislative sessions with similar results. Until such time that either the state enacts a boat registration bill or the USCG upgrades its data management system, any estimate of the current magnitude of the recreational smallcraft fleet in Washington State will remain conjectural.

These measures have generally proposed an excise tax on boats similar to that collected from motor vehicle owners. Boating interests have resisted such legislation. Instead, they have called for repeal of personal property tax on their vessels and for establishment of a special state boating fund, earmarked for boating safety and facilities, and administered by a council on which boating interests are represented.

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[1] New Hampshire, Alaska, and American Samoa have no state boating registration statutes.

[2] 46 USC 1451-89.

[3] Statistical summaries of boat trailer registration data are no longer routinely published by the Dep. of Licensing since Fall of 1979, when boat trailers were aggregated with "personal use" trailers.

[4] The U.S. Coast Guard registers all smallcraft with motors in Washington State.

[5] See Ch. III for derivation of this estimate.

At the heart of this controversy is the question: Are boat owners poor or wealthy? This question can now be answered with some precision. The median annual household income of boat-owning households in 1978 was $25,000-30,000. For all families and unrelated individuals the statewide median annual household income was $15,205. These figures mean that half of the State's boat owners had an income of up to twice that of the general population of the state. However, the distribution of boaters' incomes as a functon of boat length is equally important: owners of motorized boats less than 12' in length had a median annual household income of $10,000-15,000; while those owning boats 33-39' in length earned $40,000-50,000. This information should be of value during future legislative debate over state boat registration and the equity of fees charged to boat owners.

• The Washington State Legislature should pass a state Boating Safety Act which provides for:

1. A certificate of title for all undocumented smallcraft
2. Annually published registration data by boat length class, propulsion, horsepower, hull material, age, state of manufacture and state of purchase, ownership transfers, scrapping rate and out-of-state sales of used Washington boats, and boat use (i.e., commercial fishing, charter fishing, private recreational, workboat, etc.)

Until a state Boating Safety Act is passed by the legislature, the USCG 13th District, Seattle, should upgrade its boat registration, data management, and reporting system. The USCG annual reports on boating in Washington State should include:

1. County-by-county boat registrations by length, hull type, power type and use
2. Similar information on documented smallcraft
3. Numbers of new, renewed, and non-renewed registrations.

B. Moorage Market Conditions, 1981

The market for moorage has changed drastically since the halcyon days of the late seventies when boat dealers, with some justification, claimed moorage shortfalls were retarding boat sales. The reverse now seems likely: downturns in boat sales may well be retarding the growth in the market for moorage. Declines in the number of pleasurecraft registered in Washington and Oregon during 1980, a precipitous drop in sales of new and used boats and motors in Washington State and the appearance of persistent vacancies in some counties' marinas auger poorly for some segments of the moorage market in the near term. While it is doubtful that a significant number of pleasurecraft have disappeared from moorages--where would they go?--the increments of new boats necessary to sustain the fleet at its current size have been reduced heavily. This report shows that declining real per capita income, coupled with soaring interest rates, have deflated demand for boats and, hence, in the short term (1-3 years), for moorage. Washington State economic forecasts of

expansion rest on the budget and tax cut package proposed by the Reagan administration. At time of writing the tax cuts have been approved, but the FY's 82 and 83 budgets were still being debated in Congress.

The COE estimates of recreational boat moorage demand to year 2000 are vastly greater than reported in this publication. There are two reasons for this divergence: First, the COE used marinas' waiting lists to establish 1978 base year demand. Both in theory and practice waiting lists contain redundancies and must be used selectively to determine real demand. Second, the COE staff and their consultants did not have available to them the latest economic data presaging economic contraction in Washington State and nationally.

Expansion of Moorage Supply

Regionwide, the amount of moorage under construction, and planned for construction by 1986, will expand existing supply by 27-37%, or at an annual rate of from 4.9 to 6.5%. But, at the county level, vast disparities in expansion of supply are seen. Pacific Coast and lower Columbia River counties show no planned expansion. However, Puget Sound counties will expand at rates from 3.9% (Snohomish County) to almost 300% (Skagit).

Expansion of Moorage Demand

Even if the whole region's recreational boating fleet expanded at the rate forecast for Puget Sound Council of Governments region--2.8% per year through 1985--by 1986, the total change would be only 14.8%. In only five of the 15 counties or multi-county regions in the study area does planned expansion of moorage supply fall short of 14.8%, and in two of these cases--Pacific and Grays Harbor counties, and Columbia River counties--significant and growing year-round vacancies are evident. Even recognizing that fleet expansion forecasts rely solely on historical boat trailer registration data, the 20% of the fleet which utilizes moorage facilities would have to expand at a rate 5 times faster than the trailered fleet to fill planned moorage by 1986! Put another way, if the moored fleet grew at the same rate as the trailered fleet, it would take 10 years to fill the new moorage slips planned to be on line within the next 5 years.

Obviously, not all moorage facilities now on the drawing boards will be built, nor, if built, would they necessarily be as large as originally proposed. Furthermore, delays due to permit procedures, or financing difficulties, could retard the proposed rate of expansion. Nonetheless, in counties where 5-year expansion plans dramatically exceed forecasted rates of fleet expansion, investor caution is in order.

C. Investment Potential and Constraints

Counties with High Year-round Vacancies

Pacific and Grays Harbor counties: persistent high, year-round vacancies are found in existing public marinas (Westport and Ilwaco) due to

restrictions on the sport and commercial ocean salmon fisheries and fuel cost increases.

Lower Columbia River counties: (Wahkiakum, Cowlitz, and Clark). Persistent year-round and even higher winter seasonal vacancies are evident in these counties in which rental rates are the lowest among all Washington coastal counties.

Counties with Excess Summer Seasonal Demand Only

San Juan, Mason, and the eastern parts of Clallam and Jefferson counties exhibit winter seasonal vacancies. "Market limit" rates are one dollar per foot per month lower in winter than in summer. The western part of Clallam County (west of Port Angeles) is a special case: Moorage facilities are rented by the day and close during winter months, except for LaPush Boat Haven, leased from the Quileute Tribe by the Port of Port Anageles. Access to the county's shoreline has been reduced by the Hood Canal Bridge disaster. Sequim Bay Marina, if built, would satisfy growth in demand in east Clallam and east Jefferson counties for the next 10 years.

Counties with Excess Year-round Demand

Most Puget Sound counties' marinas are full and waiting lists are evident at the highest priced facilities. Skagit, Island, Snohomish, Pierce, Thurston, and Kitsap have no significant vacancies. New King County marinas charging $4.50 or more per foot per month for open wet moorage have experienced slow fill-up (15 boats per month, between January and September 1981). Whatcom County mainland marinas are full year-round.

However, when the planned additions to the stock of moorage in these counties is taken into account, there are several cases where over-investment by 1986 could occur. In Skagit County, planned moorage could expand the existing supply almost 3-fold, in Whatcom by 45%, Thurston 56%, Kitsap by 27%, and King County by 21%. In each case, the rate of expansion significantly exceeds that forecasted for the Puget Sound Council of Governments' four-county region by 1986: 14.8%. Furthermore, this forecast was made before the Prime Rate soared to its 1981 peak and the consequent 50% drop in sales of boats and motors from the 1978 high ($'s, 1967) appeared. The forecast may, simply, be overly optimistic.

- Changes in key moorage market indicators--occupancy rates, waiting lists and prices--should be assessed by potential developers to identify recent changes in market conditions at the county level.

- The rate at which new facilities fill with boats should be monitored carefully. Data on the origin of new tenants, their boat type and length, whether they relocated from existing moorage, or are new boaters to the region, should be collected and analyzed. Such studies are particularly important at new public facilities where rental rates are lower than prevailing private rates in the

same market area. The WPPA Marine Committee could maintain such information for and through its member ports. Similar services for the private sector could be performed statewide by the Northwest Marine Trade Association (NMTA), or the Association of Independent Moorages (AIM) in the Seattle area.

D. Condominium Moorage

This report has dealt with condominium moorage in the same way as rental moorage; that is, it is treated as part of the stock of moorage available for occupancy by boaters. It is common practice to lease unsold slips as if they were rental moorage slips, at rates established by market forces. However, as the proportion of slips sold in these facilities increases, there may be differences in the composition of fleets moored in condominium marinas compared to fleets in rental facilities. This speculation rests on the assumption that condominium moorage offers tax advantages to those in higher (50%+) income tax brackets--individuals more able to own larger boats.

- Fleet characteristics of boats mooring in condominium moorage facilities should be compared with those occupying rental moorage in the same service area to determine whether significant differences exist.

III. CHARACTERISTICS OF THE RECREATIONAL SMALLCRAFT FLEET, 1978

A. Methods

During June, 1979, the Washington Sea Grant (WSG) Program, with the assistance of the NMTA and the U.S. Army Corps of Engineers (COE) Seattle District, conducted a survey of 2,500 boating households in Washington and northern Oregon Columbia River counties. The study area for destination boating needs and activities included all Washington coastal counties and the counties bordering the Washington bank of the Columbia River upstream to the Bonneville Dam.

Access to USCG boat registration data for 1978 was provided to Washington Sea Grant researchers through the courtesy of the COE Seattle District office. Analysis of these data revealed that of 154,536 entries, approximately 130,000 were motorized recreational boats. The number of boats appearing on USCG files are listed by length class and county of registration in Table 3.1. Documented pleasure craft did not appear on this list. In addition, data on 20,000 pleasure craft registered in northern Oregon Columbia River counties were made available through the Oregon State Marine Board files.

Using every 60th name on the two data lists, a sample of 2,500 Washington and Oregon boat owners was drawn for a mail survey of boating households. A copy of the questionnaire appears as Appendix A. Usable responses were received from 439 households which accounted for 615 registered boats. Analyses of the responses were performed by the COE Seattle District, Automatic Data Processing Section, using the Statistical Package for the Social Sciences (SPSS). Further analyses were performed at the University of Washington using the same statistical program.

Statistically reliable estimates of the entire motorized fleet characteristics can be inferred from the responses to questions 1-15, 29-31, and 36-41. In the case of these questions there was a 95% probability that the mean values of responses to those questions lie within plus or minus 5% of the mean value of the entire fleet. For example, it is proper to impute the number of boats in each length class in the entire fleet from the distribution of length classes of boats in the sampled population.

Where questions are specific to a particular county (16-28, 32-34), the number of responses is insufficient in most cases to give reliable estimates of the whole fleet's utilization of facilities in that county, or the precise demands made by another county's boaters on those same facilities. For example, the number of recreational smallcraft from Pierce County using temporary moorage in San Juan County cannot be ascertained from the sample data. However, the regionwide proportions of the fleet mooring in county of residence, adjacent counties, or non-adjacent counties can be determined from the sample, since the inferences are drawn from data describing a larger, aggregated population.

Table 3.1. Washington pleasure smallcraft registration by county and size class, 1978.

County		1'-11'	12'-15'	16'-20'	21'-26'	27'-32'	33'-39'	40'-50'	51'-65'	65+	NEC	Total	Number House'lds (000's)	Reg'd boats/ 1000H's	Reg'd trailers	Trailer/ 1000H's
Whatcom	#	53	704	1,619	620	198	76	19	2	0	0	3,291	34.01	96.7	3,690[1]	108.50
	%	1.6	21.4	49.2	18.8	6.0	2.3	0.6	0.1	0.0	0.0	100.0	2.71	--	3.10	--
San Juan	#	19	211	337	191	61	34	17	2	1	1	874	2.91	300.34	142	48.80
	%	2.2	24.1	38.6	21.9	7.0	3.9	1.9	0.2	0.1	0.1	100.0	.23	--	0.12	--
Skagit	#	76	940	1,368	379	135	39	11	1	0	0	2,949	20.35	144.91	2,722	133.76
	%	2.6	31.9	46.4	12.9	4.6	1.3	0.4	0.0	0.0	0.0	100.0	1.62	--	2.29	--
Island	#	89	823	897	206	60	8	6	2	1	0	2,092	12.65	165.38	1,663	131.46
	%	4.3	39.3	42.9	9.9	2.9	0.4	0.3	0.1	0.1	0.0	100.0	1.01	--	1.40	--
Snohomish	#	357	3,260	3,772	944	231	80	40	6	2	3	8,695	91.34	95.19	10,404[1]	113.90
	%	4.1	37.5	31.9	10.9	2.7	1.0	0.5	0.1	0.0	0.0	100.0	7.27	--	8.74	--
King	#	3,453	17,970	19,955	5,993	2,142	908	396	47	20	11	50,895	419.40	121.35	30,263	72.16
	%	6.8	35.3	39.2	11.8	4.2	1.8	0.8	0.1	0.0	23.91	100.0	33.37	--	25.41	--
Pierce	#	552	5,511	6,685	1,455	400	151	49	5	4	1	14,813	150.03	98.73	11,707	78.03
	%	3.7	37.2	45.1	9.8	2.7	1.0	0.3	0.0	0.0	2.17	100.0	11.94	--	9.83	--
Thurston	#	150	1,411	1,707	428	128	46	13	1	0	1	3,885	36.52	106.38	4,594[1]	125.79
	%	3.9	36.3	43.9	11.0	3.3	1.2	0.3	0.0	0.0	2.17	100.0	2.91	--	3.86	--
Mason	#	85	707	663	124	30	12	4	0	0	0	1,625	9.06	179.36	1,082	119.43
	%	5.2	43.5	40.8	7.6	1.85	0.7	0.3	0.0	0.0	0.0	100.0	0.72	--	0.91	--
Kitsap	#	274	2,375	2,466	624	188	83	17	2	1	5	6,035	47.23	127.78	3,723	78.83
	%	4.5	39.4	40.9	10.3	3.1	1.4	0.3	0.0	0.0	0.1	100.0	3.76	--	3.13	--
Clallam	#	98	1,326	1,320	279	70	18	12	0	1	2	3,126	16.07	194.52	3,012	187.43
	%	3.1	42.4	42.2	8.9	2.2	0.6	0.4	0.0	0.0	0.1	100.0	1.28	--	2.53	--
Jefferson	#	34	319	377	126	36	13	3	0	3	1	912	5.27	173.06	699	126.94
	%	3.7	35.0	41.3	13.8	4.0	1.4	0.3	0.0	0.3	0.1	100.0	0.42	--	0.56	--
Puget Sound Region	#	5,240	35,557	41,166	11,369	3,679	1,468	587	68	33	25	99,192	839.60	--	73,701	--
	%	5.3	35.9	41.5	11.5	3.7	1.5	0.6	0.1	0.0	0.0	100.0	67.10		61.90	
Grays Harbor	#	83	891	623	147	18	3	0	0	0	1	1,766	21.71	81.35	1,815[1]	83.60
	%	4.7	50.5	35.3	8.3	1.0	0.2	0.0	0.0	0.0	0.1	100.0	1.73	--	1.52	--
Pacific	#	36	279	218	61	7	1	0	0	0	2	604	6.14	98.37	481	78.34
	%	6.0	46.2	36.1	10.1	1.2	0.2	0.0	0.0	0.0	0.3	100.0	0.49	--	0.40	--
Columbia River	#	190	3,394	3,808	662	106	26	4	0	2	2	8,194	85.26	90.80	7,784	91.30
	%	2.3	41.4	46.5	8.1	1.3	0.3	0.1	0.0	0.0	0.0	100.0	6.78	--	6.54	--
Wash. Coastal Zone	#	5,549	40,121	45,815	12,239	3,810	1,498	591	68	35	30	109,756	952.70	113.98	83,751	87.43
	%	5.1	36.6	41.7	11.2	3.5	1.4	0.5	0.1	0.0	0.0	100.0	76.21	--	70.33	--
Rest of Wash.	#	516	9,994	12,400	1,336	188	95	39	4	10	16	24,598	298.98	82.27	35,335[1]	118.19
	%	2.1	40.1	50.4	5.4	0.8	0.4	0.2	0.0	0.0	0.1	100.0	23.79	--	29.67	--
Wash. Total	#	6,065	50,115	58,215	13,575	3,988	1,593	630	72	45	46	134,354	1,251.70	106.89	119,086	94.74
	%	4.5	37.3	43.3	10.1	3.0	1.2	0.5	0.1	0.0	0.0	100.0	100.00	--	100.00	--

[1]Number registered trailers exceeds number registered boats.

Source: U.S. Coast Guard boat registrations; Washington State Department of Motor Vehicles trailer registrations; U.S. Bureau of Census census of population.

The survey respondents were broken down into two additional groups: Washington State residents, and Puget Sound County residents. In general, the same cautions pertaining to the statistical significance of these responses must be used as for the entire Washington and Oregon sample.

B. Length Class by County of Residence

In order to revise the USCG registration figures the number of boat trailers in each county was obtained from the State Department of Licenses. These data are believed to be very accurate since enforcement of trailer registration is performed by the Washington State Patrol and local police responsible for highway law enforcement. Table 3.1 contains the number of registered trailers, by county, region and state. Note that in four counties and "Rest of Washington"--east of the Cascade Range--the number of registered trailers exceeds the number of boats registered by the USCG in 1978. Within Puget Sound, the USCG registered approximately 75% of the "registerable" fleet, an improvement over 1966 when only 55% of the fleet was registered.[6] Statewide only 66% of the fleet was registered in 1978. From the Boating Household Survey responses it was determined that 58.7% of Washington boats in the sample are normally trailered. Using this ratio of trailered to non-trailered boats and dividing the number of registered trailers by this ratio the author estimated the total number of registerable boats in Washington State and the study region. These are tabulated in Table 3.2. Some errors creep into this estimate: first, there are small commercial fishing vessels which are normally trailered (kelpers and some gillnet vessels). Second, non-powered river "drift boats" which are not required to be registered are transported on trailers. Third, there may be geographical variations in the use of boat trailers: for example, where moorage rates are high and slips scarce there is greater incentive to trailer vessels, and, conversely, where rates are low and moorage more readily available, trailerable boats may be kept in wet moorage. Fourth, households may transport more than one boat on a single trailer. One more serious omission in these estimates is the number of non-motorized racing sailboats normally occupying wet moorage, but not registered by the USCG. Kayaks, canoes, rowboats, and non-motorized day-sailing boats are entirely omitted from both the USCG records and the author's revised estimate. It is believed that these boats contribute little to congestion at launch facilities and do not, as a rule, use wet moorage or dry storage facilities; they are stored at home, travel by car top and are launched by hand.

Seventy-two percent of the 132,556 boats in Puget Sound and adjacent waters are 20' or less in length; 87% are less than 27', the length usually limiting trailerability of vessels without fixed keels. Statewide, 74% of the fleet is less than 20' in length and 88% is less than 27'. County-level estimates of boat length distribution cannot be made from household survey data.

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[6]Source: U.S. Army Corps of Engineers, Pleasure Boat Study, 1966.

Table 3.2. Number of motorized pleasure boats by length class, author's estimate, 1978.

Region		Length class of vessel									
		Under 12'	12-15'	16-20'	21-26'	27-32'	33-39'	40-50'	51-65'	65' +	Total
Puget Sound	#	16,967	33,537	45,732	19,088	7,821	5,302	3,181	928	--[2]	132,556[1]
	%	12.8	25.3	34.5	14.4	5.9	4.0	2.4	0.7	--	100.0
State total	#	24,345	50,515	76,483	27,793	11,158	7,101	4,463	1,217	--[2]	202,872
	%	12.0	24.8	37.7	13.6	5.5	3.5	2.2	0.6	--	100.0

[1]Total errors due to rounding percent distribution by size class.

[2]Pleasurecraft in this size class are usually documented vessels and do not appear as registered smallcraft in the USCG files.

Source: WSG Boating Household Survey, Washington State Trailer Registrations, 1978.

C. Propulsion, Construction, and Engine Characteristics

Of 491 Washington State boats represented in the 1979 Boating Household Survey, less than 9% were powered sailboats. Over half the smallcraft were powered by outboard motors (60.7%), one-fifth were inboard/outdrive (20.0%), and the remaining 10.6% had inboard powerplants. Powered sailboats (90.3%), and inboards (88.3%) usually exceed 20' in length, but outboards rarely do (1.0%). Outdrives occupy the 16-26' vessel size class (96.9%). Table 3.3 reveals the distribution of vessel propulsion types over the various vessel size classes.

Table 3.4 shows the percentage distribution of the Washington recreational smallcraft fleet across size classes and hull construction material. The most favored construction material for boats over 12' in length is fiberglass; over 60% of the Washington recreational smallcraft fleet is built from this material. Aluminum is the most popular material used to build 12-15' boats (39.5%). Boats built from aluminum account for 16% of the fleet. Wood, while used across all size of classes becomes increasingly popular as the length increases, accounting for 36% of boats in the 40-50' class and two-thirds of those in the 51-65' class. Wood boats account for 15% of the Washington recreational smallcraft fleet. Steel, the least evident construction material, is used in less than 1% of the fleet. Other materials, such a ferro-cement, account for only one-half of 1% of the fleet.

When propulsion rather than length is compared with construction material, the following patterns emerge (see Table 3.5): wood and fiberglass account for almost equal shares of inboard boat construction (47.5% and 45.8%, respectively) and are favored 9:1 over steel. Inboard/outdrives are almost entirely constructed from fiberglass (91.8%), as are powered sailboats (83.3%). Outboards are primarily fiberglass (57.1%), followed by aluminum (27.5%); wood accounts for only 14.6% of outboards.

Main engine horsepower (hp) varies both with the length and propulsion type. Table 3.6 and Table 3.7 show the percentage distribution of hp by length and propulsion type, respectively. A general trend of hp increasing with length is evident, but two groups of length classes vary significantly from this trend: in the 21-26', 27-32', and 33-39' classes, distribution of hp splits into high and low groups; in the 16-20' and 21-26' classes, the engines are larger than the general trend. The first group is split between sailboats (low hp) and larger powerboats (higher hp); the second group is probably ski boats or drag boats (high hp). Median[7] horsepower class for each size class and propulsion type is shown in tables as asterisks (*). Sailboats have, expectedly, the smallest median hp (less than 10). Inboards have the highest (201-300). Inboard/outdrive median hp is one class behind inboard (131-200); while outboard median is 26-50 hp.

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[7]The median value in this case is the hp class above and below which there are equal numbers of boats.

Table 3.3. Washington State recreational smallcraft fleet: Propulsion by size class (percentage distribution), 1979.

Propulsion		Vessel size class: Less than 12'	12'-15'	16'-20'	21'-26'	27'-32'	33'-39'	40'-50'	51'+	Propulsion Total
Inboard	Row	0.0	2.0	9.8	25.5	23.5	17.7	15.7	5.9	10.6
	Col	0.0	0.8	2.7	19.7	46.2	52.9	75.0	100.0	--
Inboard/ Outdrive	Row	0.0	1.0	59.4	37.5	2.1	0.0	0.0	0.0	20.0
	Col	0.0	0.8	31.2	54.6	7.7	0.0	0.0	0.0	--
Outboard	Row	17.8	40.4	40.8	1.0	0.0	0.0	0.0	0.0	60.7
	Col	94.6	98.3	65.0	4.6	0.0	0.0	0.0	0.0	--
Sail	Row	7.3	0.0	2.4	34.2	29.3	19.5	7.3	0.0	8.5
	Col	5.5	0.0	0.6	21.2	46.2	47.1	25.0	0.0	--
Other	Row	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.2
	Col	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0	--
Total		11.4	25.0	38.1	13.7	5.4	3.5	2.3	0.6	100.0

Source: WSG Boating Household Survey, 1979.

Note: Two entries in the table are in heavy boxes. The first, "Outboard" row, "21'-26'" column is interpreted as follows: of all the outboard boats in the Washington State recreational smallcraft fleet, 1.0% of these are in 21'-26' size category. Conversely, the second entry, "Sail" row, "33'-39'" column, means: of all the boats in the fleet whose length is from 33'-39', 47.1% are powered sailboats.

Table 3.4. Washington State recreational smallcraft fleet: Hull construction by size class (percentage distribution), 1979.

Construction material		Vessel size class								Construction type total (Row)
		Less than 12'	12'-15'	16'-20'	21'-26'	27'-32'	33'-39'	40'-50'	51'+	
Wood	Row	6.8	24.3	31.1	13.5	9.5	6.8	5.4	2.7	15.2
	Col	8.5	15.1	12.5	14.9	25.9	29.4	36.4	66.7	--
Steel	Row	0.0	33.3	0.0	0.0	33.3	0.0	0.0	33.3	0.6
	Col	0.0	0.8	0.0	0.0	3.7	0.0	0.0	33.3	--
Aluminum	Row	19.7	61.8	15.8	2.6	0.0	0.0	0.0	0.0	15.6
	Col	25.4	39.5	6.5	3.0	0.0	0.0	0.0	0.0	--
Fiberglass	Row	11.8	16.0	44.3	16.6	5.7	3.6	2.1	0.0	68.2
	Col	66.1	44.5	79.9	82.1	70.4	70.6	63.6	0.0	--
Other	Row	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.4
	Col	0.0	0.0	1.1	0.0	0.0	0.0	0.0	0.0	--
Size class Total	Col	12.1	24.4	37.8	13.8	5.5	3.5	2.3	0.6	100.0

Source: WSG Boating Household Survey, 1979.

Table 3.5. Washington State recreational smallcraft fleet: Hull construction material by propulsion type (percentage distribution), 1979. (Includes N. Oregon Columbia River counties.)

Propulsion		Construction material					Propulsion total
		Wood	Steel	Aluminum	Fiberglass	Other	
Inboard	Row	47.5	5.1	1.7	45.8	0.0	9.8
	Col	30.8	60.0	0.9	6.9	0.0	
Inboard/ Outdrive	Row	2.5	0.8	4.9	91.8	0.0	20.2
	Col	3.3	20.0	5.4	28.6	0.0	
Outboard	Row	14.6	0.0	27.5	57.1	0.8	61.5
	Col	59.3	0.0	91.1	54.1	100.0	
Sail	Row	12.5	2.1	2.1	83.3	0.0	8.0
	Col	6.6	20.0	0.9	10.2	0.0	
Other	Row	0.0	0.0	66.7	33.3	0.0	0.5
	Col	0.0	0.0	1.8	0.3	0.0	
Total		15.1	0.8	18.6	65.0	0.5	100.0

Source: WSG Boating Household Survey, 1979.

Table 3.6. Washington State recreational smallcraft fleet: Main engine horsepower by size class (percentage distribution), 1979. (Includes N. Oregon Columbia River counties.)

Size class		Horsepower class - main engine: Less than 10	11-25	26-50	51-80	81-130	131-200	201-300	300+	Size class total
Less than 12'	Row	97.1*	2.9	0.0	0.0	0.0	0.0	0.0	0.0	11.4
	Col	40.6	3.5	0.0	0.0	0.0	0.0	0.0	0.0	--
12'-15'	Row	42.0	24.7*	24.1	8.1	1.2	0.0	0.0	0.0	28.7
	Col	44.0	74.1	45.2	17.5	2.3	0.0	0.0	0.0	--
16'-20'	Row	2.7	3.1	15.7	28.3*	28.7	15.7	4.5	1.4	36.7
	Col	3.6	12.1	37.6	78.8	73.6	52.2	28.6	14.3	--
21'-26'	Row	18.2	2.6	1.3	1.3	18.2	31.2*	22.1	5.2	12.7
	Col	8.4	3.5	1.1	1.3	16.1	35.8	68.6	19.1	--
27'-32'	Row	19.4	6.5	22.6	0.0*	9.7	16.1	12.9	12.9	5.1
	Col	3.6	3.5	7.5	0.0	3.5	7.5	11.4	19.1	--
33'-39'	Row	0.0	11.1	33.3	5.6*	16.7	5.6	11.2	16.7	3.0
	Col	0.0	3.5	6.5	1.3	3.5	1.5	5.7	14.3	--
40'-50'	Row	0.0	0.0	16.7	8.3	0.0	16.7	16.7*	41.7	2.0
	Col	0.0	0.0	2.2	1.3	0.0	3.0	5.7	23.8	--
50'+	Row	0.0	0.0	0.0	0.0	33.3	0.0	0.0	66.7*	0.5
	Col	0.0	0.0	0.0	0.0	1.2	0.0	0.0	9.5	--
Total HP class		27.4	9.6	15.3*	13.2	14.3	11.0	5.8	3.5	100.0

*Median horsepower class for size class.

Source: WSG Boating Household Survey, 1979.

Table 3.7. Washington State recreational smallcraft fleet: Main engine horsepower by propulsion type (percentage distribution), 1979. (Includes N. Oregon Columbia River counties.)

Propulsion		Horsepower class - main engine								Propulsion total
		10	11-25	26-50	51-80	81-130	131-200	201-300	300+	
Inboard	Row	0.0	7.0	0.0	0.0	15.8	19.3	28.1*	29.8	16.0
	Col	0.0	7.7	0.0	0.0	10.7	16.4	45.7	81.0	--
Inboard/ Outdrive	Row	0.8	0.8	0.0	0.0	38.0	41.3*	15.7	3.3	21.2
	Col	0.7	1.9	0.0	0.0	54.8	74.6	54.3	19.1	--
Outboard	Row	33.0	12.4	22.3*	22.3	8.4	1.7	0.0	0.0	60.6
	Col	81.4	82.7	16.3	96.3	34.5	9.0	0.0	0.0	--
Sail	Row	55.6*	6.7	33.3	4.4	0.0	0.0	0.0	0.0	7.9
	Col	17.9	5.8	83.7	2.5	0.0	0.0	0.0	0.0	--
Other	Row	0.0	50.0	0.0	50.0	0.0	0.0	0.0	0.0	0.4
	Col	0.0	1.9	0.0	0.0	0.0	0.0	0.0	0.0	--
Horsepower total		24.5	9.1	16.1	14.7*	14.7	11.7	6.1	3.7	100.0

*Median horsepower class for propulsion type.

Source: WSG Boating Household Survey, 1979.

D. Trailerability

Respondents to the WSG Boating Household Survey were asked, "Do you normally trailer your boat?" It was hoped that this question would permit us to identify regional variations in moorage/launching ramp utilization. In retrospect, two other questions should have been asked: (a) is your boat trailerable? and (b) do you own a boat trailer? Armed with the responses to these questions we would have a more precise measure of the proportion of trailerable boats using wet moorage or dry storage adjacent to water, and a more certain census of vessels based on boat trailer registrations. Table 3.8 summarizes trailerability by boat length class.

In Puget Sound and adjacent waters, 55.6% of registerable recreational boats are normally trailered. Statewide, this proportion increases to 58.7%, reflecting the smaller length class of the inland river and lake-based boating fleet. When size class of vessels is examined in Table 3.8 the limits to trailerability become clear: the highest rate of trailer use is in the 16-20' class (85.7%); below that length class boats are either car-topped to the water, stored aboard larger vessels, or moored at buoys or floats. Boats 21-26' in length are equally divided between those trailered and non-trailered; in the 27-32' length only 3.9% are trailered, and no boats over 32' are normally trailered.

Since almost 52% of the state's recreational smallcraft fleet falls into the 16-26' size grouping, factors which influence trailering boats will have a potentially dramatic effect on the availability of moorage. Moorage rates, fuel costs and availability, and pulling power of the automobile fleet could work jointly to influence boaters' decision to moor, store, or trailer their boat, the destination areas they use, or even whether to participate or not participate in recreational boating. These issues will be taken up in Chapter V of this report.

E. Ownership, Age, and Market Value

In 1979, the typical boater in Washington state owned a 10-year-old, twenty-foot-long boat,[8] which was purchased in 1978 for $6,108 and had a current (1979) market value of $6900. A boating household typically owned 1.4 boats.[9] Second boats with an average length of 14' were owned by 33.5% of the boating households; third boat owners, 7.3% of boating households, typically owned a third largest boat of 13' average length. One of three boats purchased during the preceding twelve months were new boats, two were used boats. Annual sales of new boats accounted for 5% of the 1979 fleet. The rate of boats being scrapped, or sold out of state

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[8]Boat lengths of less than 12' were assumed to average 10' in length. Boats purchased or built before 1962 were assumed to have been purchased or built in 1960; this assumption may result in an underestimate of age and length of ownership.

[9]This may be a conservative number, since the survey did not account for ownership of more than three boats.

Table 3.8. Washington State recreational smallcraft fleet: trailerability of vessels by length class.

Length of class	Percent normally trailered		Percent not normally trailered		Percent in size class	
	Puget Sound	Washington State	Puget Sound	Washington State	Puget Sound	Washington State
Less than 12'	47.1	44.6	52.9	55.4	12.8	12.0
12-15'	52.0	56.0	48.0	44.0	25.3	24.9
16-20'	85.3	85.7	14.7	14.3	34.5	37.7
21-26'	45.9	49.3	54.1	50.8	14.4	13.7
27-32'	4.2	3.9	95.8	96.2	5.9	5.5
33-39'	0.0	0.0	100.0	100.0	4.0	3.5
40-50'	0.0	0.0	100.0	100.0	2.4	2.2
50' +	0.0	0.0	100.0	100.0	0.7	0.6
Total	55.6	58.7	44.4	41.3	100.0	100.1[1]

[1]Error due to rounding.

Source: Washington Sea Grant Boating Household Survey, 1979.

is unknown.[10] Table 3.9 and 3.10 show the distribution of the fleet by year acquired by present owner and age of boat, respectively.

F. Income of Owners

When just the largest boat owned is considered, there is an expected general trend of boat length increasing with the income class of the owner. Table 3.11 reveals that the median household income class of owners ragnes from $10-15,000 per year for boats of less than 12' in length, to over $45,000 per year for boats in the 40-50' class. The only reversal in this trend is in the 27-32' class: here owner's median income is lower than for the next smaller class, the 21-26' length boat. Larger outdrives dominated the 21-26' class two to one over both sail and inboard power boats, while inboards and sailboats account for an equal and overwhelming share of the 27-32' class (see Table 3.3). This distinction seems ironic since sailboats and inboards outprice outdrives 2.5:1, suggesting some difference in values and motivation of the owners of these different vessel types, e.g., do sailboaters and inboard power boaters allocate more of their disposable income to their recreational boating, than do owners of outdrives?

When first, second, and third largest boats are combined, as in Table 3.12, the median income class for owners of boats 12' and under increases to $25-30,000 per household, per year, reflecting the use of small outboards by larger boat owners for either ferrying passengers ashore, as a lifeboat, or simply "kickers" for sheltered water fishing.

G. State of Purchase and Manufacture

Ninety-four percent of boats owned in Washington State were purchased in Washington State, 3% in Oregon, 2% in California and 1% in other states. Approximately one in three boats purchased were new boats; the remaining two were used boat sales. It is not known what proportion of used boat sales were by brokers versus private parties, however.

Domestically-produced boats in the Washington recreational fleet are manufactured in 23 states. Of all boats in the fleet, 60.9% are manufactured in Washington and 35.7% elsewhere in the United States. Imported hulls account for 3.6% of the fleet.

When length classes of boats manufactured in Washington State are compared to those manufactured elsewhere, it is apparent that Washington State is more self-sufficient in supplying the recreational boater with small boats, than with large ones; 68% of the boats 26' or under are manufactured in Washington, while only 27% over 26' in length are manufactured in this state.

[10] The volume of boats scrapped, or sold out of state could be determined in the future if a suitable boat registration bill were passed. Annual renewal of registration and returns of certificates of title to the licensing agency when a boat is scrapped or sold out of state would ensure that these data were maintained.

Table 3.9. Washington State recreational smallcraft fleet: Year boat acquired by present owner. (Includes N. Oregon Columbia River counties.)

Year acquired	Percent of fleet
1978	9.3
1977	10.9
1976	12.4
1975	10.9
1974	8.7
1973	7.3
1968-72	24.6
1963-67	8.3
1962 or earlier	7.6
Total	100.0

Source: WSG Boating Household Survey, 1979.

Table 3.10. Washington State recreational smallcraft fleet: Age of Boat. (Includes N. Oregon Columbia River counties.)

Age (Years)	Percent of fleet
1	5.1
2	6.4
3	9.6
4	6.0
5	9.1
6-10	31.0
11-25	30.5
26+	2.3
Total	100.0

Source: WSG Boating Household Survey, 1979.

Table 3.11. Washington State recreational smallcraft fleet: Owners' income class, by size class, largest boat, 1979. (Includes N. Oregon Columbia River counties.)

Length class		Income classes									Total length class[1]
		Less than $10,000	$10,000-15,000	$15,000-20,000	$20,000-25,000	$25,000-30,000	$30,000-35,000	$35,000-40,000	$40,000-45,000	Over $45,000	
Less than 12'	Row %	33.3	22.2*	0.0	11.1	11.1	0.0	11.1	0.0	11.1	2.4
	Col %	11.5	9.1	0.0	1.4	1.7	0.0	2.9	0.0	1.9	
12'-15'	Row %	14.8	7.4	21.0	21.0*	12.3	9.9	6.2	3.7	3.7	21.2
	Col %	46.2	27.3	36.2	23.9	17.2	17.8	14.7	11.5	5.7	
16'-20'	Row %	3.0	6.5	12.5	20.8	17.9*	13.7	10.1	5.4	10.1	44.0
	Col %	19.2	50.0	44.7	49.3	51.7	51.1	50.0	34.6	32.1	
21'-26'	Row %	7.1	4.3	4.3	17.1	11.4	15.7*	7.1	12.9	20.0	18.3
	Col %	19.2	13.6	6.4	16.9	13.8	24.4	14.7	34.6	26.4	
27'-32'	Row %	4.0	0.0	12.0	20.0	24.0*	8.0	16.0	8.0	8.0	6.5
	Col %	3.8	0.0	6.4	7.0	10.3	4.4	11.8	7.7	3.8	
33'-39'	Row %	0.0	0.0	6.3	6.3	12.5	6.3	6.3	12.5*	50.0	4.2
	Col %	0.0	0.0	2.1	1.4	3.4	2.2	2.9	7.7	15.1	
40'-50'	Row %	0.0	0.0	10.0	0.0	0.0	0.0	10.0	10.0	70.0*	2.6
	Col %	0.0	0.0	2.1	0.0	0.0	0.0	2.9	3.8	13.2	
Over 50'	Row %	0.0	0.0	33.3	0.0	33.3*	0.0	0.0	0.0	33.3	0.8
	Col %	0.0	0.0	2.1	0.0	1.7	0.0	0.0	0.0	1.9	
Total	Col %	6.8	5.8	12.3	18.6	15.2*	11.8	8.9	6.8	13.9	100.0

[1] Length class distribution not comparable to Table 33: only largest boat owned is reported here.

* Median income class by boat length.

Source: WSG Boating Household Survey, 1979.

Table 3.12. Washington State recreational smallcraft fleet: Owners' income class by size class, all boats, 1979. (Includes N. Oregon Columbia River counties.)

Length class		Income classes									Total length class
		Less than $10,000	$10,000-15,000	$15,000-20,000	$20,000-25,000	$25,000-30,000	$30,000-35,000	$35,000-40,000	$40,000-45,000	Over $45,000	
Less than 12'	Row	6.6	9.8	8.2	18.0	18.0*	4.9	9.8	14.8	9.8	
	Col	13.3	19.4	7.8	11.0	12.5	5.1	12.8	20.5	7.2	11.2
12'-15'	Row	8.5	7.2	15.0	20.9*	15.0	9.2	8.5	5.9	9.8	
	Col	43.3	35.5	35.9	32.0	26.1	23.7	27.7	20.5	18.1	28.0
16'-20'	Row	3.5	5.5	12.0	19.5	18.0*	13.5	8.5	5.5	14.0	
	Col	23.3	35.5	37.5	39.0	40.9	45.8	36.2	25.0	33.7	36.6
21'-26'	Row	6.7	4.0	6.7	16.0	10.7	16.0*	6.7	13.3	20.0	
	Col	16.7	9.7	7.8	12.0	9.1	20.3	10.6	22.7	18.1	13.7
27'-32'	Row	3.6	0.0	14.3	17.9	25.0*	7.1	14.3	7.1	10.7	
	Col	3.3	0.0	6.3	5.0	8.0	3.4	8.5	4.6	3.6	5.1
33'-39'	Row	0.0	0.0	6.3	6.3	12.5	6.3	6.3	12.5	50.0*	
	Col	0.0	0.0	1.6	1.0	2.3	1.7	2.1	4.6	9.6	2.9
40'-50'	Row	0.0	0.0	10.0	0.0	0.0	0.0	10.0	10.0	70.0*	
	Col	0.0	0.0	1.6	0.0	0.0	0.0	2.1	2.3	8.4	1.8
Over 50'	Row	0.0	0.0	33.3	0.0	33.3*	0.0	0.0	0.0	33.3	
	Col	0.0	0.0	1.6	0.0	1.1	0.0	0.0	0.0	1.2	0.6
Total income classes		5.5	5.7	11.7	18.3	16.1*	10.8	8.6	8.1	15.2	100.0

*Median income class by boat length.

Source: WSG Boating Household Survey, 1979.

IV. UTILIZATION OF MOORAGE AND STORAGE FACILITIES

A. Origin of Demand for Wet Moorage

Boaters place four kinds of demand on moorage facilities: year-round, seasonal, temporary, and transient. The non-trailerable boat owner usually maintains occupancy at a year-round, permanent facility to ensure the slip remains available, but will sometimes sub-lease the slip on a seasonal basis to be nearer favored destination areas - e.g., San Juan Islands. Temporary and transient moorage is used overnight or longer, during weekend or vacation cruises by trailerable and non-trailerable boats.

Of the 439 respondents to the WSG Boating Household Survey, 79 boaters indicated they moored their largest boat in the study area (Western Washington waters) year-round; 97 used summer seasonal moorage, and 77 used winter seasonal moorage in the same area. But of those responding to the seasonal use questions, 22 used only summer moorage and 8 used only winter moorage, thereby placing demands on facilities in addition to those occupying moorage year round. Table 4.1 summarizes these responses. Permanent, year-round moorage users moored predominantly in their county of residence (86.9%); only 5.6% moored in counties adjacent to county of residence[11] and 7.5% in counties beyond those adjacent to county of residence.

The propensity of recreational boaters to utilize permanent and seasonal moorage close to their homes (within county of residence) is further reinforced by results of the survey conducted at the 1980 Seattle Boat Show. One-hundred forty-two boaters, predominantly from central Puget Sound counties, were asked to estimate the number of miles between home and place of moorage. Twenty-three percent moored either at home or within 2 miles of their residence, over 50% moored less than 8 miles from their home, and 75% moored less than 12 miles from home. Only 10% of the respondents moored their boats more than 30 miles from home, and these destinations were primarily ports in north Puget Sound, convenient to the cruising waters of the San Juan Islands.

Temporary (4-29 days) and transient (1-3 days) moorage demand shows a reversal of locational choice, particularly in the summer months: 72% of temporary summer moorage and 74% of transient summer moorage occurred beyond counties adjacent to county of residence. During winter months 42% of temporary moorage and 53% of transient moorage was in distant counties. San Juan, West Clallam and West Jefferson, Island, and Mason counties were the favored destinations for temporary summer moorage. Transient boaters used moorage in San Juan, Kitsap, Island, East Clallam and Jefferson counties, and Skagit county, ranked in order of use. The information gained on moorage use by respondents to the WSG Boating House-

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[11] Defined as a county, contiguous by land to county of residence of boater.

Table 4.1. Utilization of moorage/storage in Washington's coastal zone by county of residence, 1978.

Moorage/ storage use	Location of moorage/storage: Percent in county of residence	Percent in adjacent county	Percent in non-adjacent county	Total percent*	Number of respond-dents
Year round	88.5	5.7	5.7	99.9	160
Seasonal summer	86.5	5.9	7.7	100.1	174
Seasonal winter	87.0	5.6	7.4	100.0	164
Temporary summer	26.0	6.5	67.4	100.0	89
Temporary winter	51.9	7.4	40.7	100.0	28
Transient summer	12.4	13.2	74.4	100.0	128
Transient winter	31.1	17.8	51.1	100.0	47

*Errors due to rounding.

Source: WSG Boating Household Survey, 1978.

hold Survey does not provide statistically significant results at the individual county level; only study area-wide inferences can be drawn.

Moorage Tenant Origin Study

The 1978 Boating Household and 1980 Seattle Boat Show attendees surveys relied on samples of boaters from which to infer moorage use. An alternative approach is to survey a sample of moorage facilities to determine actual distributions of tenants' residences in relation to where they moor their boats. During 1979, 14 public smallcraft harbors provided lists of the zip codes of their tenants' residences. In all but one case[12] 100% of the tenants were included in the listings.

Year-round, seasonal summer and seasonal winter tenants' origins are mapped and tabulated separately in order to discriminate among these three groups' geographic behavior. First, summary data are presented in Figs. 4.1, 4.4, and 4.6 and Table 4.2, 4.3, and 4.4. A circle, proportional to the total number of tenants mooring at each facility, is drawn adjacent to the facility it represents. Inside the outer circle is another circle, shaded black, proportional in size to the number of tenants residing outside the port city's zip code area. The gray shaded area between the two circles, then, is proportional to the number of local tenants occupying moorage space in that port. Each port's tenants' origins are then individually mapped in Figs. 4.2, 4.3, 4.5, and 4.7. The aggregate local and non-local number of tenants is displayed in the same fashion, using proportional circles; but in addition, lines are drawn between the port and the tenant's resident zip code area, their width proportional to the number of tenants residing at that zip location.

Year-Round Moorage Tenants

Table 4.2 and Figure 4.1 reveal that of 14 ports surveyed, 4 cater to year-round tenants, 80% or more of whom live outside the city in which the port is located. Each of these ports is in a small community, some distance from major population centers. Ilwaco (92.3% non-local tenants) on the mouth of the Columbia River serves principally the Portland, Oregon/Vancouver, Washington market, but has a significant number of tenants from central and south Puget Sound (see Fig. 4.3).

La Conner (91% non-local tenants), on the Swinomish Slough in Skagit County, serves central and north Puget Sound boaters and provides a "gateway harbor" to the cruising waters of the San Juan Archipelago.

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[12]Shilshole Bay Marina, Port of Seattle, supplied a usable list of 18% of their tenants' resident zip codes selected by taking every fifth name on their complete file of tenants. Figures 4.1, .2, .4, .5, .6 and .7 show the sampled tenant population; the larger dashed circles represent the total number of tenants in that port.

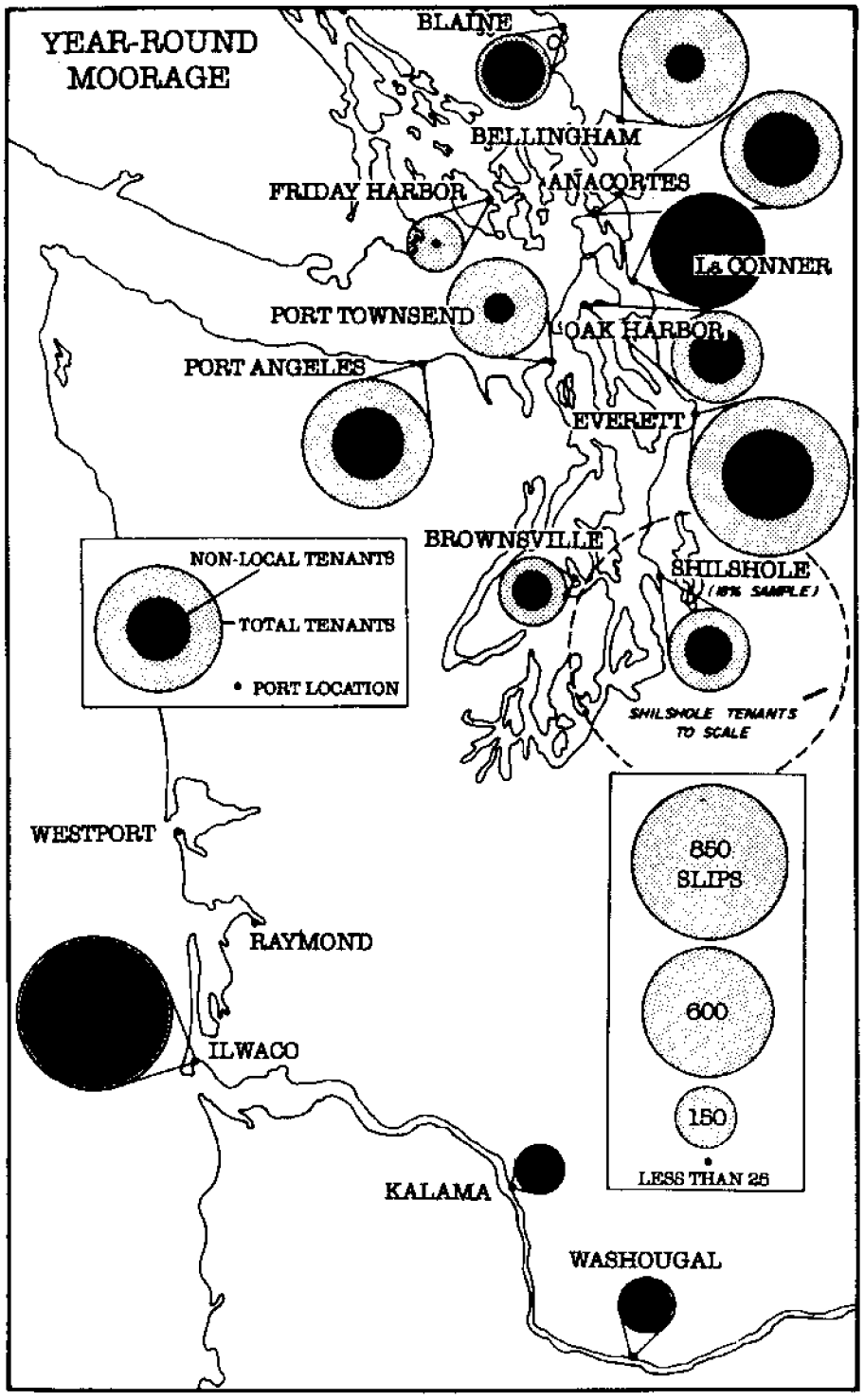

Fig. 4.1. Origin of recreational tenants in selected public smallcraft harbors, 1978-79: Summary map, year-round tenants.

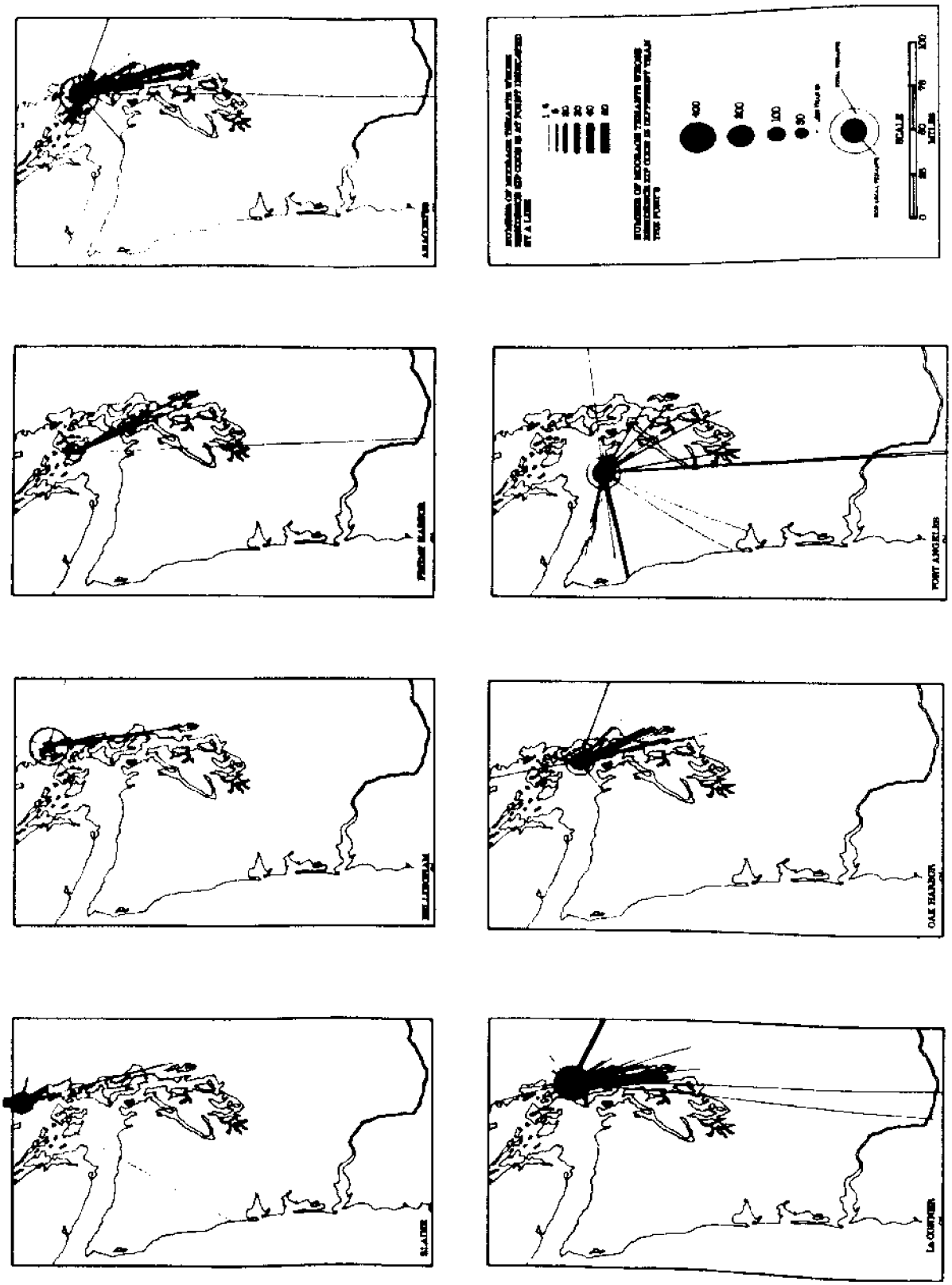

Fig. 4.2. Origin of recreational tenants in selected public smallcraft harbors, 1978-79: Port-by-port maps, year-round tenants.

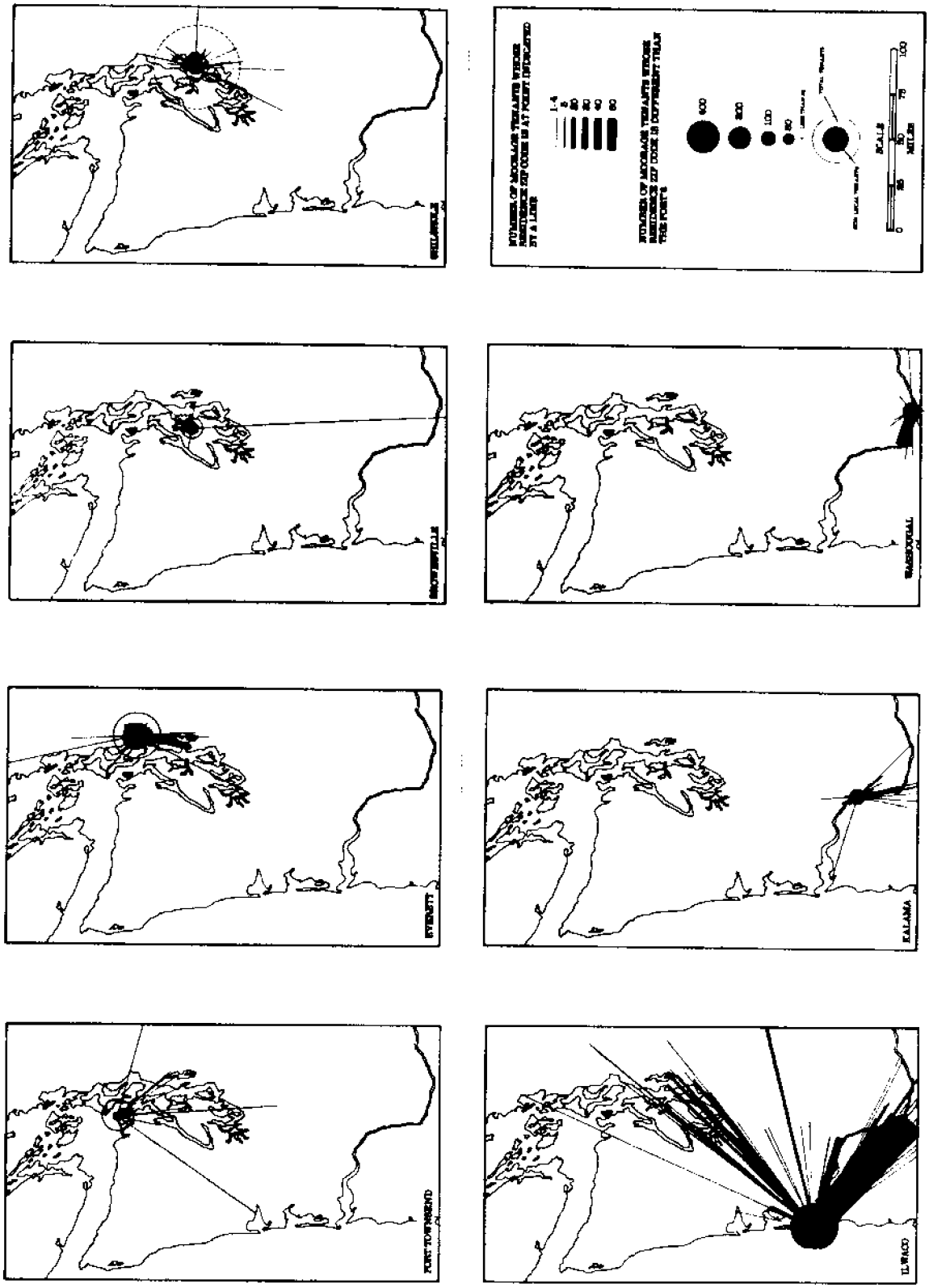

Fig. 4.3. Origin of recreational tenants in selected public smallcraft harbors, 1978-79: Port-by-port maps, year-round tenants.

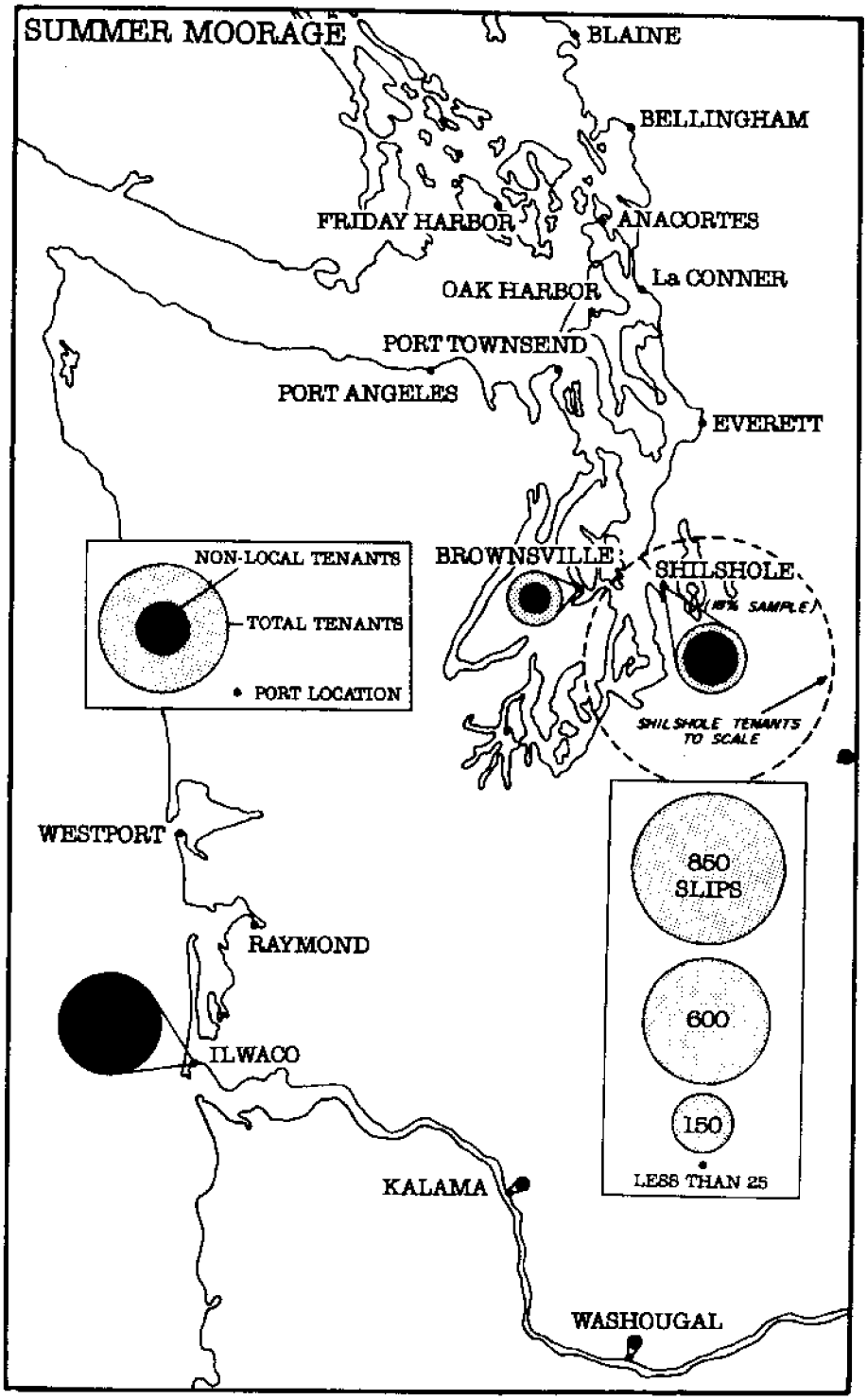

Fig. 4.4. Origin of recreational tenants in selected public smallcraft harbors, 1978-79: Summary map, summer seasonal tenants.

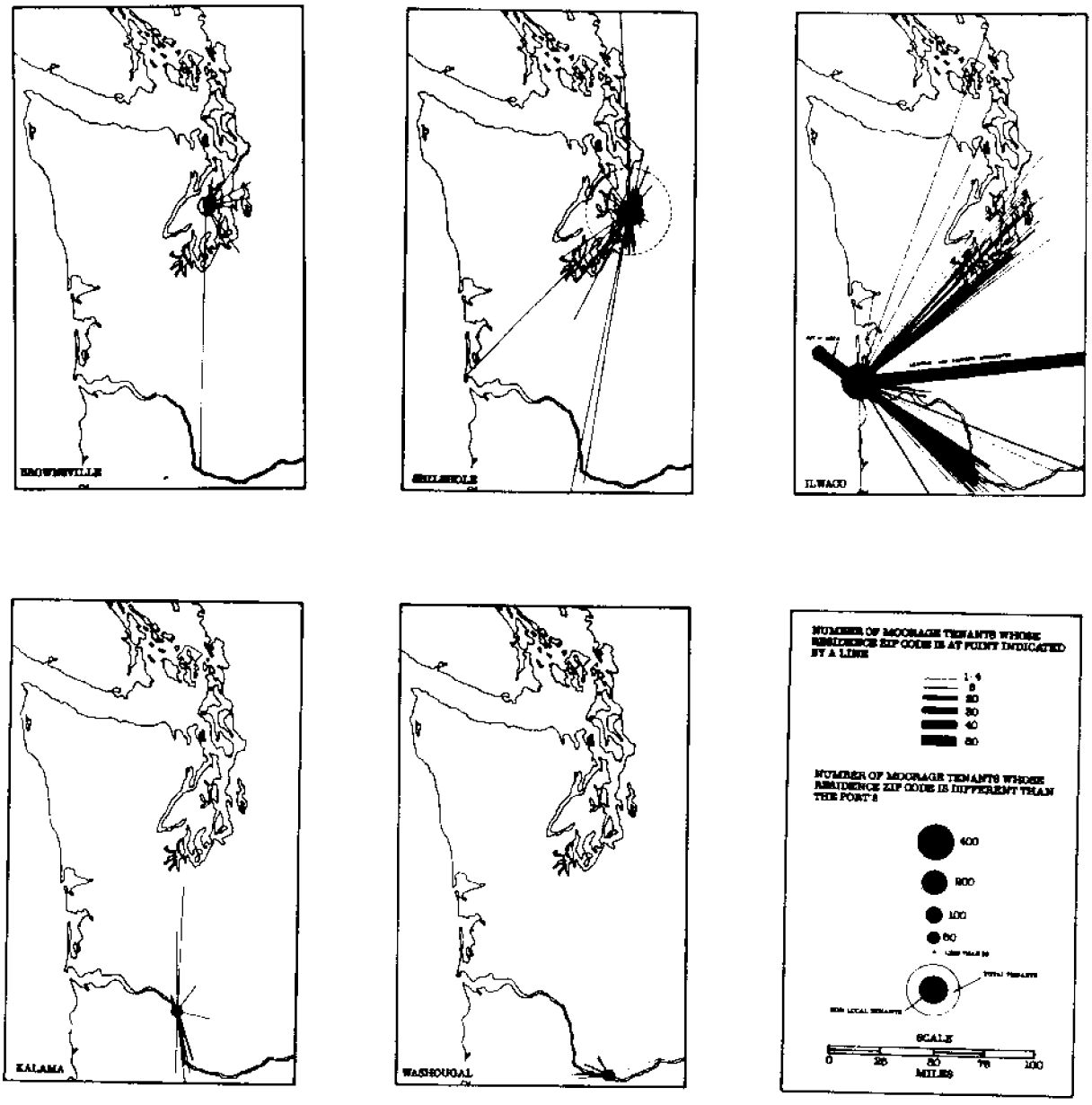

Fig. 4.5. Origin of recreational tenants in selected public small-craft harbors, 1978-79: Port-by-port maps, summer seasonal tenants.

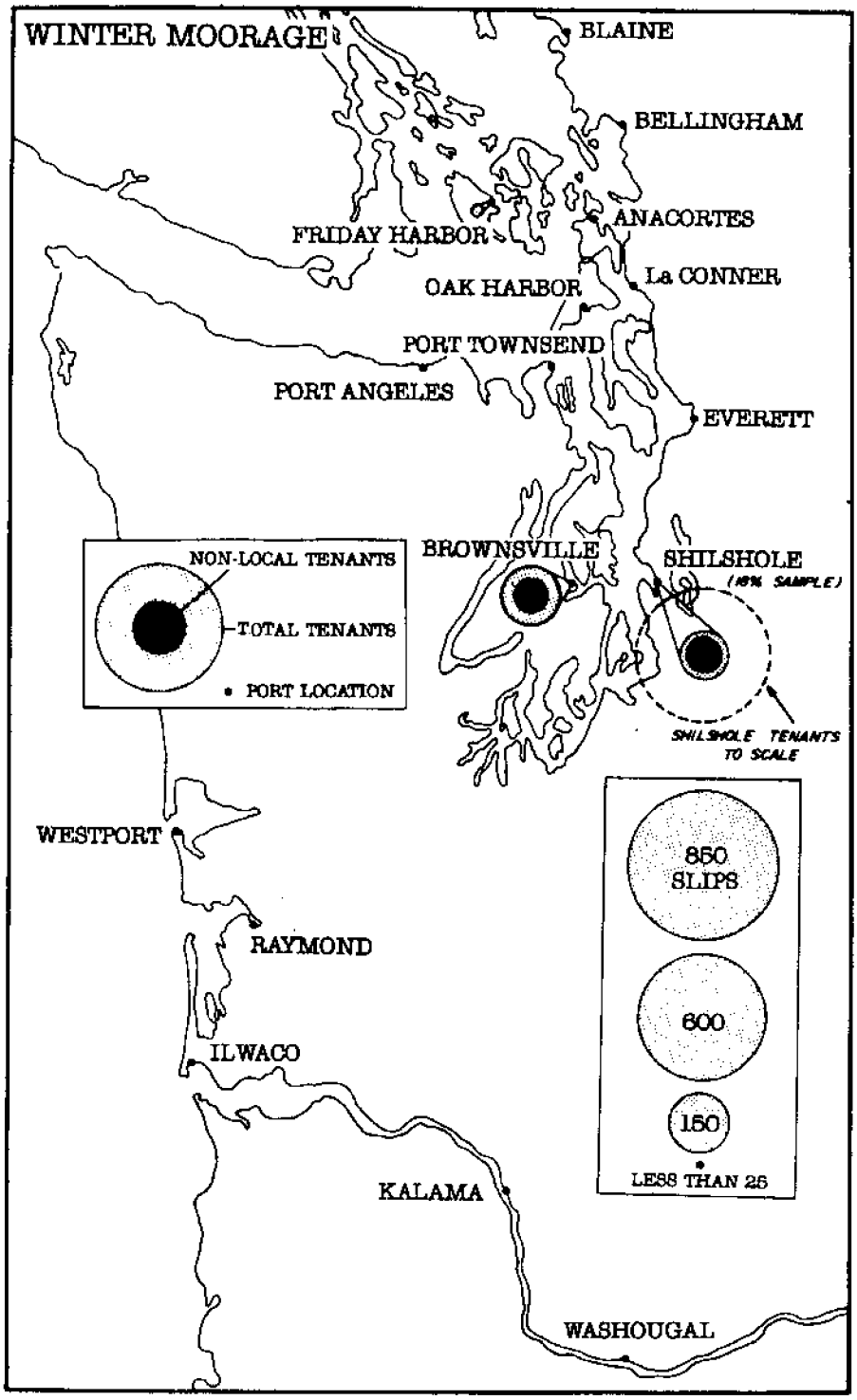

Fig. 4.6. Origin of recreational tenants in selected public smallcraft harbors, 1978-79: Summary map, winter seasonal tenants.

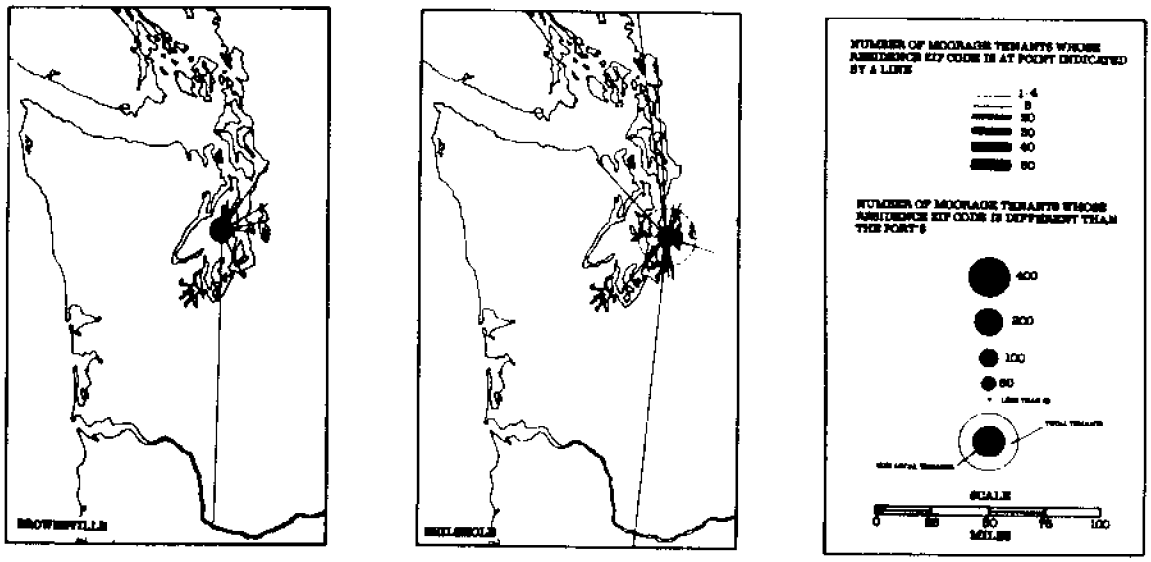

Fig. 4.7. Origin of recreational tenants in selected public smallcraft harbors, 1978-79: Port-by-port maps, winter seasonal tenants.

Table 4.2. Origin of recreational tenants in selected public smallcraft harbors, 1978-79. Summary table, year-round tenants.

Port	Total tenants	Local tenants		Non-local tenants	
	Number	Number	Percent	Number	Percent
Port Angeles	609	411	67.5	198	32.5
Everett	843	544	64.5	299	35.5
LaConner	499	45	9.0	454	91.0
Anacortes	523	308	58.9	215	41.1
Bellingham	588	530	90.1	58	9.9
Brownsville	185	123	66.5	62	33.5
Port Townsend	378	342	90.5	36	9.5
Oak Harbor	317	191	60.3	126	39.8
Camas-Washougal	137	23	16.8	114	83.2
Ilwaco	828	64	7.7	764	92.3
Friday Harbor	128	109	85.2	19	14.8
Shilshole	1,375	886	64.4	489	35.6
Blaine	209	76	36.4	133	63.6
Kalama	108	18	16.7	90	83.3
Region totals:	6,727	3,670	54.6	3,057	45.4

Camas-Washougal (83.2% non-local tenants), located above Portland/Vancouver on the Columbia River, serves a non-local Vancouver, Washington market. Kalama (83.3% non-local tenants), further downstream on the Columbia River below Portland, houses boats from Vancouver, smaller nearby river towns, and more distant Oregon communities to the south. Recently opened in 1978, the marina is still being filled.

At the opposite end of western Washington, Blaine (63.6% non-local tenants) satisfied a significant Canadian demand, accounting for over 40% of the non-local tenant market. Locally unsatisfied demand from Bellingham accounts for a further 20% of non-local tenants.

Anacortes (41.1% non-local tenants), and Oak Harbor (39.8% non-local tenants), with larger local markets than nearby La Conner (91.0% non-local tenants), have similar distributions of non-local tenants (the Seattle metropolitan area and smaller communities to the north). Practically none of the Anacortes, La Conner or Oak Harbor tenants reside in communities north of their port cities, nor in communities anywhere on the Olympic Peninsula. Port Angeles (32.5% non-local tenants), conversely, serves a predominantly north Olympic Peninsula market, 24% of non-local tenants being from nearby Sequim. A smattering of central and south Puget Sound tenants moor at this port.

Of all the large public ports surveyed, Shilshole has the most spatially compact non-local (35.6%) market. Among the 18% sampled, all but a handful of tenants reside in the greater Seattle metropolitan area, particularly on the east side of the Lake Washington.

Everett (35.5% of non-local tenants), to the north has a market biased strongly to the city of Seattle and its suburban communities immediately to the north (Edmonds, Lynnwood, and Bothell). Since the survey was conducted, Everett has expanded to become the largest smallcraft harbor north of Marina Del Rey in Los Angeles. No analysis of the origins of tenants subsequent to expansion has been undertaken.

The most surprising case among ports surveyed was Friday Harbor; only 14.8% of its moorage is occupied by mainland boaters. Given the centrality of this harbor within the region's most favored cruising waters, the author expected a far larger non-local market. Presumably the public and private marinas in Skagit County present an appealing "intervening opportunity" to San Juan-bound mainland boaters, syphoning off Friday Harbor's potential market.

Bellingham (9.9% non-local tenants) serves a predominantly local boating population. Blaine, to the north, absorbs Canadian boaters and Skagit County facilities to the south satisfy boating demand from the Seattle metropolitan area.

Port Townsend is a special case (only Jefferson County residents are permitted to lease permanent moorage in the port). The few non-county residents revealed in the survey are probably "grandfathered" in.

The Port of Brownsville (33.5% non-local tenants) on the Kitsap Peninsula serves almost exclusively peninsula boaters, making it the most locally oriented of all ports surveyed.

Some generalizations can be made from this discussion of year-round moorage utilization:

1. The major metropolitan areas of Seattle, Portland, Oregon/Vancouver, Washington, and (probably) Vancouver, B.C., exert enormous influence on the shape of marina's markets in Western Washington.

2. The Columbia River ports serve Portland/Vancouver, and Washington markets in addition to local communities. Ilwaco, the largest on the Columbia River, serves central and south Puget Sound blue-water boaters, approximately 25% of whom have commercial troll fishing licenses and cannot, therefore, be considered representative recreational boaters.[13]

Seasonal Moorage Tenants. Of the five public smallcraft harbors reporting a significant summer seasonal moorage market, few obvious changes from year-round distributions of tenants' origins can be discerned (Table 4.3). During the summer months Shilshole and Ilwaco cater

Table 4.3. Origin of recreational tenants in selected public smallcraft harbors, 1978-79. Summary table, summer seasonal tenants.

Port	Total tenants		Local tenants		Non-local tenants	
	Number	Percent	Number	Percent	Number	Percent
Brownsville	123	100.0	84	68.3	39	31.7
Shilshole Bay	220[1]	100.0	97	44.1	123	55.9
Ilwaco	416	100.0	12	2.9	404	97.1
Washougal	41	100.0	9	22.0	32	78.0
Kalama	45	100.0	9	20.0	36	80.0

[1]Includes some transient vessels.

to more distant markets, however. Large numbers of central and eastern Washington and out-of-state summer tenants occupy moorage at Ilwaco (Fig. 4.5). Most of these summer tenants (75%) have commercial troll licenses and occupy slips during the ocean troll fishing season. Overall, approximately the same proportion of summer-only tenants (97.1%) are from non-local origins as are year-round tenants (92.3%). Shilshole's non-local summer tenants (54.9%) are proportionally greater in number than year-round (35.6%). They include Canadian and Oregonian boats and larger numbers from Olympia and other south Puget Sound areas.

[13]Personal communication with Robert Peterson, Manager, Port of Ilwaco.

Winter seasonal tenants were reported as significant only in Shilshole and Brownsville (Table 4.4, Figs. 4.6, 4.7). The proportion of non-local/winter tenants at Shilshole (54.9%) was approximately the same as for summer seasonal tenants, but less widely distributed around the region. Brownsville's non-local winter tenants showed the same proportion (34.2%) as year-round, non-local tenants (33.5%), but included more boaters from the greater Seattle area. A local market still predominated, however.

Table 4.4. Origin of recreational tenants in selected public smallcraft harbors, 1978-79. Summary table, winter seasonal tenants.

Port	Total tenants		Local tenants		Non-local tenants	
	Number	Percent	Number	Percent	Number	Percent
Shilshole Bay	111	100.0	50	45.1	61	54.9
Brownsville	152	100.0	100	65.8	52	34.2

Private Marinas Tenant Origins. Previous research (Goodwin and Stokes 1980) has shown that, on the average, private marinas moorage fees are double those of public facilities. Theory would suggest that for boaters seeking moorage and wishing to minimize total boating costs, travel to distant public facilities will be more acceptable than to distant private facilities (savings in moorage fees can be allocated to travel costs incurred in reaching a more distant public harbor). Vars (1980) has shown that as travel costs rise in relation to moorage costs, boaters who have the option of trailering their boats will increasingly adopt the cost-saving strategy of mooring their boats at destination areas (on the Oregon coast), for the duration of the summer boating season. The operator of a north Puget Sound private marina, conveniently located in respect to the San Juan Islands, revealed that these Oregon findings may apply in Washington State. Over one-third of the slips in that facility are currently occupied by boats under 24' in length. Fifty boaters are on a waiting list for summer seasonal moorage only, and over 80% of the moorage tenants are from out-of-county, predominantly the Seattle metropolitan area and eastern Washington markets.

B. Moorage Preferences

Boating households in WSG survey were queried on the moorage preferences based on the assumption that slips were available at prevailing market prices. Table 4.5 tabulates preferred moorage by geographical area and these results are compared with actual moorage use. Table 4.6 shows the percentile spread between similar entries in the two preceding tables and the difference in numbers of respondents of each question for existing and preferred mooring utilization.

It is assumed that dissatisfaction with existing moorage would be revealed by both differences in the number and the geographic distribution of responses to questions on preferred versus actual use of moorage. The greatest dissatisfactions inferred from boaters' responses were over the

Table 4.5. Moorage/storage preference in Washington's coastal zone by county of residence, 1978.

Moorage use	Location of moorage/storage: Percent in county of residence	Percent in adjacent county	Percent in non-adjacent county	Total percent*	Number of responses
Year round	84.2	6.7	9.2	100.1	120
Seasonal summer	73.9	7.0	19.1	100.0	115
Seasonal winter	84.6	6.4	9.1	100.1	110
Temporary summer	24.0	13.8	62.3	100.1	167
Temporary winter	50.0	16.2	33.8	100.0	68

*Error due to rounding.

Source: WSG Boating Household Survey, 1978.

Table 4.6. Comparison of moorage/storage utilization and preference in Washington's coastal zone by county of residence, 1978.

Moorage use	Location of moorage/storage: Percent in county of residence	Percent in adjacent county	Percent in non-adjacent county	Difference in number of responses
Year round	-4.3	+1.0	+3.5	-40
Seasonal summer	-12.6	+1.1	+11.4	-59
Seasonal winter	-2.4	+0.8	+1.7	-54
Temporary summer	-2.0	+7.3	-5.2	+78
Temporary winter	-1.9	+8.8	-6.9	+40

Source: Tables 4.1 and 4.5.

availability of temporary summer and winter moorage. Compared to their existing use of this type of moorage, 88% more boaters would use temporary summer and 143% would use temporary winter moorage. While the availability appears inadequate, the location of what is available appears reasonably satisfactory; differences between actual and preferred temporary moorage locations were identified by less than 10% of the respondents, the highest shift being from counties non-adjacent to counties adjacent to the county of residence.

Year-round and seasonal moorage availability caused less dissatisfaction. Only 75%, 66%, and 67% of boaters responding to actual utilization of year-round, seasonal summer, and seasonal winter moorage, respectively responded to the preference question for the same moorage type. The

location of that moorage seemed satisfactory except for summer seasonal use: here, the shift in preference was toward non-adjacent (destination area) counties and away from county of residence.

Transient moorage preferences were not probed in the Boating Household Survey.

Responses of boaters to questions concerning types of moorage used and preferred, suggest the greatest dissatisfaction with existing temporary summer and winter moorage. Wet covered temporary moorage during the summer months and dry covered temporary storage during the winter months appear to be the unsatisfied preference of respondents. Existing users of wet open moorage seem least satisfied in either season. Boaters storing or mooring their craft at home year round, summer, or winter, exhibited a preference for wet covered and wet enclosed moorage if it were available.

V. PROJECTING THE FUTURE RECREATIONAL FLEET SIZE

A. Methods

In order to adequately plan for expansion of boat-serving facilities it is necessary to predict the future stock of recreational boats in Washington State, their type and length, and where they will be stored and used. To perform such predictions at the most useful scale--that is, by county--is almost impossible, given the meager amount of essential information in Washington State. Fig. 5.1 illustrates this point by creating a "plumbing" analogy to the recreational boating market. The "tank" in the center of the diagram represents the fleet of boats at any given time in Washington State. Boats are added to the fleet in two ways: first, new boats and used boats imported into the state are purchased by Washington residents (1). Second, boat-owning households migrating into the state bring their boats with them (2). A continual recycling of used boats, through dealers and brokers (3a, 3b) may result in some boats being temporarily removed from the active fleet, though many of these vessels occupy moorage and storage facilities. Boats are subtracted from the fleet by being removed from the state by out-migrant households (4), sold to out-of-state residents (5), or scrapped (6). Controlling each of these additions and subtractions to the fleet are "valves" which determine the rate at which boats enter or leave Washington State.

Unfortunately there are no data kept on what these rates are on a year-by-year basis. The USCG maintains a single, annually updated file of boat registrations, but has no data on the rates of scrapping, sales to out-of-state boaters, out-migrant boaters, or the origin of boats entering the fleet. The USCG data include non-recreational small craft: commercial fishing and charter boats; and exclude documented vessels--primarily commercial fishing vessels, but also some larger yachts. Registration enforcement is poor, particularly for boats registered by the original owner and subsequently sold in-state as a used boat. Boats not re-registered at the expiration of the three-year registration period are not purged from the master file, and may still be afloat somewhere in the state.

Very little confidence can be placed in the USCG registration data either for a single year or for long-term trends in boat ownership. As reported in Chapter III, the author estimated the 1978 fleet of motorized craft in Washington's Puget Sound counties to be 132,556 boats. This figure must be used to check future trends in the fleet.

Returning to the diagram, it is clear that "new" sales have a marked effect on the growth of the fleet. Specifically, demand for "new" boats must be estimated in order to project the future fleet size, and, hence, demand for boating facilities: moorage, storage, launch ramps, anchorage, etc. What forces in the economy open and close the demand "valve" for boats? They are believed to be population, income, price of boats, cost of credit (interest rates), the costs of operation and maintenance of boats, and the prices of other outdoor recreation activities which com-

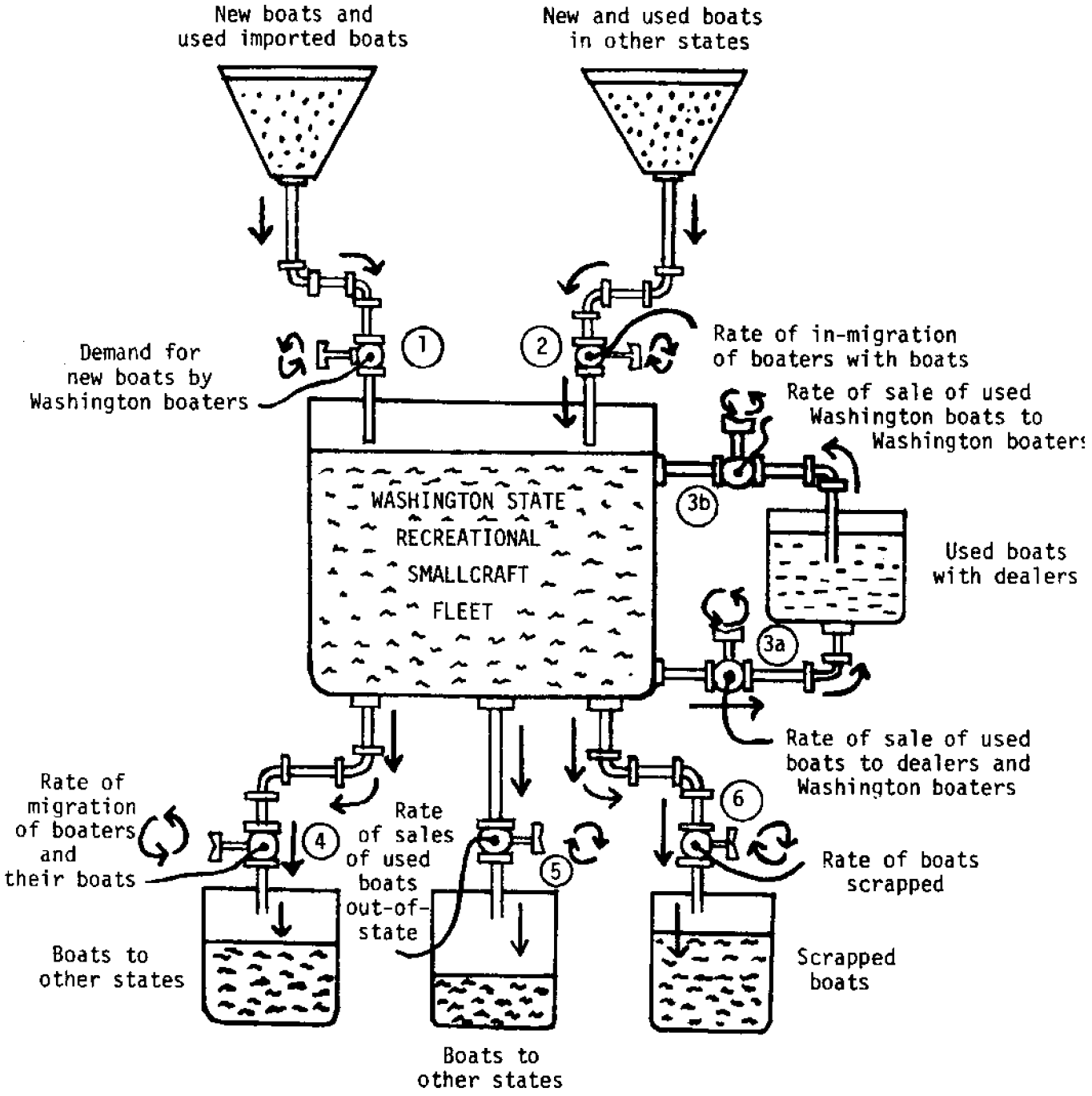

Fig. 5.1. Schematic diagram of the dynamics of the Washington State recreational smallcraft fleet.

pete with boating for the consumer dollar. Each of these factors is discussed below.

B. Factors Affecting Demand for Pleasure Craft Population

Population. If all other factors are held constant, the size of the population in a given region will determine the number of boats owned. Ideally, the best measure of the boat-owning population would be the number of households, rather than total number of individuals. But since neither the 1980 census estimates of household size, nor number of households were available at time of writing, we must rely on total population figures.

Income. Economists use the term "discretionary income" to describe the income left over after basic household needs are met. Housing, transportation, food, clothing, and health care are relatively fixed requirements which must be satisfied before non-essential (discretionary) purchases are made. Entertainment, outdoor recreation, and leisure travel would fall into the latter category. Apart from those who live aboard their boats or use their boats for both income-producing activities (commercial fishing) and recreation, the mass of boaters is engaged in a pastime which they would curtail if their discretionary income fell drastically. In Chapter III we saw that there is a quite consistent and unsurprising relationship between income and boat length. The greater the boat length, the higher income of the owner. Only 12.6% of the households owning boats earned less than the State's $15,200 median annual state household income in 1978.[14] The median income for boating households in 1978 was $25-30,000, almost twice the statewide household median median income. The market for boats, then, is highly differentiated with respect to income and kind of boat purchased. In the absence of other constraints on ownership of boats, discussed below, we would expect boat ownership rates to rise with rising household income. Since 1980 Census household income data are unavailable, per capita income, deflated by the Urban Consumer Price Index (CPI-U),[15] is used in the models reported below.

Perhaps, as incomes rise, the rate of boat ownership will initially rise, too, but at some point will saturate. Beyond that point, the kind of boat, rather than the number of boats might change: larger boats would be purchased by those already owning boats. To test this hypothesis the natural logarithm of deflated per capita income was substituted into the models reported below.

Price. A household's decision to purchase a boat will be strongly influenced by the prices it faces. This will be true whether the household already owns the boat and wishes to trade up or down, or is buying a

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[14]Source: Table 3.11.

[15]Department of Economics, "Databank" (automated file of economic statistics), University of Washington.

boat for the first time. Sharp, upward shifts in boat prices, due in part to increases in petroleum product cost, are having an unknown effect on purchasing patterns. Theory would suggest that some purchasers will shift to smaller boats; others will drop out of the market altogether. The net effect would be a reduction in aggregate boat sales. In the absence of accessible, standardized boat price data, price changes are assumed to be captured by the CPI, used to deflate per capita income.

Cost of Credit. At time of writing, interest rates charged for financing pleasure boats by commercial banks were at an all-time high (23-24.25%), and an equity requirement of 25% was in force. The repayment period had shrunk to two years.[16] According to the same bank's spokesperson, under "normal" economic conditions a $10,000 boat could be financed at 20% down with the balance repayable over 8 years at 10-12% per annum interest rates. Even for those with sufficient capital to purchase a boat under current financing conditions, the "opportunity cost"[17] of capital invested in 2-year money market certificates is at least 15%. However, the unfavorable current consumer credit terms are more likely to affect the prospective purchaser of a small boat than those in the market for a large vessel.

A good measure of cost of credit is the Prime Rate set by United States banks. This measure is used in the models reported below.

C. Long-term Trends in Recreational Fleet Size

A series of multiple regression equations was developed to assess the factors affecting changes in Washington State boat and boat trailer registrations and boat sales from 1965 to 1980.

The form of these equations is:

$$Y = a_0x_0 + a_1x_1 + a_2x_2 \cdot \cdot \cdot \cdot \cdot a_nx_n$$

Where:

Y is the dependent variable (# boats, # boat trailers, $ sales, etc.) and a_0, a_1, a_2 . . . etc. are coefficients of the independent variables x_0, x_1, x_2 . . . etc. (population, per capita income, Prime Rate, etc.). Variables falling outside the 95% confidence limits were discarded.

The regression equations for State, regional and county trailer registrations are presented in Table 5.1.

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[16] If the vessel were documented through the U.S. Coast Guard (5 tons and over), more favorable rates would be available through a "preferred marine mortgage" (17.5% per annum over 10 years with a "balloon" payment after 3 years).

[17] "Opportunity cost" refers to the best rate of return on capital invested elsewhere.

Table 5.1. Boat trailer registration, 1965-1978: multiple regression equation results.

County/Region	Constant (t-value)	Population coefficient (t-value)	Per capita income coefficient (t-value)	Log_e per capita income coefficient (t-value)	Coefficient of determination (R^2)	Trailers per 1000 population (1980)
Whatcom	-25897 (16.819)	N.S. --	-- --	3471.3 (18.228)	0.9680	21
San Juan	-221.9 (-5.217)	0.35 (6.211)	0.042 (3.43)		0.9146	22
Skagit	-21198.6 (-7.377)	N.S. --	-- --	2857.8 (8.113)	0.8568	39
Island	-10913.3 (-10.982)	0.0168 (3.355)	-- --	1462.8 (10.709)	0.9755	35
Snohomish	-6461.1 (-3.534)	0.050 (7.288)	N.S. --	N.S. --	0.8034	27
King	-45219.8 (-2.889)	0.0331 (1.937)	7.227 (3.443)	-- --	0.7877	23
Pierce	-11414.2 (-8.732)	N.S. --	5.849 (15.82)	-- --	0.9579	24
Thurston	-3161.1 (-5.654)	0.066 (10.171)	N.S. --	N.S. --	0.8883	32
Mason	-7866 4 (-3.699)	0.066 (3.855)	-- --	907.42 (2.995)	0.9644	40
Kitsap	-40276.4 (-2.130)	0.0394 (1.976)	-- --	4888.7 (1.929)	0.8762	31
Clallam	-28325.0 (-11.540)	0.0387 (2.665)	-- --	3574.1 (10.125)	0.9791	61
Jefferson	-805.1 (-8.580)	0.0628 (5.347)	0.171 (7.130)	-- --	0.9610	40
Grays Harbor	-18216.0 (-13.208)	N.S. --	-- --	2399.9 (14.132)	0.9478	24
Pacific	-3819.9 (-9.588)	0.0614 (2.893)	-- --	396.64 (5.109)	0.9513	26
Wahkiakum	-64.78 (-3.073)	N.S. --	0.0063 (6.218)	-- --	0.7785	20
Cowlitz	-22872.7 (-8.114)	0.0513 (2.769)	-- --	2626.9 (5.598)	0.9610	31
Clark	-34326.7 (-3.183)	0.020 (2.514)	-- --	4327.1 (2.992)	0.9565	26
Puget Sound Counties	-106573.6 (-4.690)	0.035 (1.912)	20.892 (3.133)	-- --	0.9069	26
Coast and Columbia River Counties	-75622.2 (-4.676)	0.029 (2.364)	-- --	9206.9 (3.878)	0.9688	27
Washington coastal zone	-805507.1 (-3.853)	0.033 (1.764)	-- --	95054.2 (3.141)	0.9204	26
Washington State	-1480338 (-11.729)	N.S. --	-- --	191452.4 (12.498)	0.9232	28

Washington State Pleasure Boat Fleet. Because Washington State's water-based recreational opportunities are as varied as its topography, climate and hydrology, population growth can occur in some regions without a corresponding growth in boat ownership. Hence, for the state as a whole, change in per capita income has been a far more potent force boosting trailer registrations. In fact, population changes between 1965 and 1980 produced no statistically significant effect on statewide trailer registrations. The natural logarithm of per capita income (1967 $'s) "explained" 93% of the year-to-year variations in trailered boat ownership in the state as a whole. The inference is that, as average real income rises, boat ownership rises at first rapidly, then more slowly. However, without time-series data on the size-class of vessels in the fleet, we cannot conclude that rising per capita results in successively larger, rather than successively more boats appearing in the fleet.

Washington's Coastal Zone Fleet. In Washington's coastal zone counties, where access to water-based recreational opportunities is convenient, long-term growth in trailered boat ownership[18] has been driven by changes in both population and real per capita income. Over 90% of the variations in fleet size are explained by these two factors. When Puget Sound counties are separated from all coastal counties, similar results are observed: both income and population are significant factors in explaining 91% of the fleet size variations between 1965 and 1978. The remaining ocean coast and Columbia River counties' fleets are even more strongly related to the two variables; 96% of the variations over the same 13-year period are explained by the model.

When individual counties' trailer fleets are subjected to the same analysis, both income and population again figure in explaining historical change since 1965, though not uniformly across the region. For example, in Snohomish, Thurston and Kitsap counties population changes alone account for changes in fleet size; conversely, changes in per capita income alone explain changes in Whatcom, Skagit, Pierce, and Grays Harbor counties' fleets. In the case of San Juan, Island, King, Mason, Clallam, Jefferson, Pacific, Cowlitz, and Clark counties, changes in both population and per capita income interact to explain historical variation in trailered fleet size.

Statistical Summary. For the state as a whole, each 1 dollar increase in average, real (1967 $'s) per capita income will cause the trailerable boat fleet to increase by 47.7 boats and the total fleet by 81.1 boats. In Washington's coastal zone counties 23.6 new trailerable boats or 40.1 total fleet boats appear with each 1 dollar increase in average per capita income, while 1,000 new residents cause 35 new trailerable boats or 59.5 total fleet boats to be registered.[19] The total number of

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[18]USCG boat registration estimates are not reported due to unreliable data. Between 1965 and 1980 the ratio of USCG fleet size to trailer registrations varied between 0.95:1.0 and 1.58:1.0; i.e., in some years more trailers were reported than total fleet size!

[19]Between 1979-80, boat trailer registrations actually fell by 4.9% as a result of a decline in real per capita income over the same period.

boats in the fleet, statewide, would increase 1.7 times the rate of increase for trailer registrations.

In the case of Puget Sound counties, 36 new trailered boats or 61.2 total fleet boats are added to the fleet for each 1,000 new residents; 21 new trailered boats or 35.7 total fleet additions are added for each 1 dollar increase in average per capita income.

On the ocean coast and Columbia River 32 new trailered boats are purchased for each increment of 1,000 new residents; for each dollar increase in average per capita income 2.5 such new boats would be purchased. (No estimates of percent of fleet trailered are available for this region.)

Table 5.2 summarizes these estimates. Appendix B graphs the results of multiple regression analyses of state, region and county trailer registrations.

Table 5.2. Effects of changes in per capita income and population on trailers, Washington State boat and recreational boat fleet, by region, 1965-1980.

Region	Number new trailer registrations		Number new boats in fleet	
	Due to $1 increase in PCI ('67 $'s)	Due to 1,000 increase in population	Due to $1 increase in PCI ('67 $'s)	Due to 1,000 increase in population
Washington coastal zone counties	23.6*	35	40.1	59.5
Puget Sound counties	36.0	21	61.2	35.7

*In forecasting future fleet size, the natural logarithm of PCI produces the "best fit" equations in some cases. PCI is used here for comparative purposes only.

Variations among Counties' Fleets, 1978. While long-term changes in the size of Washington's trailerable boat fleet are governed by changes in per capita income and population, the differences among the individual counties' fleets in a given year are determined solely by county population in that year. At first blush these two statements may seem paradoxical, but on close examination they are unsurprising. In the long run, regionwide changes in population and per capita income are a gradual phenomenon. Between 1965 and 1978 real per capita income increased 40% in Washington's coastal counties, while population increased 26% in the same time period. For any given year, however, the differences among counties' populations are enormous and mask the much smaller differences

in counties' per capita income. For example, Wahkiakum County had a population of 3,900 in 1978; King County had 1.2 million--over three hundred times greater than Wahkiakum. The differences in income are infinitesimally small by comparison--$4,097 versus $5,187. Thus, population differences control the variations in counties' fleet sizes.

Because it has long been believed that the supply of boating facilities inhibits boat ownership, the numbers of boat launch ramps and moorage slips in each county were introduced as variables in the regression equations. No significant effects could be discerned from the results. That is, neither the supply of launch ramps nor moorage slips explained any of the variation in size among counties' trailered boat fleets. Since there are no reliable county-based data on the non-trailered component of the boating fleet, the effects of the supply of moorage facilities on the number of boats requiring them could not be tested.

Per capita trailered boat ownership in Washington coastal zone counties for the year 1978 varied from a low of 23 boats per thousand population (Wahkiakum County on the Columbia River) to 68 boats per thousand population in Clallam County on the Strait of Juan de Fuca. Region-wide averages for both Puget Sound counties and the entire coastal zone are the same: 30 boats per thousand population. But clearly, there are factors other than population affecting geographic variations in trailered boat ownership. They are not income or supply of launching or moorage facilities, however. Variations in personal taste, opportunity to catch fish, quality of the boating experience in nearby waters, availability of alternative outdoor recreational opportunities all affect the decision to become a boater; but these factors are difficult to quantify and must remain conjectural at this time.

The model explained 99% of the variation in the trailered fleet size among Washington coastal counties in 1978.[20] There were some counties, however, where the model seriously overestimated the number of trailered boats: almost 400% over, in fact, in San Juan County, 167% in Pacific County, and 900% in Wahkiakum County on the Columbia River. The actual numbers of boats in these counties were small, however, and the percentage errors are correspondingly large.

Counties whose fleets were underestimated included Clallam (36% below actual fleet size), Thurston (24% below actual fleet size), and Kitsap (23% below actual fleet size).

D. Forecasting Fleet Size

Published forecasts of per capita income are available for the state as a whole[21] and for the four-county Puget Sound Council of Governments

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[20] Income data are unavailable at the county level for years later than 1978.

[21] Washington State Office of Fiscal Management, Economic and Revenue Forecast for Washington State, June 1981.

(PSCOG) region,[22] though not for any individual counties. But, given the turbulent national economy and the unprecedented change in fiscal policy proposed by the White House and being debated in Congress, income forecasts are fraught with uncertainty. There is no choice, however, but to use the figures available and these forecasts of per capita income for Washington State, through 1983, and PSCOG counties through 2000, were introduced in to the state-wide model discussed above. Population forecasts, by county, are made for the state through year 2000,[23] but no comparable per capita income forecasts are available.

The 1980 state trailered fleet of 114,527 boats is expected to expand at an annual rate of 2.6% through 1983, to 123,698 boats, an 8.0% increase. Within the four-county central Puget Sound region (King, Pierce, Snohomish, and Kitsap counties) annual growth rates in the trailered fleet are forecasted at 2.8% to 1985, 2.2% from 1985-90, 1.6% from 1990-95, and 1.4% from 1995-2000; or, from 53,851 trailers in 1980 to 80,075 in 2000. Table 5.3, below, summarizes the historical and forecasted trailered boat fleet size, by year.

Table 5.3. Recreational boat and trailer forecasts: Washington State and Puget Sound COG region.

Region	Forecast year					
	1980	1983	1985	1990	1995	2000
Washington State:						
Number boat trailers[1]	114,527	123,690	--	--	--	--
Number boats	194,696	206,163	--	--	--	--
Annual percent change		2.6				
Puget Sound COG:						
Number boat trailers[2]	53,851	--	61,906	69,024	74,682	80,075
Number boats	91,547	--	105,240	117,341	126,960	136,128
Annual percent change	--	--	2.8	2.2	1.6	1.4

[1]The number of trailers registered statewide actually fell 6.3% from 122,282 in 1979.

[2]The number of trailers registered in the Puget Sound COG region fell 4.9% from 56,647 in 1979.

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[22]Puget Sound Council of Governments, "Puget Sound Regional Profiles, Economic Demographic Report No. 7," Seattle, April 1981.

[23]State of Washington Office of Fiscal Management, "State and County Population Forecasts by Age and Sex: 1980-2000," Special Report No. 30, January 1980.

The total number of registerable boats in both regions is estimated from the 1978 proportion of boats "normally trailered." Unknown changes in boating household consumer preferences among boat types could change this proportion. Variations in individual counties' proportions of trailerable boats are not known either.

In neither the state as a whole, nor in the PSCOG region did the Prime Rate influence in a statistically significant way the historical change in trailered boat ownership. But in none of the years between 1965 and 1980 did the Prime Rate reach the levels experienced in 1981 (20%+). The disastrous impact of such high interest rates on boat sales, reported in the next section, and the unforecasted downturn in real per capita income at the state level since 1979, must be taken into consideration when assessing the validity of these forecasts. They may, simply, be too optimistic.

E. Trends in Sales of Boats and Motors, 1973-80

Since 1973, reported sales of boats and motors (SIC 555) in Washington State[24] have been volatile, varying from 31.5 million dollars (1967 dollars) in 1974, to a high of 55.9 million dollars in 1978, and back down to 32.2 million dollars in 1980. These peaks and troughs in sales mirror movement in the Prime Rate charged by banks; they are tied strongly also to real per capita income (1967 dollars), which, between 1979 and 1980 fell 6.5%. The (annually averaged) Prime Rate climbed from 12.7% to 15.3% in the same period. Combined, these two factors forced a precipitous decline of 32.2% in boat and motor sales. Figure 5.2, below, graphs the behavior of these factors and the forecasted sales through 1983. Trends in interest rates and real per capita income auger badly for 1981 sales. Extrapolation of 1st and 2nd quarter 1981 sales data suggests a further 13% reduction over the current year, leading to annual sales 50% down from 1978. Similar trends in boat and motor sales are evident in Puget Sound counties: sales fell 29.2% and trailer registrations declined 6.4% from 1979 to 1980.

Some level of sales of new and imported used boats is necessary to replace boats which are scrapped, moved with out-migrant boaters to other states, or are sold out of state.[25] With no data on these rates, however, the sales volume necessary to maintain the size of the current fleet is unknown. But both the numbers of boats registered by the Coast Guard and boat trailers registered by the Washington State Department of Licenses have shown a drop since 1978 and 1979, respectively, and may be early indicators of an absolute reduction in the number of boats seeking moorage or storage. More importantly, these data point toward a severe

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[24]Washington State Office of Fiscal Management, personal communication. Reported sales do not include sales between private parties of used boats, but these sales are unlikely to affect the size of the fleet in a significant fashion.

[25]See Fig. 5.1 depicting how these rates affect the size of the recreational boating fleet.

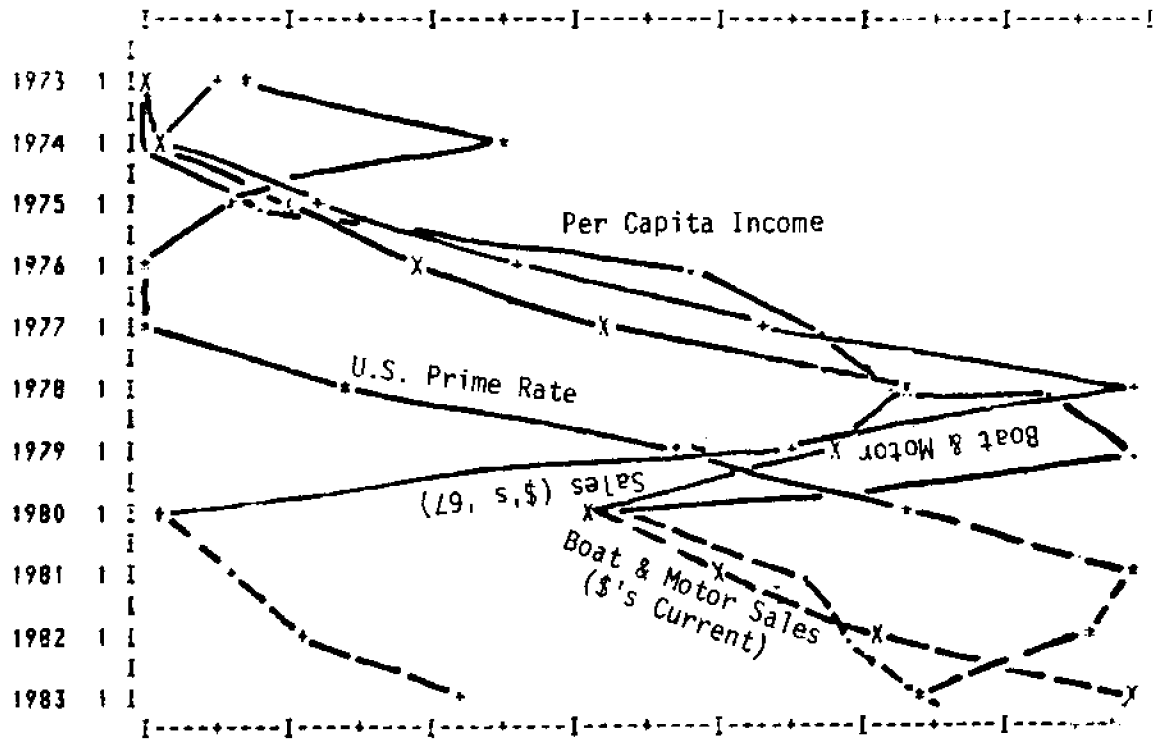

Fig. 5.2 Washington State annual boat and motor sales (SIC 555), 1973-80 and forecasts to 1983.

Source: Washington State Department of Revenue.

softening of demand for new moorage and storage at a time when actual and planned expansion in the stock of wet moorage has been occurring at a rate of over 5% per year in Washington's coastal zone generally, and at rates substantially higher in some Puget Sound counties. Two other west coast states have experienced similar declines in boat registrations: Oregon's recreational fleet registrations declined 4.3% during 1980;[26] California's downturn in registration during the same period was 1.6%.

F. Forecasts of Boat Sales in Washington State to 1983

Historically, since 1973, a 1 dollar increase in real per capita income has increased reported gross sales of boats and motors by almost $60,000 while a single percentage point increase in the U.S. Prime Rate caused a $1.07 million decrease in sales. Projected movements of these two factors[27] yield an estimated increase of sales from $32.2 million in the 1980 base year, to $39.3 million in 1983; annual percent increases from 1980 through 1983 are 5.1, 5.2, and 10.4%, respectively.

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[26]Oregon Marine Board staff: personal communication.
[27]Washington State Office of Fiscal Management, Economic and Revenue Forecast for Washington State, June 1981.

VI. THE MARKET FOR WET MOORAGE IN WASHINGTON'S COASTAL ZONE COUNTIES, 1981

A. Methods and Meaning

Given the age and limitations of moorage utilization data obtained in the 1978 Washington Sea Grant Boating Household Survey, reported in Ch. IV of this report, and the paucity of county-level data on recreational fleet size, by length and boat type, it became necessary to develop information about current demand for recreational boat moorage, county-by-county, throughout the study area. Given, too, the age of data on the supply of moorage (1978), significant increments of new slips in new and expanded facilities needed inventorying. To these ends a new survey of marinas was conducted in April and May 1981.

Using a 1978 inventory of marinas[28] an initial sample of approximately 90 facilities offering rental wet moorage was selected for a telephone survey conducted by the author. A series of questions[29] was asked of each marina operator, owner, or manager contacted, to ascertain any change in the number of wet slips subsequent to the 1978 OIW survey. Each respondent was asked to identify any other facilities in his vicinity that had been expanded or built since 1978, or was planning construction or expansion. The owners, developers, or operators of these facilities were contacted by the author and added to the sample. As a further check on changes in the supply of moorage the author examined Shoreline Substantial Development permit activity since 1978, recorded on the Washington State Department of Ecology's (DOE) computer files. Each permit applicant was traced through local government permit records and was contacted by telephone. A final total of 125 marinas responded to the telephone survey. Not a single respondent refused to provide any of the data requested.

Twenty-five (25) out of a total of 46 public marinas and 92 out of a total of 256 private marinas were surveyed. Ninety-three percent (93%), or 12,685 public wet moorage slips and 74%, or 11,962, private wet moorage slips were accounted for in the survey. However, virtually all new or expanded wet moorage facilities, built since 1978, are accounted for. Omitted from the survey were yacht clubs, marinas with less than 20 slips and exclusively dry storage facilities. Condominium moorage was included since slips frequently are leased by owners or their condominium moorage association as rental moorage. The exact numbers of facilities and slips surveyed in each county appear in the county synopses.

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[28] Oceanographic Institute of Washington (OIW), Survey of Marine Boat Launching and Moorage Facilities in Washington, 1978.

[29] See Appendix D for copy of the questionnaire used in the telephone survey.

The questions revealed three important pieces of information for assessing the condition of the market for wet moorage in each of 14 counties, or multi-county regions in Washington's coastal zone: rental rate for open wet moorage, occupancy/vacancy rates and waiting lists. From these data three key rates for each county were adduced: the average private rental rate, the average public rental rate and the "market limit" rate at which waiting lists shrank to zero and vacancies began to appear. (A theoretical discussion of the "market limit" rate appears in Appendix B.) In addition, the author estimated the current (May 1981) stock of rental wet moorage, by county, and compared these stocks with those reported in June 1978. Average rate changes in both the public and private moorage sectors were calculated and the results are reported in the county synopses below.

As Dr. Stokes and the author pointed out in an earlier publication, (Goodwin and Stokes, 1980), it is unsurprising to find waiting lists at marinas since there are two markets--public and private--with different moorage rates. Public rates reflect, in some cases, substantial federal subsidies for construction and the availability of bond market interest rates. Private rates reflect non-subsidized construction and commercial or private interest rates on borrowed capital. The rate variations within each sector can be attributed to variations in the age of facilities and hence their amortization costs, and the range of attitudes among owners of private facilities toward pricing. Regardless of cause, variations in price of the same kind of service will produce lists of willing buyers at the lower-priced facilities; hence, waiting lists appear even when vacancies are evident at the upper end of the market.

When the market indicators--moorage rates, occupancy rates, and waiting lists--are aggregated to the county level, a system of sub-regional markets emerges. In most cases there is a fairly distinct price[30] where waiting lists disappear and vacancies appear. Below that price, demand, exceeds supply as evidenced by waiting lists; above that price, occupancy rates fall, revealing excess supply. This "market limit price" is an important datum for new investors in marina facilities: setting rates below that price would enhance the probability of high, initial occupancy; charging at or above that price would produce slow fill-up of the facility and low initial return on investment until regional boat ownership rates grew to fill the new supply of slips.[31]

Where waiting lists are evident in even the highest-priced marinas, the market limit rate is assigned to the next higher rate class. For example, if the highest rate charged currently is between $2.50 and $2.99, and waiting lists occur at that rate, the limit rate is set at $3.00-$3.50. This decision rests on the conservative assumption that the highest priced enterprises are knowledgable about the market, yet allow a

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[30]Yacht clubs, whose pricing policies differ from rental moorage facilities, are omitted when calculating this price.

[31]Appendix C contains a theoretical discussion of these points.

cushion of safety--excess demand--against short-run whims of their boater customers. County-level data used to derive the market limit rate appear in Appendix E, and the results are tabulated below (Table 6.1). Since the average rate charged by private owners is below the "market limit" rate, both actual demand (moored tenants) and latent demand (those boaters or non-boaters on waiting lists)[32] are greater at the average price than at the "market limit rate." Consequently, if all marinas attempted to charge the "market limit" rate, the eventual outcome would be significant vacancy rates in all facilities and a flooded market of used boats for sale! Whether or not revenues would fall depends on the price elasticity of demand for moorage: if an increase in moorage rates produces a proportionately greater decrease in demand, then revenues would fall. If the decrease in demand is proportionately less than the increase in moorage rates, revenues would climb as rates rose.

B. Growth and Change in Supply of Wet Moorage, 1978-81

The supply of wet moorage slips in Washington's coastal counties has grown by 16.4% since June 1978, or by 5.2% per year. This growth rate is virtually the same as that occurring between 1966 and 1978, when the supply increased by 86% over the 12-year period, or at an average annual rate of 5.3%.

Snohomish County led the region's growth, largely through expansion of the Port of Everett marina, now the largest on the West Coast north of Marina del Rey in Los Angeles. Supply increased 78% in the county and accounted for almost 32% of the region's growth in wet moorage slips. Next came Pierce County with a 33% increase, contributing to 19% of the region's growth. Other strong growth counties were: Thurston (up 43%, 10% of the region's growth), the eastern parts of Clallam and Jefferson counties (up 26%, 8.5% of the region's growth) and Whatcom (up 17.8%, 9.5% of the region's growth). Little significant change occurred in Island County, the lower Columbia River counties (Wahkiakum, Cowlitz, and Clark), or on the Pacific Coast (Grays Harbor and Pacific counties). Table 6.2 summarizes these results.

C. Moorage Market Conditions, 1980-81

Summary. Great variations in magnitude, price, and seasonality of current markets are evident among Washington's coastal zone counties. Also, there have been changes since 1978; the last year a similarly comprehensive study of the region's moorage market was conducted.[33]

The moorage market remains firm in most Puget Sound counties, as indicated by rental rates, waiting lists, and occupancy rates. "Market limit" rates, where waiting lists disappear and vacancies begin to occur,

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[32]Waiting lists contain redundant names--boaters on more than one list--and are therefore only indicative of latent demand at that price.

[33]OIW, 1978.

Table 6.1. Derivation of market limit rates, June 1980, January 198[illegible].

County	Market limit rate ($/ft/mo)	Vacancies at next higher observable rate: Rate	Vacancies at next higher observable rate: Percent of available slips	Waiting list at next lower observable rate: Rate	Waiting list at next lower observable rate: Percent of available slips	Remarks
East Clallam and East Jefferson	2.25-2.49 (S) 2.00-2.24 (W)	2.50-2.99 2.25-2.49	33 35	2.00-2.25 1.50-1.99	30 12	Winter seasonal rate lower on Hood Canal.
West Clallam[1]	1.00-1.49 (S) less than 1.00 (W)	--	--	--	--	Summer season: Highest rate 5.50-5.99 per day, 20' boat.
Grays Harbor and Pacific	less than 1.00	1.00-1.49	24	--	--	Market shrinking @ existing facilities yr round.
Island	2.50-2.99	--	--	1.00-1.49	158[2]	Highest-priced facilities full yr round.
King	4.50-4.99	5.00-5.49	87	4.00-4.49	6*	*Few private marinas maintain waiting lists.
Kitsap	3.50-3.99	4.00 +	--	3.00-3.49	33	Highest-priced facilities full yr round.
Mason	3.00-3.49 (S) 2.00-2.49 (W)	-- 2.50-2.99	-- 25	2.50-2.99 1.50-1.99	83 Closed winter	Highest-priced facilities full (S).
Pierce	3.50-3.99	--	--	3.00-3.49	38	Highest-priced facilities full yr round.
San Juan	3.00-3.50 (S) 2.00-2.50 (W)	-- 2.50-2.99	-- 50	2.50-2.99 1.50-1.99	40 107	Highest-priced facilities full (S).
Skagit	3.00-3.50	--	--	2.50-2.99	22	Highest-priced facilities full yr round.
Snohomish	2.50-3.00	--	--	2.00-2.49	34	Highest-priced facilities full yr round.
Thurston	2.50-2.99	--	--	2.00-2.49	21	Highest-priced facilities full yr round.
Wahkiakum, Cowlitz, and Clark	1.25-1.50 (S) less than 1.00 (W)	-- 1.00-1.49	-- 23	less than 1.00 --	79 --	
Whatcom	2.50-2.99	3.00-3.49	40	1.50-1.99	38	Vacancies only at Pt. Roberts, serving principally a Canadian market.

[1]Only one year-round marina.
[2]No facilities in $2.00-2.49 rate range.

Source: Washington Sea Grant Moorage Market Survey, May 1981.

Table 6.2. Growth and change in stock of wet moorage, 1978-81.

County	No. wet slips, June 1978			No. wet slips, May 1981			Change No. slip	Percent shift	Percent share of region's change
	Public	Private	Total	Public	Private	Total			
Whatcom	1,166	1,067	2,233	1,166	1,464	2,630	397	17.8	9.5
San Juan	123	737	860	123	841	964	104	12.1	2.5
Skagit	853	1,026	1,879	853	1,325	2,178	299	15.9	7.1
Island	316	173	489	316	173	489	--	--	--
Snohomish	1,608	93	1,701	2,942	93	3,035	1,334	78.4	31.8
King	3,141	4,526	7,667	3,141	4,775	7,916	249	3.3	5.9
Pierce	188	2,301	2,489	--	3,300	3,300	811	32.6	19.4
Thurston	--	1,002	1,002	--	1,433	1,433	431	43.0	10.3
Mason	96	80	176	96	109	205	29	16.5	0.7
Kitsap	1,069	750	1,819	1,069	940	2,009	190	10.5	4.5
Jefferson, E. Clallam	902	509	1,411	932	849	1,781	370	26.2	8.8
W. Clallam	344	510	854	344	510	854	--	--	--
Coast[1]	1,728	109	1,837	1,750	131	1,881	44	2.4	1.1
Lower Columbia River[2]	892	190	1,082	944	70	1,014	(68)	(6.3)	(1.6)
Washington Coastal Zone Total	12,426	13,073	25,499	13,676	16,013	29,689	4,190	16.4	100.0

[1]Grays Harbor and Pacific counties.

[2]Wahkiakum, Cowlitz, and Clark counties.

Source: Oceanographic Institute of Washington, 1978; Washington Sea Grant, Moorage Market Survey, 1981.

are highest in central Puget Sound. King County's Lake Union marinas in Seattle have the top "limit" rates ($4.50-5.00 per foot per month), followed by Pierce and Kitsap ($3.50-4.00 per foot per month). Next at $3.00-3.50 per foot per month is Skagit County in north Puget Sound, where "gateway" harbors to the San Juan Islands attract many King County boaters choosing to save fuel by mooring close to destination cruising waters.

Whatcom, Island, Snohomish, and Thurston counties, serving primarily in-county residents, have "market limit" rates of $2.50-3.00 per foot per month. Mason and San Juan counties have a firm summer seasonal trade, overlying a weak year-round market. Boaters in Hood Canal and the San Juan Islands seem prepared to pay rates $1.00 per foot higher in the summer months ("market limit" rate $3.00-3.50) than during the winter ($2.00-2.50).

The western part of Clallam County is a wholly seasonal market. Private marinas are normally closed from October through May, though a few open as early as February. Only LaPush Boat Haven, leased from the Quileute Indian Tribe by the Port of Port Angeles, remains open year-round as a harbor-of-refuge.[34] Except for the LaPush Boat Haven, slips are rented by the day (or night); "market limit" rates are $5.00-5.50 per day for a typical 20-foot trailered boat, plus a surcharge, pro-rated with length over 20'.

The market on the Pacific Coast (Grays Harbor and Pacific counties) and the lower Columbia River (Wahkiakum, Cowlitz, and Clark counties) is badly depressed year-round and even worse during winter months. Reductions in both the sports and commercial ocean salmon fishery, higher fuel costs, and unfavorable press following the Mt. St. Helens eruptions have created year-round vacancies in Ilwaco, Westport, and Kalama public marinas, as commercial, charter, and recreational boaters reacted to these factors. "Market limit" rates are probably below $1.00 per foot in most coastal and lower Columbia River counties.

D. Moorage Market Outlook

Regionwide, the amount of moorage under construction, and planned for construction by 1986, will expand existing supply by 27-37%, or at an average annual rate of from 4.9 to 6.5%. But, at the county level, vast disparities in expansion of supply are seen. Pacific Coast and lower Columbia River counties show no planned expansion. However, Puget Sound counties will expand at rates from 3.9% (Snohomish County) to almost 300% (Skagit).

Even if the whole region's recreational boating fleet expanded at the rate forecast for Puget Sound Council of Governments region--2.8% per year through 1985--by 1986, the total change would be only 14.8%. In only

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[34]Lease will terminate on May 1, 1982, and it is unlikely to be renewed.

five of the 15 counties or multi-county regions in the study area does planned expansion of moorage supply fall short of 14.8%, and in two of these cases--Pacific and Grays Harbor counties, and lower Columbia River counties--significant and growing year-round vacancies are evident. In Skagit County planned moorage could expand the existing supply almost 3-fold, in Whatcom by 45%, Thurston by 56%, Kitsap by 27%, and in King County by 21%. Even recognizing that fleet expansion forecasts rely solely on historical boat trailer registration data, the 20% of the fleet which utilizes moorage facilities would have to expand at a rate 5 times faster than the trailered fleet to fill planned moorage by 1986! Put another way, if the moored fleet grew at the same rate as the trailered fleet, it would take 10 years to fill the new moorage slips planned to be on line within the next 5 years.

Obviously, not all moorage facilities now on the drawing boards will be built, nor, if built, would they necessarily be as large as originally proposed. Furthermore, delays due to permit procedures, or financing difficulties could retard the proposed rate of expansion. Nonetheless, in counties where 5-year expansion plans dramatically exceed forecasted rates of fleet expansion, investor caution is in order.

New public moorage is being developed by the Ports of Olympia (East Bay Marina), Friday Harbor, Anacortes[35] (Cap Sante Small Boat Haven), Bellingham (Blaine and Squalicum Harbors), Brownsville, Seattle (Shilshole Bay Marina), and Port Angeles (Sequim Bay Marina). The moorage rates established at these public marinas will be the critical factor affecting: 1) revenue to pay off public revenue bonds; 2) the viability of private marina enterprises within the ports' market areas. In the case of East Bay Marina (Port of Olympia) this new public wet moorage will add a very significant increment--over 50%--to Thurston County's total supply and will serve primarily a slow-growing, in-county market. Setting rates too high will retard fill-up of the slips; setting rates too low will cause an exodus of boats from private marinas.

In the case of Sequim Bay Marina (Port of Port Angeles) the same caveat applies: Until the Hood Canal Bridge is replaced, most of the growth in demand will be from county residents. Clallam County is the only county in the coastal zone to show continued growth in boat sales and trailer registrations since 1979, however. This strength in demand for boats could ameliorate the impact of a 24% increase in the eastern parts of Jefferson and Clallam counties' stock of moorage attributable to Sequim Bay Marina, but the port's rate-setting policy could impact on the private marinas in Jefferson County's Puget Sound and Hood Canal shorelines.

On the other hand, massive private investment in Skagit County and, to a smaller degree, in Whatcom County, could oversupply the market in those counties by 1985 or 1986. In various stages of planning in Skagit

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[35]Subject to availability of presently frozen federal loan.

County are a total of between 2,500 and 5,000 new private wet moorage slips, which would double or triple the 1981 supply. Investors should be extremely cautious, building only to the market as it develops and carefully monitoring prices and occupancy rates in the Anacortes and LaConner area marinas.

E. County-by-county Market Analysis

1. Whatcom County, 1981

Sixty-two and one-half percent of the private moorage in Whatcom County is located in one facility on the Point Roberts peninsula. Its physical location precludes easy access from the United States mainland (one must cross into Canada) but there are good road links to the Vancouver, B.C., metropolitan region. The remaining supply of moorage is dominated by two large public facilities operated by the Port of Bellingham.

The market is year-round--no discernible differences exist between summer and winter occupancy rates.

Under construction are two new private facilities with a first phase construction total of 576 wet slips and a potential build-out of 1,120 slips. An expansion of 450 slips is planned within 12 months for Squalicum Harbor, by the Port of Bellingham. By the fall of 1981 the supply of private marina space will have increased by 54% over that available in June of 1978.

Tenant-origin data for Squalicum Harbor, Bellingham, show a predominantly local market. Canadian demand at Blaine Harbor is unlikely to grow fast given the prevailing unfavorable foreign exchange rates facing the Canadian boater; and the overflow from Bellingham utilizing Blaine Harbor could easily dry up when Squalicum's expansion comes on line. Skagit County, to the south, effectively absorbs metropolitan Seattle boaters seeking "gateway harbors" to the San Juan Archipelago.

Therefore, when the slips under construction and planned for construction within the next year come on line, it is difficult to see the market for new moorage remaining firm. Investors should proceed with great caution until evidence of waiting lists in these new facilities appears.

2. San Juan County, 1981

All San Juan County's public year-round moorage is provided the Port of Friday Harbor, a 123-slip facility. Almost seven times that amount of moorage is provided by the private sector, whose larger facilities are located on San Juan and Orcas islands. A large number of small facilities operates in a summer market of seasonal, temporary, and transient boaters.

Within 2 years, the public supply of wet moorage will have grown almost two-and-a-half times, through the expansion of the Port of Friday Harbor. Two private facilities on San Juan Island will expand the private supply in the county by 25%.

The inconvenience and cost of transporting gear and people by ferry from the mainland has deterred the development of a year-round mainland tenant market. Only 15% of the Port's tenants at Friday Harbor originate from off-island locations. Again, the Skagit County marinas provide an attractive intervening opportunity for island-bound boaters. The facilities on San Juan Island charging rates of $2.50 per foot per month show off-season vacancies as high as 75%, while those charging $1.50 are full year-round. Vacation resort enterprises provide much of the summer seasonal, temporary, and transient moorage.

Investors and operators should be aware of the seasonality of the market in San Juan County, perhaps designing a seasonally differentiated rate structure to encourage high, year-round occupancy rates.

3. Skagit County, 1981

Skagit County occupies a unique location for mainland boaters cruising the San Juan Archipelago. "Gateway harbors" offer a convenient, cost-saving alternative to urban boaters in the central Puget Sound region; and the cost per mile differential between boating and driving continues to grow as cars become smaller and fuel costs rise. The significant proportion of non-local tenants in public harbors at LaConner and Anacortes comes mainly from the Seattle metropolitan area. Skagit County clearly "exports" moorage services to urban boaters. The market is year-round and firm: waiting lists are evident at even the highest priced facilities, suggesting that the market limit rate is over $3.00 per foot per month. Two private facilities--one new, one expansion--offer condominium moorage at up to $1,000 per foot and sales are brisk, according to the developers. One-hundred sixty-seven new private slips are under construction, and, pending release of a frozen federal loan, 400 new public slips will be built at Cap Sante Boat Haven. An additional 105 private slips are planned for construction within 2 years. When complete, these additional facilities will have expanded the 1981 supply of wet moorage by 31%.

In various stages of predevelopment and planning are 2,500-5,000 wet moorage slips in four new private facilities. If permitted, these proposals would more than double the current and permitted number of wet slips in the county. Inevitable cost driven increases in rates and an uncertain economy combine to raise a cautionary flag on such massive increments to the county's moorage supply. Occupancy rates in the new facilities should be monitored carefully as they come on line, in order to avert potentially massive over-investment.

4. Island County, 1981

The supply of wet moorage in Island County, unchanged since 1978, is dominated by one public facility operated by the city of Oak Harbor. One private facility expects to construct 80 new slips within 1 year, increasing the meager private supply by 46%. Of the 40% non-local tenants moored in the Oak Harbor marina, all but a handful reside in the Seattle metropolitan area. The operator of one of the county's largest private marinas indicated a similar, off-island urban market.

Because road access from the mainland is limited to the northern part of Island County, Skagit County marinas have a competitive advantage for island-bound traffic. Massive expansion of facilities around Anacortes and LaConner will therefore suppress demand from off-island tenants. Similarly, any expansion of moorage in south Snohomish County will tend to siphon off demand for potential Whidbey Island moorage tenants using the Mukilteo ferry. For these reasons, most of the growth in demand will likely be from island residents. There are no significant vacancy rates up to the top price range in existing facilities, and the market appears firm year-round.

5. Snohomish County, 1981

Massive expansion at the Port of Everett has made its smallcraft facility the largest north of Marina Del Rey in southern California. Together with the Port of Edmonds marina, these two public ports provide 97% of the wet moorage in Snohomish County. However, a large upland storage facility between Everett and Marysville provides 900 dry storage spaces and launching facilities capable of handling boats, normally wet moored, at prices comparable to the upper range of public moorage rates.

The Tulalip Indian tribe is planning a tribal fishing vessel harbor of 110 slips, due for completion in 1983. Ten percent of the slips will be reserved for visitor use, but no permanent recreational moorage will be available at the facility planned on Tulalip Bay.

The non-local components (36%) of tenants at the Port of Everett marina reside in the Seattle metropolitan area, particularly in the northern suburbs and south Snohomish County. Predictably large waiting lists are evident at the two public marinas, but, since there are no moorage facilities priced above these low public rates, the market limit price is elusive. However, it is safe to say that significant increments in salt water moorage priced below three dollars per foot per month would fill quickly, but perhaps at the expense of moorage occupancy rates in north King County marinas to the south and those in Skagit County to the north, where, in both cases, market limit rates are higher. At current rates, the market is under-supplied, firm and year-round.

6. King County, 1981

King County has the firmest moorage market among Washington's coastal zone counties. Rates in excess of $5.00 per foot per month are evident in the newest facilities on Lake Union, which, though below capacity, are filling with larger vessels (40-50 feet) and liveaboards. Growth in supply is slow, facilities are generally at 100% occupancy, and waiting lists are evident up to $4.50 per foot per month. King County resident boaters are found mooring year-round in every public facility surveyed, except on the Columbia River. These boaters clearly favor Snohomish, Island, Kitsap, and Skagit county ports, however.

A recent survey conducted by the Port of Seattle[36] revealed that 75% of boaters whose names appear on the waiting lists at Shilshole Bay marina would be willing to pay up to $1.00 more per foot per month for open wet moorage at that facility than they currently pay for moorage at existing marinas. Since 75% of those polled already had moorage in private facilities (average rate $3.47 per foot per month) this is unsurprising. The Port of Seattle has plans to expand moorage at Shilshole Bay marina by 400-600 slips within 2 years. New tenants will likely be King County residents, if the spatial distribution of the new market is similar to that of the tenants already moored at the facility.

While the percentage of growth in private moorage has been small (5.5%) since 1978, five new private facilities have been constructed, adding 250 slips to the (net) supply. Between January and September 1981, the rate at which new slips (primarily on Lake Union) filled up was approximately 15 boats/month.[37] Under construction is a 136-slip facility in Kenmore, and two facilities--one on Vashon Island, the other in south Lake Washington--plan expansion of 35 slips each in 1 and 2 years, respectively.

Moorage operators at the newest facilities identify a market for larger (35-foot +) vessels, reflecting their owners' relative immunity to the vagaries of current consumer credit terms.

King County had almost 3,500[38] less wet slips in 1978 than its "share" of an equally divided regional total supply. The 5.5% increase in slips exceeded the 3.8% increase in population since 1978, but an expansion of supply will be required if and when interest rates turn downwards, credit terms are eased, and consumers increase their discretionary expenditures.

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[36]Port of Seattle, "Rate Management Study for Shilshole Bay Marina," September 1981, p. 10.

[37]Author's estimate, Sept. 1981. Correspondence to Seattle Dept. of Parks and Recreation on demand for moorage at proposed Seacrest Marina, West Seattle.

[38]Goodwin and Stokes (1978), p. 14.

7. Pierce County, 1981

Pierce is one of only two Washington coastal zone counties without a stock of public moorage--the Port of Tacoma's former Fishboat Haven has been leased to a private operator. Extensive growth in private moorage has occurred in Commencement Bay, particularly along City Waterway. Here, the City of Tacoma has concentrated public resources to upgrade streets and utilities in a successful effort to encourage investment in private, marine-related enterprises. Other concentrations of moorage are found in Gig Harbor and on the southeast shore of the Narrows opposite Hale Passage.

Occupancy rates approach 100% up to the highest price range, though, surprisingly, some slow fill-up's are evident in new facilities at below-market prices. Growth in supply of moorage has been at a rate five times faster than growth in county population, almost eliminating Pierce County's 1978 1,293-slip shortfall in its "share" of the regional moorage supply. Since there are no public facilities in Pierce County, tenant origin data are unavailable. However, intuition would suggest the market is primarily local, with some tenants from south King County. While the market appears firm at present prices, slow growth in boat ownership will retard fill-up rates if the current trend in facility construction continues. A net gain of almost 600 dry storage spaces through construction of a proposed new 650 space dry-stacked storage facility in Commencement Bay will offer an attractive alternative to marginally-trailerable (22-26 foot) pleasure craft fleets which might otherwise be wet-moored.

8. Thurston County, 1981

Moorage facilities in Thurston County are concentrated in Budd Inlet and at Johnson Point to the east. The Port of Olympia and the City of Olympia are engaged in revitalization of the downtown waterfront; small-craft moorage figures prominently in the plans. The Port of Olympia's East Bay marina will provide the first public rental moorage in Thurston County. Underway is a phased construction program with a build-out of between 650 and 800 wet moorage slips, which, when complete, will have increased the supply of moorage by 46-57%. Since 1978, moorage growth has been two-and-one-half times greater than population growth in the county.

Few facilities maintain waiting lists for wet moorage, but occupancy rates approach 100% through the entire rate range. The Port's policy toward pricing its new public moorage should take into account its potential impact on private sector marina operations. If rates are set below $3 per foot per month for open moorage, a significant exodus of tenants from private marinas could occur. A careful review of the Port's waiting list for slips at their East Bay marina should confirm that a high proportion of potential candidates already occupy private moorage in Thurston County.

Since Olympia is the closest Puget Sound port to the Portland/Vancouver, WA, metropolitan area, there exists a potential for capturing that area's demand for Puget Sound moorage. It is likely that this demand would be for summer seasonal moorage for smaller vessels, but year-round for larger boats. The magnitude of this market is unknown, however.

9. Mason County, 1981

Public and private rental moorage in Mason County is shared almost equally. Only one of the five public facilities, however, provides significant numbers of permanent rental moorage slips and the quantity provided is unchanged since 1978. Private moorage has expanded twice as much as population in the county, but the absolute number of new slips is small. Apart from the Port of Shelton with direct access to south Puget Sound, all the facilities are located on Hood Canal and cater primarily to a summer seasonal market.

Almost 80% of the vessels leasing slips are trailerable and most are removed from the water during off-season months. Of boaters surveyed in 1978 who owned recreational second homes in Mason County, 50% were King County residents. The large number of recreational property owners on Hood Canal contributes significantly to the seasonality of the moorage market and many of those tenants are from the Seattle metropolitan area.

No new construction of moorage is underway, though two private facilities indicate planned expansion of 44 and 51 slips within 1 and 5 years, respectively.

Summer occupancy rates in all price ranges are 100% and waiting lists for summer moorage are universal in the county. A market limit rate of $3 per foot per month in the summer season seems probable. The fact that one facility in the vicinity of Union, charging $2.50 per foot per month has 100% occupancy rate year-round, suggests that a small year-round market does exist on the south end of Hood Canal and could be exploited. But a larger facility on the Canal in an adjacent county to the north has a 35% winter vacancy rate at $2 per foot per month, suggesting the market is easily saturated. Marina investors and operators should assume that revenues in winter months may be only half those of summer months.

Expansion of Olympia-area marinas may dampen demand for moorage in the Shelton area of south Puget Sound. Shelton marina, operated by the Port, offers moorage at the lowest rate found in the current survey (56 per foot per month), yet has a waiting list of only 20 names.

10. Kitsap County, 1981

Kitsap County's complex shorelines provide a wide variety of marine recreational opportunities. Its Hood Canal shoreline is less accessible and developed than the eastern parts of the county--Bainbridge Island,

Port Orchard, and Sinclair Inlet--served by three ferry runs from West Seattle and Vashon Island, downtown, Seattle and Edmonds. Major public marinas are located close to two ferry termini: Port Orchard marina, operated by the Port of Bremerton, and Kingston Cove marina, operated by the Port of Kingston. Both the ports of Brownsville and Poulsbo operate marinas. But the origins of tenants moored at public facilities reflect a local market being served: less than 5% of tenants at the Port Orchard marina reside in Seattle or Tacoma. Even fewer tenants from those two cities moor at Brownsville.

The new growth in private marinas is concentrated in Eagle Harbor, Winslow, where three new facilities are on line or under construction. A higher proportion of Seattle residents is likely to moor in these facilities given their proximity to the Winslow ferry terminal.

Growth in private facilities (25.3%) has been double the rate of population growth in the county (12.0%) since 1978. One-hundred-twenty new private slips are under construction and another 110 are planned to be on line within 1 year, 18 in 2 years and an additional 63 in 5 years. The Port of Brownsville will begin construction soon of an expansion of 75 slips.

The market is firm year-round with waiting lists evident at facilities up to $3.25 per foot per month and brisk business in condominium sales at $750-800 per foot.

11. Jefferson and Clallam Counties: Eastern Parts

Public smallcraft harbors at Port Townsend and Port Angeles share the market almost equally with private facilities in Jefferson and the eastern part of Clallam counties (Port Angeles and points east). The region's shorelines include part of the western shores of Hood Canal, Admiralty Inlet on Puget Sound, and the Strait of Juan de Fuca.

Port Townsend--by public policy--and Port Angeles--by market forces--serve primarily in-county residents, though the latter port has a few central and southern Puget Sound resident tenants. Accessibility to the county from the eastern shore of Puget Sound has been reduced since the Hood Canal bridge disaster in 1979. Each port is full year-round with predictably long waiting lists.

In the private sector, summer seasonal trade with high winter vacancy rates is evident on Hood Canal and the Strait.[39] High year-round vacancies appear where the moorage rate reaches $2.50 per foot per month.

In 1978 both Jefferson and Clallam Counties had significantly more moorage (708 and 948, respectively) than their per-household "share" of the Puget Sound region's total. Population growth in Clallam and Jefferson counties combined (16.1%) was exceeded fourfold (66.8%) by expansion

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[39]cf. Mason and West Clallam counties.

of wet moorage between 1978 and 1980. Thus, the two counties' supply of moorage has increased relative to 1978.

Half the out-of-area tenants in the Port Angeles Boat Haven are residents of Sequim where the Port of Port Angeles has proposed a 422-slip marina to be constructed in Sequim Bay. The marina would provide safer access to nearby boating and sports fishing waters in the lee of Dungeness Spit than the exposed strait to the west. The rate at which the new facility would fill up and the impact it would have on the private sector market for moorage will depend upon the pricing policy of the port. Setting rates at or close to the market limit rate ($2.50 per foot per month) would have little effect on occupancy rates at Port Townsend Boat Haven or at private facilities at northeast Jefferson County; but such rates might discourage a mass exodus of Sequim resident boaters from the Port Angeles marina. However, if rates are set significantly below the market limit rate, vacancies at private marinas in Port Ludlow, Port Hadlock, and possibly even on the Jefferson County shore of Hood Canal could well occur.

12. Clallam County: Western Part, 1981

Western Clallam County--west of Port Angeles--experiences a summer-only moorage market. While it remains open year-round as a harbor-of-refuge, LaPush Boat Haven, operated by the Port of Port Angeles, had a 92% vacancy rate in January 1981. Virtually all the demand for moorage is from trailered boats visiting fishing resorts on the Strait of Juan de Fuca. Unlike other regions in Washington's coastal zone, rates are set by the day (or night) rather than by the month. The season commences anytime from February 1 to June 1, but ends by October 1. Only one private facility remained open year-round, but its January vacancy rate approached 100%.

No growth in supply of wet moorage in either public or private facilities has occurred since 1978. Accessibility to the Olympic Peninsula has been reduced by higher gasoline prices and the sinking of the Hood Canal Bridge. Coupled with a reduction in the allowable sport salmon catch to two fish per day, these factors have dampened demand for moorage in the western part of the county. Cutbacks in the commercial ocean troll fishery have exacted a similar penalty on commercial moorage demand.

There is no prospect for a year-round moorage market developing in the foreseeable future, nor is the investment climate right for expansion of summer seasonal moorage.

13. Grays Harbor and Pacific Counties, 1981

Public smallcraft harbors provide over 90% of the wet rental moorage in Grays Harbor and Pacific counties. The Port of Ilwaco and Westport Marina, operated by the Port of Grays Harbor, jointly account for 87% of all moorage in the area.

Due to factors similar to those operating in West Clallam County--travel costs, sports salmon catch limits, and cutbacks in the ocean salmon troll fishery--high, year-round vacancy rates of 20-25% persist in this deflated market. The market is over-capitalized and is likely to remain so.

Tenant-origin data for Ilwaco (1979) reveal heavy, year-round reliance on south and central Puget Sound, eastern Washington, and the Portland/Vancouver, Washington, metropolitan area resident boaters. Over 90% of year-round tenancy[40] (and a higher proportion of summer tenants) are from out of the Ilwaco local market and are vulnerable to travel cost increases. Portland area tenants, for example, have fallen off 48% in the last year.[41]

14. Wahkiakum, Cowlitz, and Clark Counties, 1981

A complete analysis of the wet rental moorage market in the lower Columbia River counties should be based on bi-state data. Unfortunately, data from the Oregon shore of the river are unavailable. But it is known that several new marinas have appeared or are planned on the Willamette River in Portland, and are affecting demand for moorage nearer the mouth of the Columbia. What has been said for West Clallam, Grays Harbor, and Pacific counties applies to the Lower Columbia: fuel costs and a reduction in allowable sport and commercial salmon fisheries are taking their toll on moorage demand. The 1980 eruption of Mt. St. Helens destroyed one private marina and caused massive changes in the navigability of the river channel. Channel depths are being reestablished, however; and long-term consequences for navigation of the ash deposition will be minimal.

The stock of moorage has declined 6.3% since 1978 and moorage rates are the lowest in western Washington; yet vacancy rates during the winter season are 23% in the $1-1.50 price range. Summer occupancy rates, on the average, are close to 100% but the Port of Kalama marina, opened in 1978, has a year-round vacancy rate of 25%.

The only identified expansion plans are at the Port of Camas-Washougal, where 30-40 new slips are proposed. The market is soft, seasonal, and currently over-capitalized.

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[40]The rate structure set at Ilwaco discourages less than year-round tenancy: lessees frequently vacate slips during winter months, but retain their tenancy rights.

[41]Personal communication with Robert Peterson, Manager, Port of Ilwaco.

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* These reports and publications were prepared by Washington Sea Grant researchers, contractors or agencies collaborating in joint research activities, coordinated through the Smallcraft Harbors Research Advisory Group (SCHRAG). The conclusions are those of the individual authors, however.

GLOSSARY

Wet moorage slips: Rental wet moorage slips and 30-foot-slip equivalents of non-slip lineal dock. Condominium moorage wet slips, sold in fee simple or leasehold, are included in the total number of wet moorage slips. They are leased frequently by owners of their moorage association.

Total number of marinas and dry storage facilities: Includes yacht clubs, boat houses that rent and store boats, upland dry storage and dry-stack storage facilities.

Average wet open moorage rate: Calculated by multiplying the number of wet rental moorage slips in each marina sampled by the open wet moorage rate charged at that facility; this product is summed across all marinas sampled in the county and then divided by the total number of sampled wet moorage slips in the county. Rates that vary with length are standardized to 30-foot equivalent rates. Higher rates charged for covered or enclosed wet moorage are not reflected in the average rate tabulated.

Number of slips vacant: Number of slips unleased during the summer (July 1980) and winter (January 1981). Slips are sometimes leased annually, but vacated by the lessees for part of the year. These are not counted as vacant, and the slips may be subleased to temporary or transient boaters.

Market limit rate: The open wet moorage rate at which supply and demand are equal; waiting lists disappear and occupancy rates being to fall. Caution: the market limit rate is higher than the average private wet moorage rate, and in some cases above the highest rates charged in the county for wet open moorage. Therefore, if all marinas raised their rates to this level, serious vacancies would arise in those marinas formerly charging rates below the market limit rate, as some boaters would be forced out of the market. Variations in rates may be attributable also to differences in kind and quality of moorage services offered, the accessibility of the facility by land or water, the amenities and other marine services in the vicinity, or the attitudes of proprietors to pricing.

APPENDIX A
Boating Household Survey Questionnaire

IF YOU DO NOT OWN A BOAT, PLEASE CHECK THIS BOX [ ] AND RETURN THE QUESTIONNAIRE TO US. THANK YOU.

TO BEGIN, WE WOULD LIKE TO ASK SOME QUESTIONS THAT WILL HELP US UNDERSTAND THE PROBLEMS YOU FACE AS A BOATER.

1. Comparing your current boating experience with when you first purchased a boat, describe how the following conditions have changed. Circle the number which best reflects your feeling about each condition.

	Much Better	Better	The Same	Worse	Much Worse
a. Boat design and performance	1	2	3	4	5
b. Quality of boating facilities	1	2	3	4	5
c. Moorage availability	1	2	3	4	5
d. Behavior of other boaters	1	2	3	4	5
e. Safety of boating	1	2	3	4	5
f. Overall quality of boating experience	1	2	3	4	5

2. What do you think should be the minimum legal requirement(s) for operating a power boat? Check all of the categories that you feel should be applied.

   a. No requirement _____

   b. Minimum age requirement (specify age in years)_____

   c. Minimum age requirement with boat length, boat type, or horsepower limitations_____

   d. Completion of a boating safety course _____

   e. State licensing examination_____

   f. Coast Guard licensing examination_____

   g. Other (please specify)_____

	Largest Boat	Second Largest Boat	Third Largest Boat
6. Fuel used			
a. Gasoline	_____	_____	_____
b. Diesel	_____	_____	_____
c. Other (please specify)	_____	_____	_____
7. Construction of hull			
a. Wood	_____	_____	_____
b. Steel	_____	_____	_____
c. Aluminum	_____	_____	_____
d. Fiberglass	_____	_____	_____
e. Ferro cement	_____	_____	_____
f. Other (please specify)	_____	_____	_____
8. Main engine horsepower			
a. 10 horsepower or under	_____	_____	_____
b. 11 to 25 horsepower	_____	_____	_____
c. 26 to 50 horsepower	_____	_____	_____
d. 51 to 80 horsepower	_____	_____	_____
e. 81 to 130 horsepower	_____	_____	_____
f. 131 to 200 horsepower	_____	_____	_____
g. 201 to 300 horsepower	_____	_____	_____
h. Over 301 horsepower	_____	_____	_____
9. Do you normally trailer your boat?			
a. Yes	_____	_____	_____
b. No	_____	_____	_____

NEXT WE WOULD LIKE A DESCRIPTION OF YOUR BOAT(S). PLEASE CHECK THE APPROPRIATE BOXES FOR THE BOAT(S) YOU CURRENTLY OWN. PLEASE INCLUDE ONLY POWER BOATS OR SAIL BOATS WITH AUXILIARY MOTORS.

	Largest Boat	Second Largest Boat	Third Largest Boat
3. Length			
a. Less than 12 feet	____	____	____
b. 12 thru 15 feet	____	____	____
c. 16 thru 20 feet	____	____	____
d. 21 thru 26 feet	____	____	____
e. 27 thru 32 feet	____	____	____
f. 33 thru 39 feet	____	____	____
g. 40 thru 50 feet	____	____	____
h. 51 thru 65 feet	____	____	____
i. Over 65 feet	____	____	____
4. Is the beam (width) of your boat 8 feet or more?			
a. Yes	____	____	____
b. No	____	____	____
5. Type			
a. Inboard	____	____	____
b. Inboard/outdrive	____	____	____
c. Outboard	____	____	____
d. Sailboat	____	____	____
e. Other (please specify)	____	____	____

	Largest Boat	Second Largest Boat	Third Largest Boat
10. Age of boat			
a. 1 year or less	_____	_____	_____
b. 2 years	_____	_____	_____
c. 3 years	_____	_____	_____
d. 4 years	_____	_____	_____
e. 5 years	_____	_____	_____
f. 6 to 10 years	_____	_____	_____
g. 11 to 25 years	_____	_____	_____
h. 26 years or older	_____	_____	_____
11. Year you acquired your boat			
a. 1978	_____	_____	_____
b. 1977	_____	_____	_____
c. 1976	_____	_____	_____
d. 1975	_____	_____	_____
e. 1974	_____	_____	_____
f. 1973	_____	_____	_____
g. 1968 to 1972	_____	_____	_____
h. 1963 to 1967	_____	_____	_____
i. 1962 or earlier	_____	_____	_____
12. Cost of your boat when you acquired it (Round your answer to the nearest one hundred dollars)	_____	_____	_____
13. Current market value of your boat (Round your answer to the nearest one hundred dollars)	_____	_____	_____

THIS SECTION OF THE SURVEY ASKS QUESTIONS ABOUT YOUR PRESENT AND FUTURE USE OF MOORAGE OR STORAGE FACILITIES. PLEASE REFER TO THE MAP WHEN ANSWERING THE QUESTIONS THAT ASK FOR MAP AREA NUMBERS.

MAP AREAS

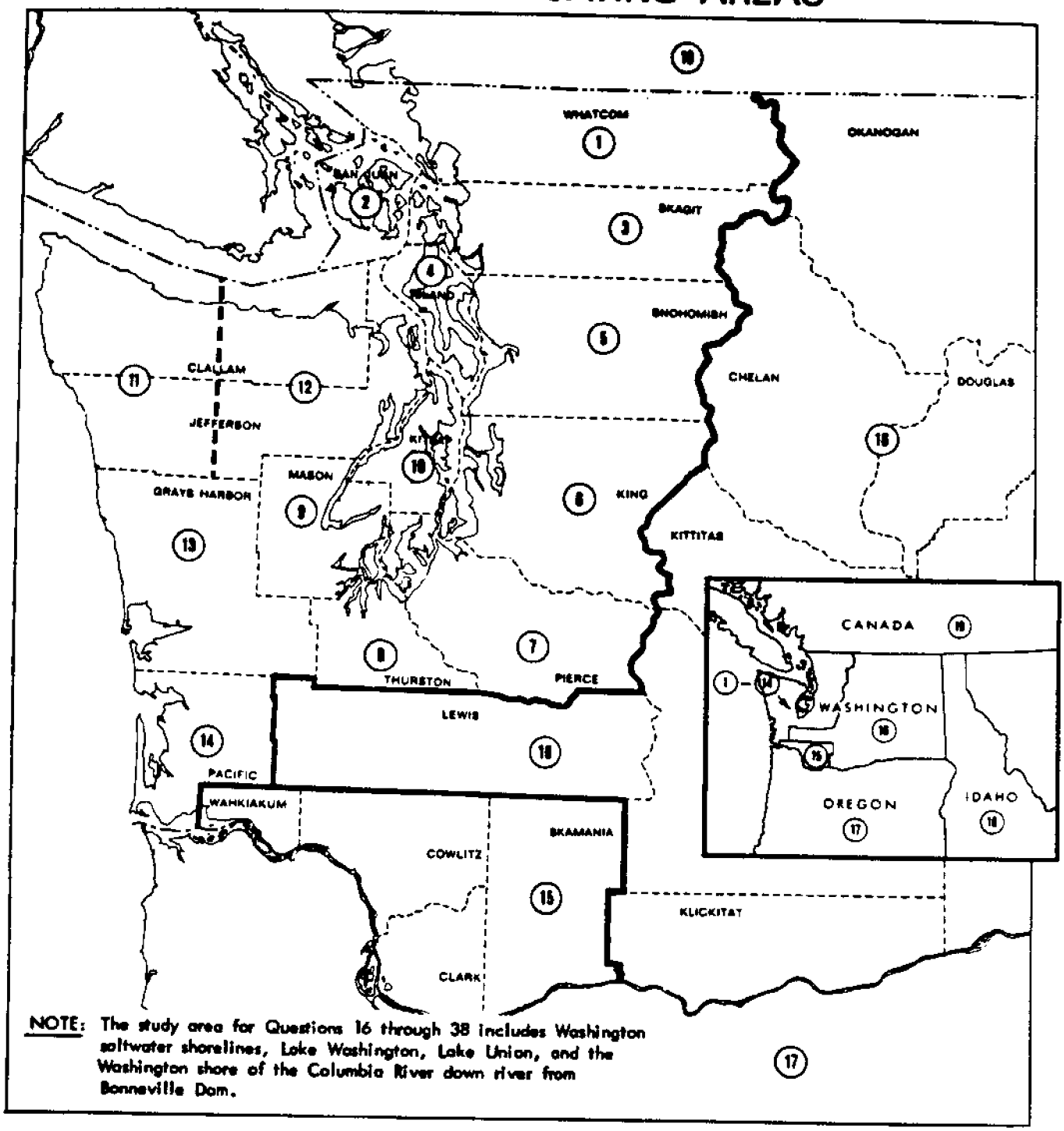
1. Whatcom County
2. San Juan County
3. Skagit County
4. Island County
5. Snohomish County
6. King County
7. Pierce County
8. Thurston County
9. Mason County
10. Kitsap County
11. West Clallam/Jefferson Counties
12. East Clallam/Jefferson Counties
13. Grays Harbor County
14. Pacific County
15. Columbia River (excluding Oregon and Pacific County, WA)
16. Rest of Washington
17. Oregon
18. Idaho
19. Canada
20. Other

FOR QUESTIONS THAT ASK FOR "TYPE OF MOORAGE FACILITY USED", PLEASE REFER TO THE FOLLOWING LIST OF MOORAGE FACILITIES. MOORAGE INCLUDES WET MOORAGE AND DRY STORAGE NEAR THE WATER, AT YOUR HOME, OR IN A MINI-WAREHOUSE.

MOORAGE/STORAGE FACILITIES

A. Wet enclosed
B. Wet covered
C. Wet open
D. Dry covered
E. Dry open
F. Home
G. Mini-warehouse
H. Other

RECREATIONAL BOATING AREAS



NOTE: The study area for Questions 16 through 38 includes Washington saltwater shorelines, Lake Washington, Lake Union, and the Washington shore of the Columbia River down river from Bonneville Dam.

MAP AREAS

1. Whatcom County
2. San Juan County
3. Skagit County
4. Island County
5. Snohomish County
6. King County
7. Pierce County
8. Thurston County
9. Mason County
10. Kitsap County
11. W. Clallam/ Jefferson Counties
12. E. Clallam/Jefferson Counties
13. Grays Harbor County
14. Pacific County
15. Columbia River (excluding Oregon and Pacific County, WA)
16. Rest of Washington
17. Oregon
18. Idaho
19. Canada
20. Other

MOORAGE / STORAGE FACILITIES

A. Wet enclosed
B. Wet covered
C. Wet open
D. Dry covered
E. Dry Open
F. Home
G. Mini-warehouse
H. Other

14. Please circle the number that represents the map area in which you lived in 1978.

AREA NUMBER 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20

15. Please circle every number that represents a map area in which you owned or used a second home or vacation home in 1978.

AREA NUMBER 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20

THE STUDY AREA FOR THE NEXT SECTION INCLUDES WASHINGTON SALT-WATER SHORELINES, LAKE WASHINGTON, LAKE UNION, AND THE WASHINGTON SHORE OF THE COLUMBIA RIVER DOWN RIVER FROM BONNEVILLE DAM

IF YOU DID NOT MOOR OR STORE YOUR BOAT IN THE STUDY AREA IN 1978, PLEASE SKIP TO QUESTION 23.

IF YOU DID MOOR YOUR BOAT IN THE STUDY AREA IN 1978, PLEASE ANSWER QUESTIONS 16 THRU 22.

PRESENT MOORAGE IN STUDY AREA

PERMANENT MOORAGE (30 days or more)

IF YOU DID NOT MOOR OR STORE YOUR LARGEST BOAT IN ONE AREA FOR THE ENTIRE YEAR IN 1978, PLEASE SKIP TO QUESTION 17.

16. Please circle the number and letter which designates the map area and the type of moorage facility in which you used permanent moorage for your largest boat for the entire 1978 year.

AREA NUMBER 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

TYPE OF FACILITY A B C D E F G H

17. Please circle the number and letter which designates the map area and the type of moorage facility in which you used permanent moorage for your largest boat in the summer (mid-April to mid-September of 1978.

AREA NUMBER 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

TYPE OF FACILITY A B C D E F G H

18. Please circle the number and letter which designates the map area and the type of moorage facility in which you used permanent moorage for your largest boat in the winter (mid-September to mid-April) of 1978.

AREA NUMBER 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

TYPE OF FACILITY A B C D E F G H

TEMPORARY MOORAGE (4-29 days)

19. Please indicate the total number of days and the type of moorage facility in which you used temporary moorage for your largest boat during the summer (mid-April to mid-September) of 1978.

AREA NUMBER	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
NUMBER OF DAYS															
TYPE OF FACILITY															

20. Please indicate the total number of days and the type of moorage facility in which you used temporary moorage for your largest boat during the winter (mid-September to mid-April) of 1978.

AREA NUMBER	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
NUMBER OF DAYS															
TYPE OF FACILITY															

TRANSIENT MOORAGE (1-3 days)

21. Please indicate the total number of nights and the type of moorage facility in which you used transient moorage for your largest boat during the summer (mid-April to mid-September) of 1978.

AREA NUMBER	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
NUMBER OF DAYS															
TYPE OF FACILITY															

22. Please indicate the total number of nights and the type of moorage facility in which you used transient moorage for your largest boat during the winter (mid-September to mid-April) of 1978.

AREA NUMBER	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
NUMBER OF DAYS															
TYPE OF FACILITY															

FUTURE MOORAGE IN STUDY AREA

IF YOUR FUTURE MOORAGE PLANS DO NOT INCLUDE MOORING YOUR BOAT IN THE STUDY AREA, PLEASE SKIP TO QUESTION 30. THE STUDY AREA INCLUDES WASHINGTON SALT-WATER SHORELINES, LAKE WASHINGTON, LAKE UNION, AND THE WASHINGTON SHORE OF THE COLUMBIA RIVER DOWN RIVER FROM BONNEVILLE DAM.

23. Please circle every number and letter that designates the map area and the type of moorage facility in which you are currently on a waiting list for available moorage.

AREA NUMBER 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

TYPE OF FACILITY A B C D E F G H

QUESTIONS 24 TO 28 ARE CONCERNED WITH THE MOORAGE FACILITIES YOU WOULD USE IF SPACE WERE AVAILABLE AND CURRENT PRICES PREVAILED.

PERMANENT MOORAGE (30 days or more)

24. Please circle the number and letter which designates the map area and type of moorage facility in which you would use permanent moorage for your largest boat during the entire year.

AREA NUMBER 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

TYPE OF FACILITY A B C D E F G H

25. Please circle the number and letter which designates the map area and type of moorage facility in which you would use permanent moorage for your largest boat during the summer (mid-April to mid-September).

AREA NUMBER 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

TYPE OF FACILITY A B C D E F G H

26. Please circle the number and letter which designates the map area and type of moorage facility in which you would use permanent moorage for your largest boat during the winter (mid-September to mid-April).

AREA NUMBER 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

TYPE OF FACILITY A B C D E F G H

TEMPORARY MOORAGE (4-29 days)

27. Please circle every number and letter which designates the map area and type of moorage facility in which you would use temporary moorage for your largest boat during the summer (mid-April to mid-September).

AREA NUMBER 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

TYPE OF FACILITY A B C D E F G H

28. Please circle every number and letter which designates the map area and type of moorage facility in which you would use temporary moorage for your largest boat during the winter (mid-September to mid-April).

AREA NUMBER 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

TYPE OF FACILITY A B C D E F G H

NEXT, WE WOULD LIKE TO ASK QUESTIONS RELATED TO HOW YOU USE YOUR BOATS.

29. List, by months, the approximate number of days your boat(s) was (were) operated during 1978 within the study area.

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
LARGEST BOAT												
SECOND LARGEST BOAT												
THIRD LARGEST BOAT												

30. List, by months, the approximate number of days your boat(s) was (were) operated during 1978 outside the study area.

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
LARGEST BOAT												
SECOND LARGEST BOAT												
THIRD LARGEST BOAT												

31. If you rented, leased, or loaned your largest boat during 1978, please list by month the approximate number of days your largest boat was used by others.

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
LARGEST BOAT												

32. Referring to the map, list, by months, the number of occasions you used a launch ramp during 1978 within the study area.

NUMBER OF LAUNCHINGS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MAP AREA 1												
2												
3												
4												
5												
6												
7												
8												
9												
10												
11												
12												
13												
14												
15												

33. Referring to the map, list, by map area, the total number of occasions you visited a public shoreline park or underwater park by boat within the study area during 1978.

MAP AREA NUMBER	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
NUMBER OF VISITS															

34. If you stayed overnight in your boat at a public shoreline park, within the study area, please indicate the total number of nights you spent aboard your boat for each map area.

MAP AREA NUMBER	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
NUMBER OF NIGHTS															

35. What is the usual number of people in your boating party? (Circle one)

1 2 3 4 5 6 7 8 9 or more

AN IMPORTANT MATTER OF CONERN IS DEBRIS CONTROL AND OBSTACLE REMOVAL

36. Did your boat incur any damage while used in 1978?

a. Yes_____

b. No _____

37. For each damage incident, indicate the map area number where the damage occurred and the amount of the damage.

CAUSE OF DAMAGE	AREA NUMBER	DOLLAR AMOUNT TO NEAREST $10
a. Collision with another vessel or dock	_____	_____
b. Grounding or hitting rocks	_____	_____
c. Logs or deadheads	_____	_____
d. Stationary debris	_____	_____
e. Small floating debris (less than five feet long)	_____	_____
f. Launching or transporting boat	_____	_____
g. Other (please specify)_____	_____	_____
_____		

A VERY IMPORTANT PART OF THIS STUDY IS MEASURING THE IMPACT OF RECREATIONAL BOATING ON THE WASHINGTON STATE ECONOMY. TO DO THIS, WE NEED INFORMATION ABOUT YOUR BOATING EXPENDITURES AND YOUR INCOME. REMEMBER, YOUR RESPONSES WILL BE HELD IN STRICT CONFIDENCE.

38. During 1978, how much did you spend in the state of Washington in the following boating related expenses? Please round your estimates to the nearest ten dollars.

a._____Insurance

b._____Permanent (30 days or more) moorage and storage charges for boat

c._____Temporary (4 to 29 days) moorage and storage charges for boat

d._____Transient (1 to 3 days) moorage and storage charges for boat

e._____Launch and ramp fees

f._____Fuel and lubricants

g._____Accessories (for example: navigation, communication, or other boating equipment)

h._____Maintenance and repair: parts and materials

i._____Maintenance and repair: labor

j._____Groceries and beverages consumed on board

k._____Tolls and fees for ferries, campgrounds, and bridges that were associated with boating trips

l._____Automobile expenses associated with boating trips

m._____Other boating expenses

39. In what state was your largest boat purchased?_____

40. In what state was your largest boat manufactured?_____

41. Please circle the letter which best describes your total household income, before taxes, in thousands of dollars.

a. $10,000 or less	d. $20,001 to $25,000	g. $35,001 to $40,000
b. $10,001 to $15,000	e. $25,001 to $30,000	h. $40,001 to $45,000
c. $15,001 to $20,000	f. $30,001 to $35,000	i. $45,001 or more

We would be interested in any other comments you care to make concerning recreational boating. Please use the ruled lines for your comments and add additional sheets if necessary.

Thank you for taking the time and effort to complete this questionnaire. Your answers will be valuable in developing a further understanding of boating in Washington State. As we stated before, your responses will be held in strict confidence. Only statistical summaries of replies will be made public. If you would like a copy of the statistical summary, please write your name and address on the enclosed card, and mail separately. This will insure protection of your anonymity.

DIVISION OF MARINE RESOURCES
UNIVERSITY OF WASHINGTON • A SEA GRANT COLLEGE

SMALLCRAFT HARBORS RESEARCH ADVISORY GROUP*

June 18, 1979

Dear Boater:

As a recreational boater, you are undoubtedly aware of the steady growth in boating activities over the past ten years. This growth is likely to continue since the Pacific Northwest is an increasingly popular region in which to live. This growth will place additional demands on existing boating facilities and will create demands for new boating facilities. To help plan intelligently to meet the increasing demands on boating facilities, the agencies and industries that are responsible for the planning, management, construction and operation of boating facilities need your help. They need to know what problems you face as a boater, what facilities you currently use, what facilities you would like to see built and what economic impact the recreational boater has on Washington State's economy.

To assist the numerous agencies that are involved with boating the Washington Sea Grant Marine Advisory Program is conducting a cooperative study of recreational boating in Washington and northwest Oregon. This questionnaire is an integral part of the study and will play an important role in the planning of new boating facilities in the Pacific Northwest.

This questionnaire is being sent to a randomly chosen sample of registered boat owners in Washington and northwest Oregon. We realize that some questions may be hard to answer, but we ask you to please answer all questions that apply to you. Return the questionnaire to the University of Washington in the enclosed stamped, self-addressed envelope on or before June 29th. Your response will be held in strict confidence. Only statistical summaries will be made public.

Sincerely,

Stanley R. Murphy, Director
Washington Sea Grant Program

*This ad hoc group was organized by Washington Sea Grant to enhance coordination among participating institutions' boating studies. A list of participants appears overleaf.

3716 BROOKLYN AVENUE NE SEATTLE WASHINGTON 98105 PHONE (206) 543-6600 SCAN 323-6600

SMALLCRAFT HARBORS RESEARCH ADVISORY GROUP

List of Participating Institutions

A. Government Agencies

1. State
   - Department of Natural Resources
   - Department of Ecology
   - State Parks and Recreation Commission
   - Interagency Committee for Outdoor Recreation
   - Department of Commerce and Economic Development
   - Department of Social and Health Services
   - Department of Fisheries

2. Federal
   - U.S. Army Corps of Engineers
   - U.S. Coast Guard
   - Heritage Conservation and Recreation Service
   - National Park Service

B. Ports
   - Washington Public Ports Association

C. Boating Industries
   - Northwest Marine Trade Association

D. Academic
   - University of Washington
   - Washington State University
     Cooperative Extension Service

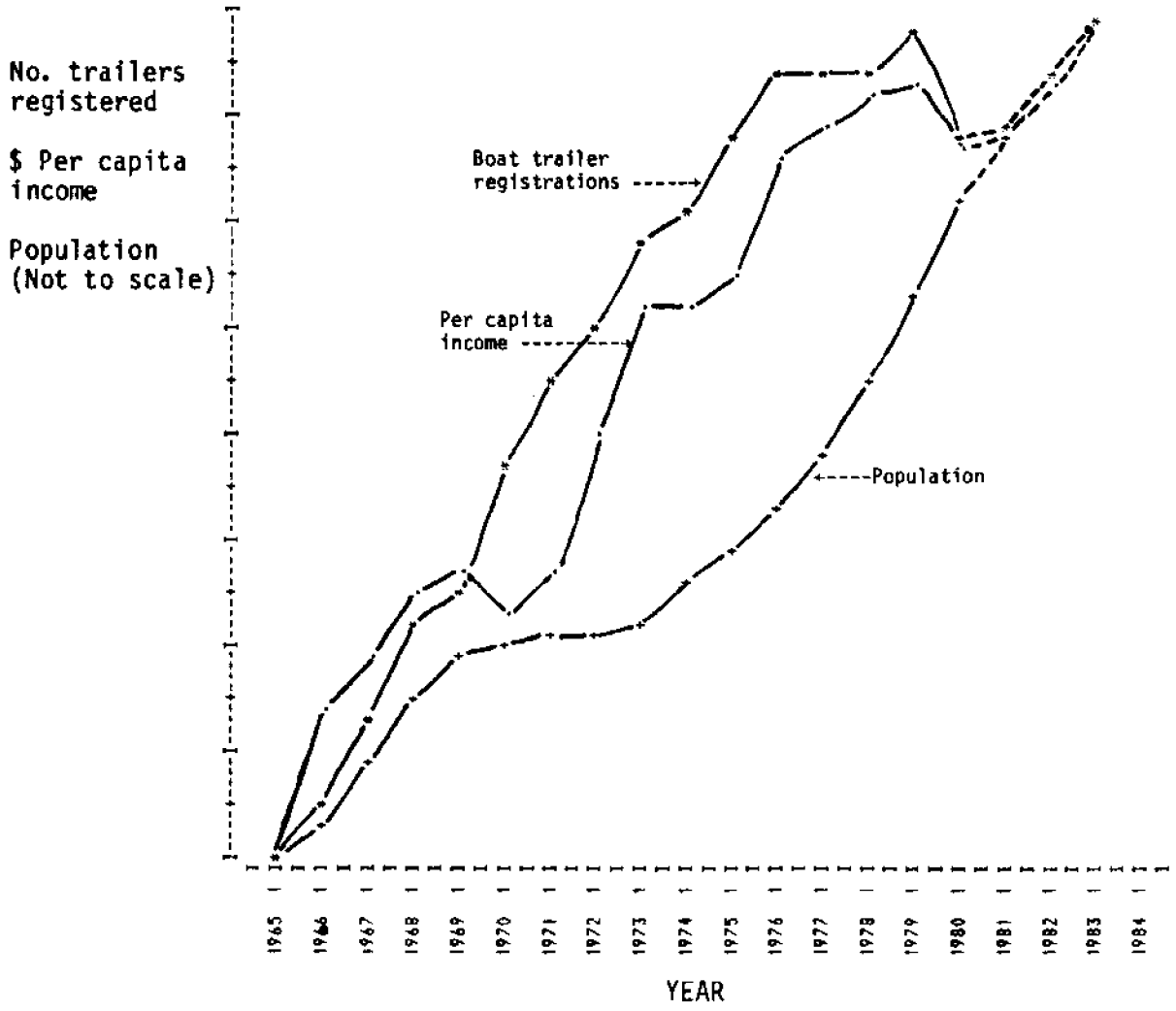
APPENDIX B

Multiple Regression Equations for Trailer Registrations, 1965-1980, Boat and Motor Sales, 1973-1980 and U. S. Coast Guard Boat Registrations, 1965-1980; Forecasts

WASHINGTON STATE BOAT TRAILERS:
FORECAST TO 1983

Regression Equation: No. of registered boat trailers = -1,493,187 + 193,008 x LN. PCI

Coefficient of Determination (R^2) = .93



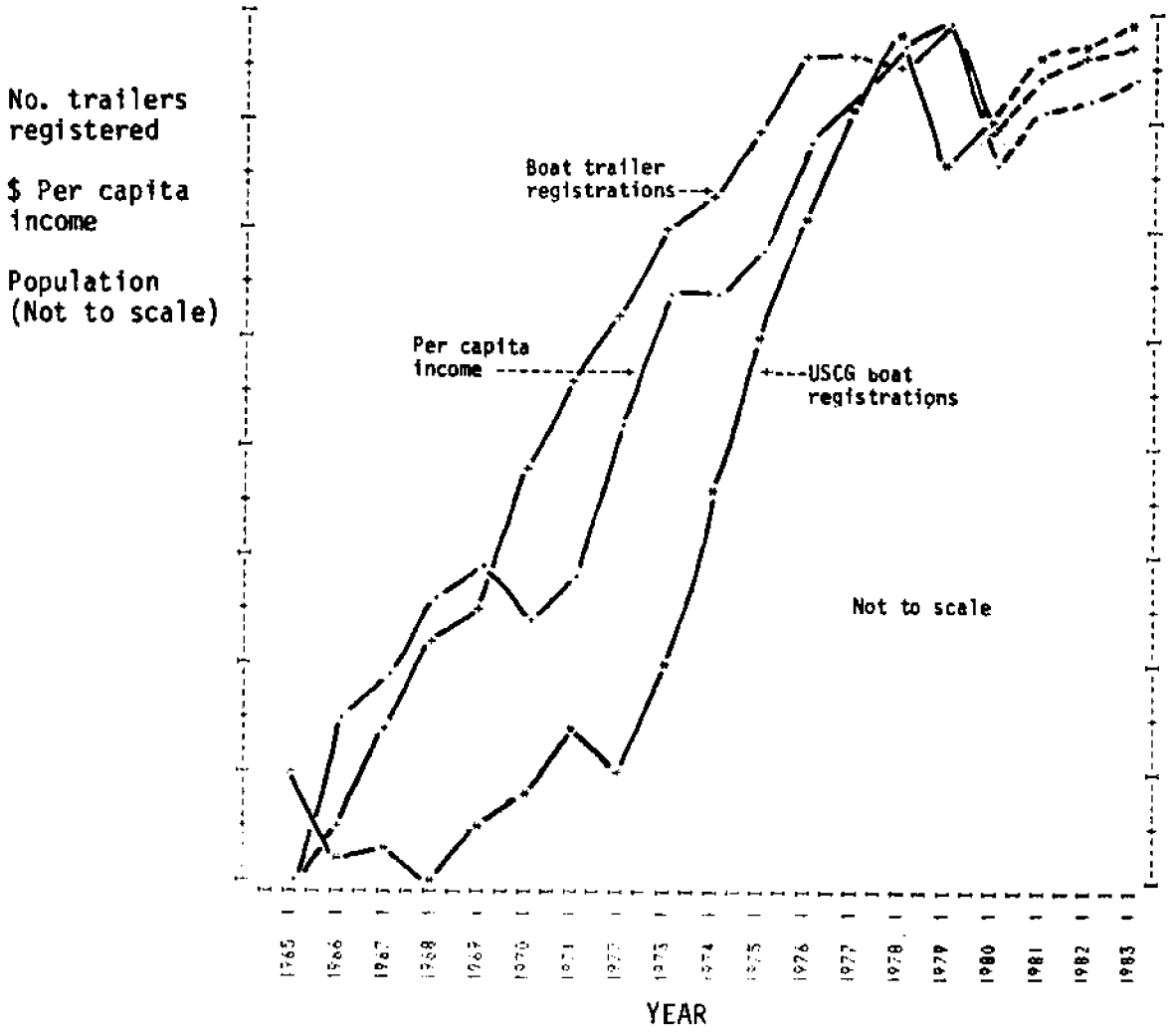
Washington State boat trailer registrations 1965-1980, forecast to 1983.

Sources: Washington State Department of Licensing; Washington State Office of Fiscal Management; Washington State Department of Revenue.

UNITED STATES COAST GUARD BOAT REGISTRATIONS
IN WASHINGTON STATE 1965-1980, FORECAST TO 1983

Regression Equation: No. of registered boats = -223,027 + 90.96 x PCI
Coefficient of Determination (R^2) = 0.81

No. of registered trailers = 45,729 + 0.41 x no. of boats registered
Coefficient of Determination (R^2) = 0.74



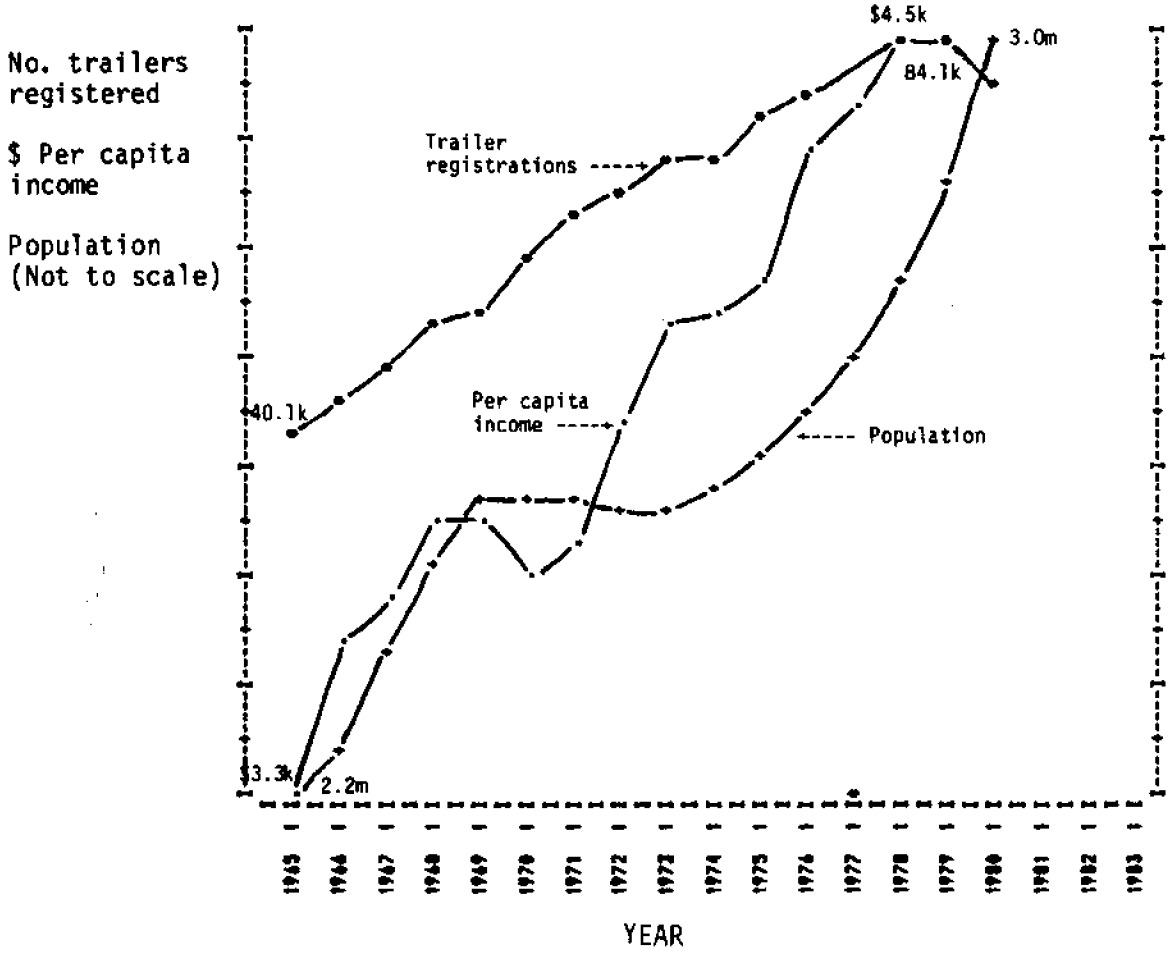
United States Coast Guard boat registrations in Washington State 1965-1980, forecast to 1983.

Sources: Washington State Department of Licensing; Washington State Office of Fiscal Management; Washington State Department of Revenue.

WASHINGTON COASTAL ZONE COUNTIES

Regression Equation: No. of registered boat trailers = -805,507 + 0.033 x Pop'n
+ 95,054 x Log PCI

Coefficient of Determination (R^2) = .92
Trailers/1000 population = 26 (1980)



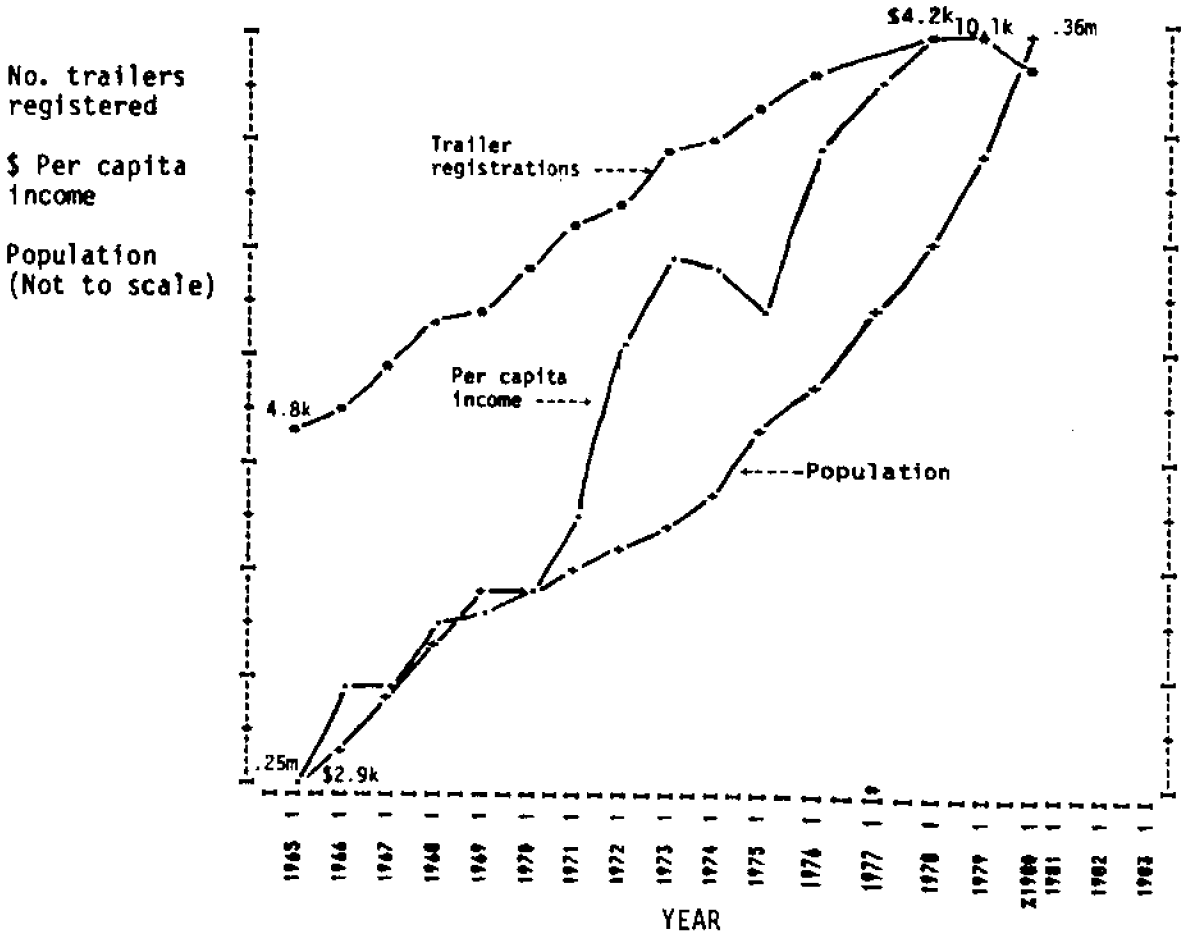
Washington coastal zone counties boat trailer registrations 1965-1980.

Sources: Washington State Department of Licensing; Washington State Office of Fiscal Management; Washington State Department of Revenue.

COAST AND COLUMBIA RIVER COUNTIES

Regression Equation: No. of registered boat trailers = -75,622 + 0.029 x Pop'n + 9207 x Log PCI

Coefficient of Determination (R^2) = .97
Trailers/1000 population = 27 (1980)



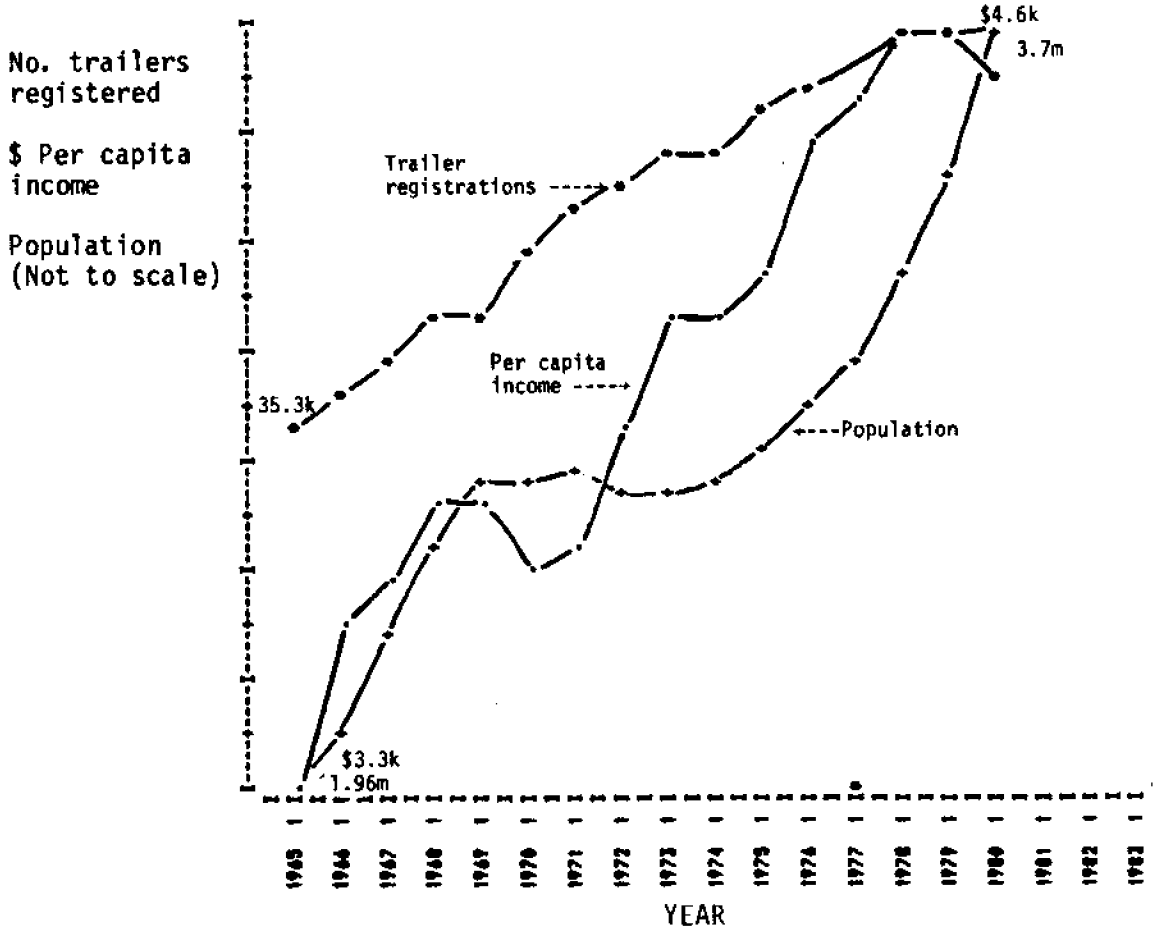
Coast and Columbia River Counties boat trailer registrations 1965-1980.

Sources: Washington State Department of Licensing; Washington State Office of Fiscal Management; Washington State Department of Revenue.

PUGET SOUND COUNTIES

Regression Equation: No. of registered boat trailers = -106,574 + 0.036 x Pop'n + 20.9 x PCI

Coefficient of Determination (R^2) = .91
Trailers/1000 population = 26 (1980)



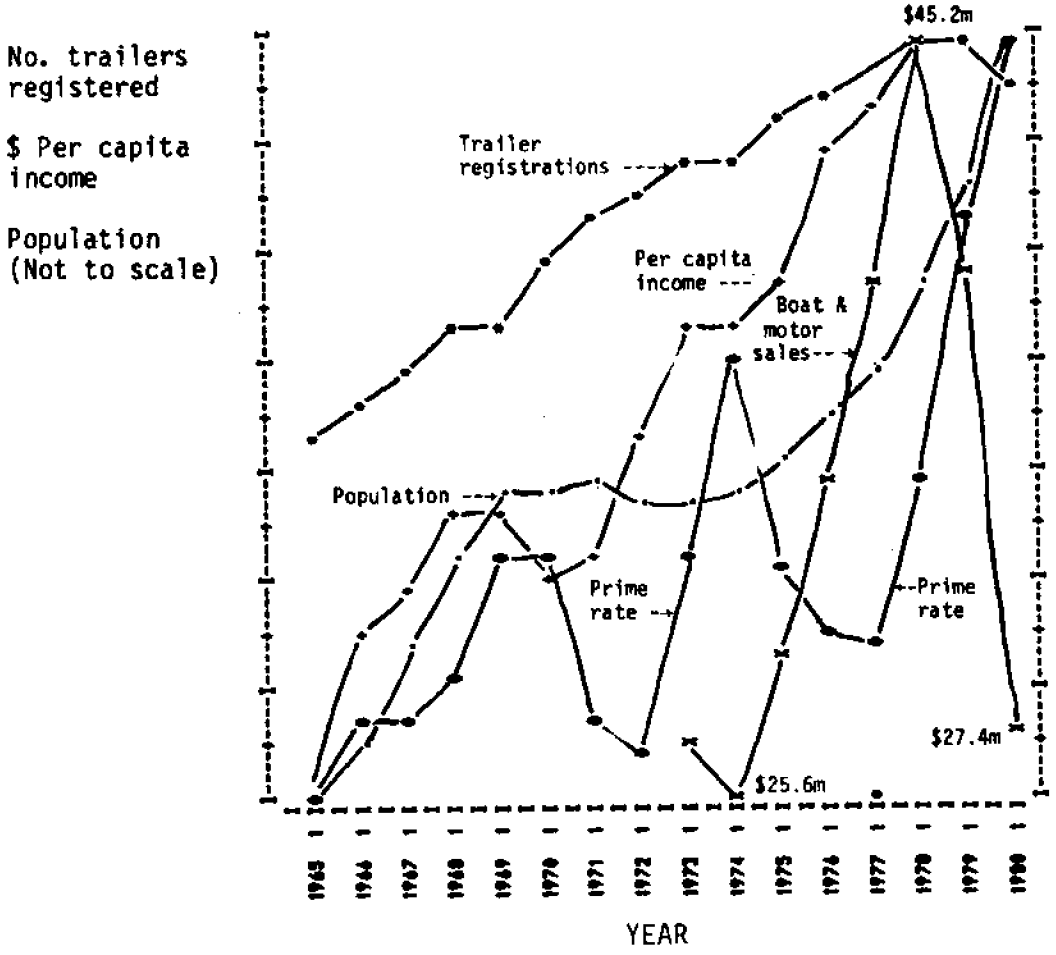
Puget Sound Counties boat trailer registrations 1965-1980.

Sources: Washington State Department of Licensing; Washington State Office of Fiscal Management; Washington State Department of Revenue.

PUGET SOUND COUNTIES: BOAT AND MOTOR SALES

Sales ($ x 1000, 1967) = -59,029 + 0.055 x Pop'n
-2492 x Prime Rate (%)

Coefficient of Determination (R^2) = .61



Puget Sound Counties: boat and motor sales 1965-1980.

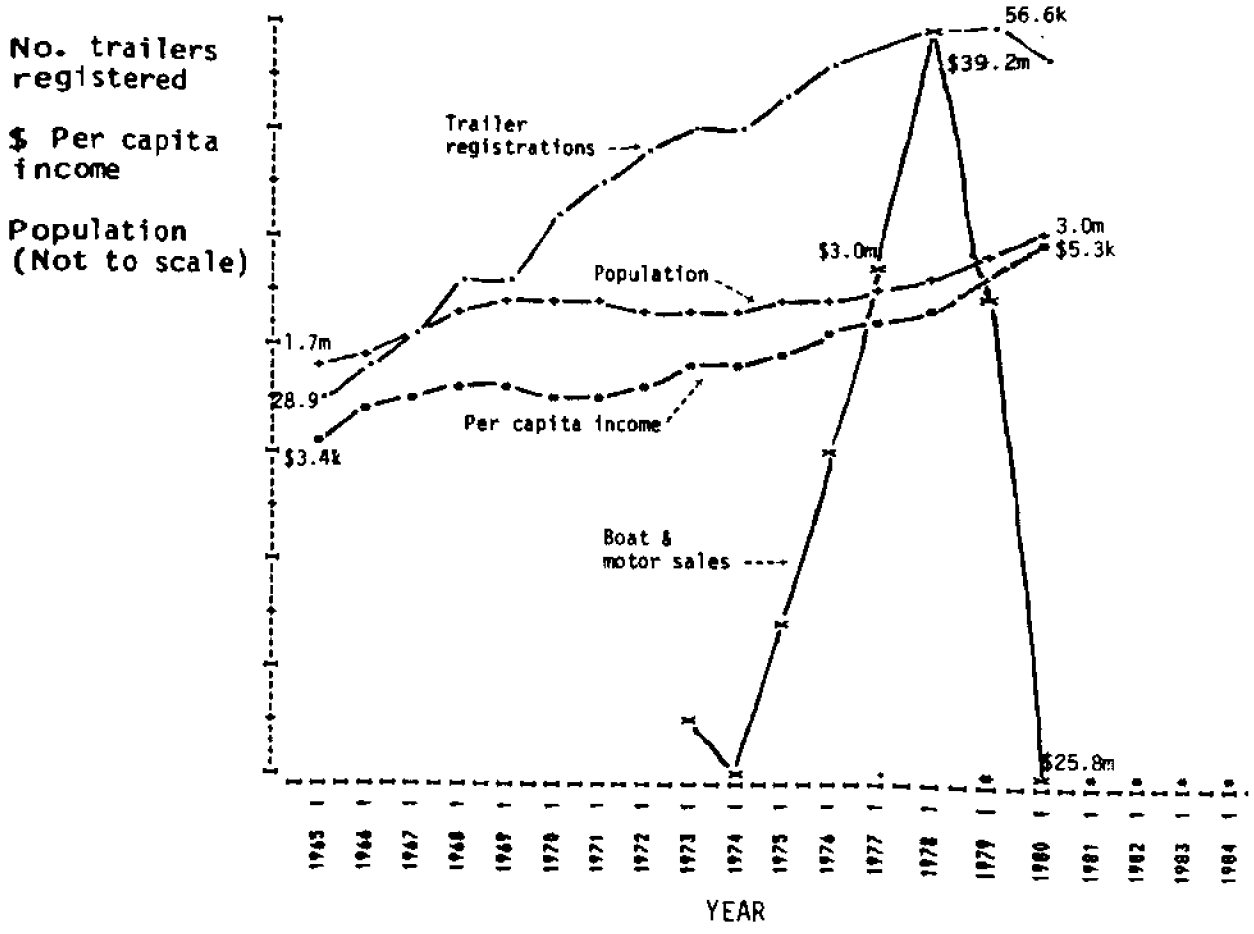
Sources: Washington State Department of Licensing; Washington State Office of Fiscal Management; Washington State Department of Revenue.

PUGET SOUND COUNCIL OF GOVERNMENTS REGION

(King, Pierce, Snohomish, Kitsap)

Regression Equation: No. of registered boat trailers = -515,434 + 67,317 x Log PCI

Coefficient of Determination (R^2) = .68
Trailers/1000 population = 24 (1980)



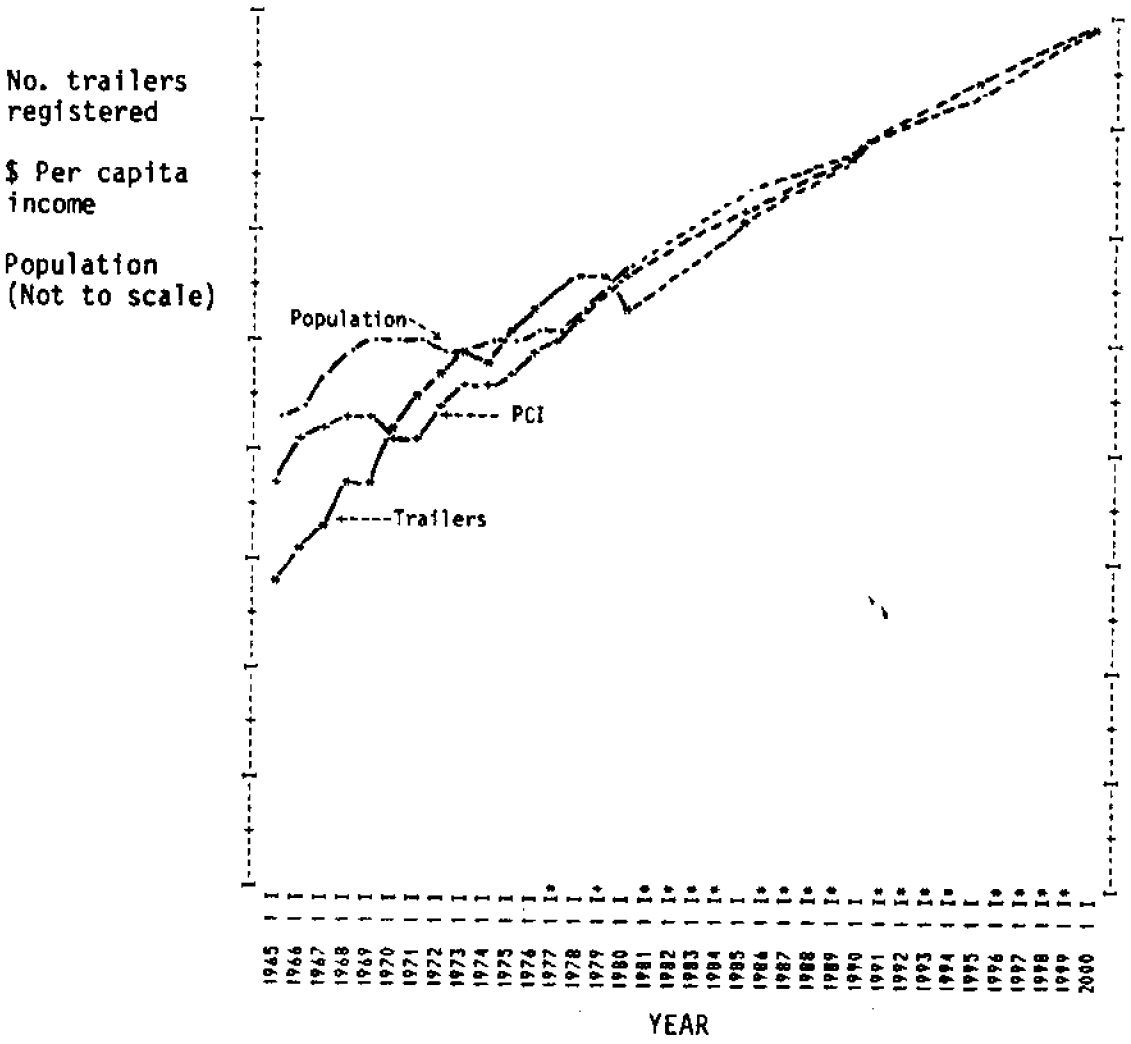
Puget Sound Council of Governments Region boat trailer registrations 1965-1980.

Sources: Washington State Department of Licensing; Washington State Office of Fiscal Management; Washington State Department of Revenue.

PSCOG TRAILER REGISTRATIONS:
FORECASTS TO 2000

Regression Equation: No. of registered boat trailers = -576,231.5 x 74,662 x LN. PCI

Coefficient of Determination (R^2) = .75



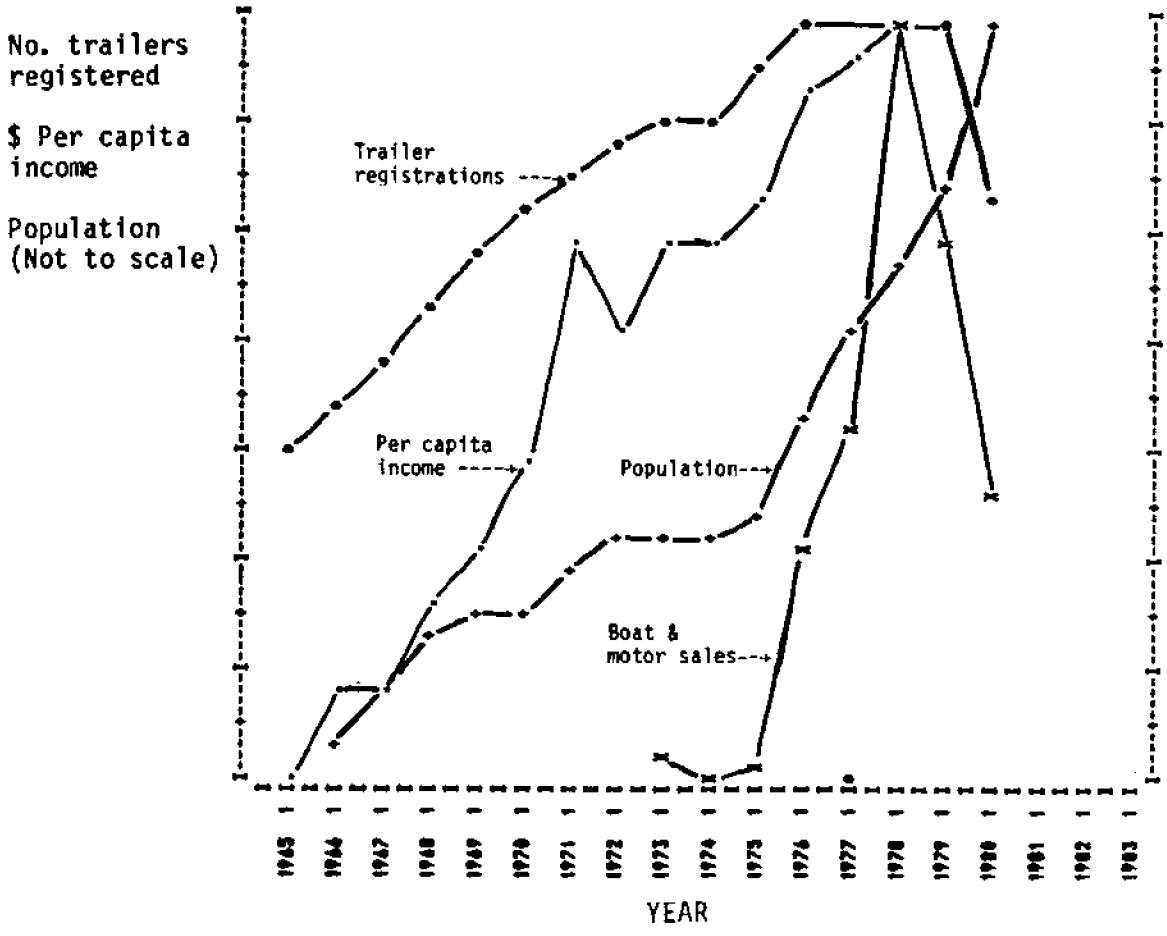
PSCOG Trailer Registrations 1965-1980. (Forecast to 2000).

Sources: Washington State Department of Licensing; Washington State Office of Fiscal Management; Washington State Department of Revenue.

WHATCOM COUNTY

Regression Equation: No. of registered boat trailers = -25,897 + 3471 x Log PCI

Coefficient of Determination (R^2) = .97
Trailers/1000 population = 21 (1980)



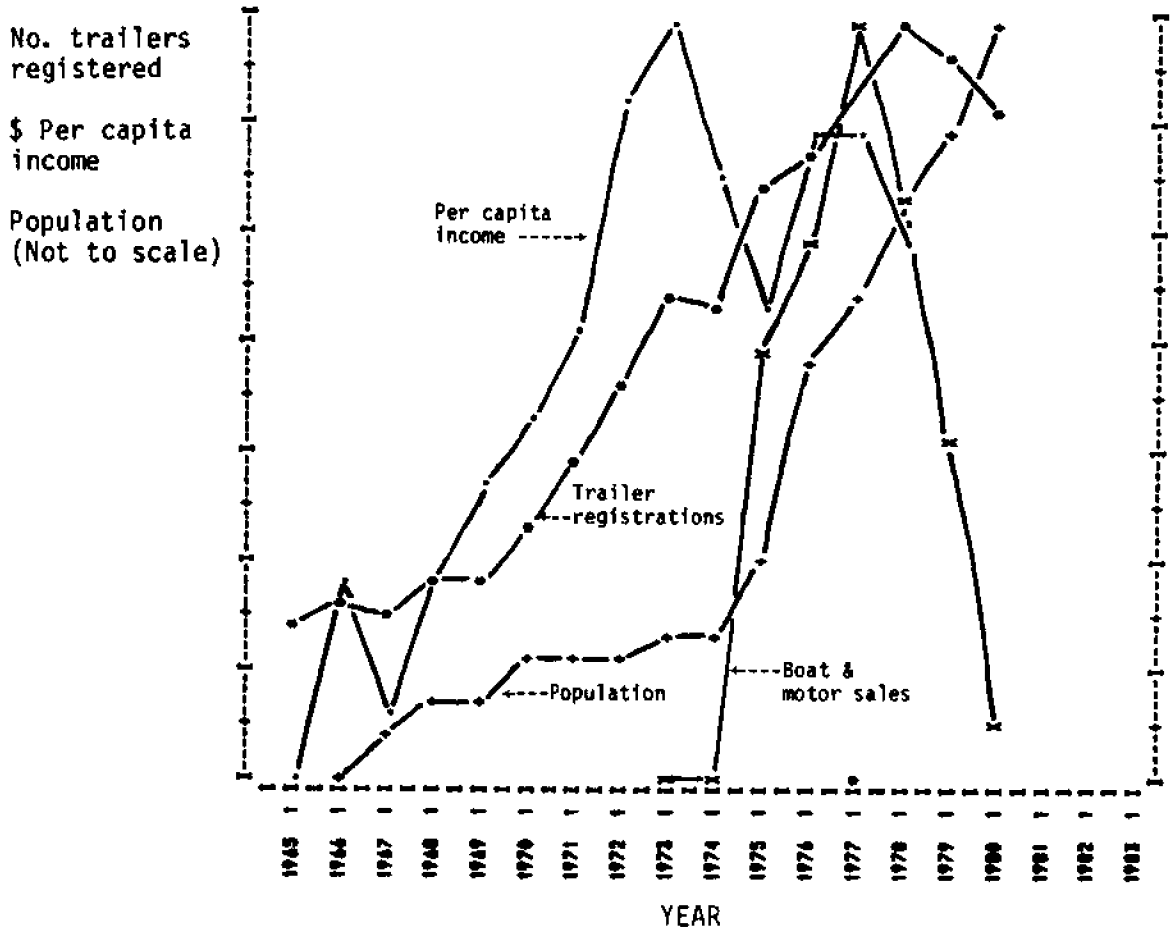
Whatcom County boat trailer registrations 1965-1980.

Sources: Washington State Department of Licensing; Washington State Office of Fiscal Management; Washington State Department of Revenue.

SAN JUAN COUNTY

Regression Equation: No. of registered boat trailers = -222 + 0.35 x Pop'n + 0.042 x PCI

Coefficient of Determination (R^2) = .91
Trailers/1000 population = 22 (1980)



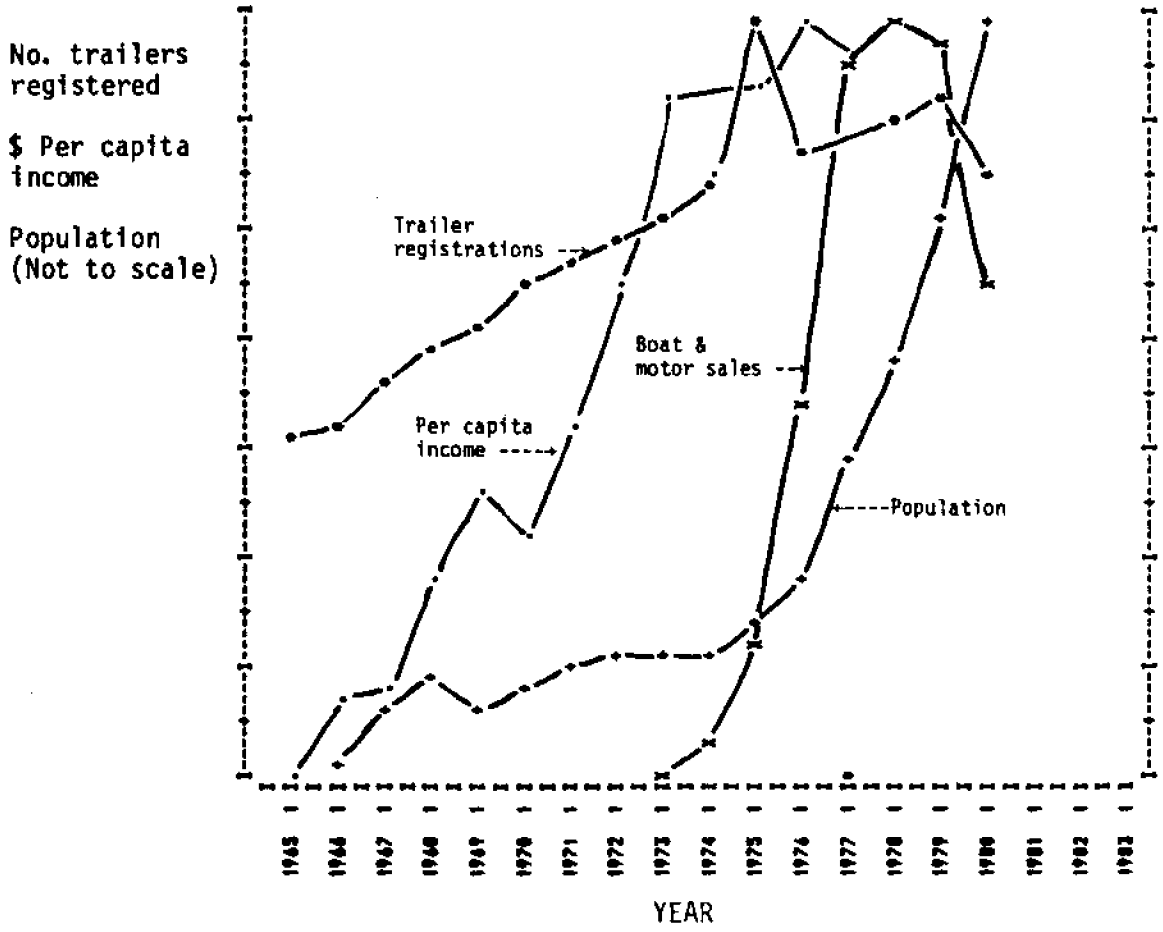
San Juan County boat trailer registrations 1965-1980.

Sources: Washington State Department of Licensing; Washington State Office of Fiscal Management; Washington State Department of Revenue.

SKAGIT COUNTY

Regression Equation: No. of registered boat trailers = -21,199 + 2858 x Log PCI

Coefficient of Determination (R^2) = .86
Trailers/1000 population = 39 (1980)



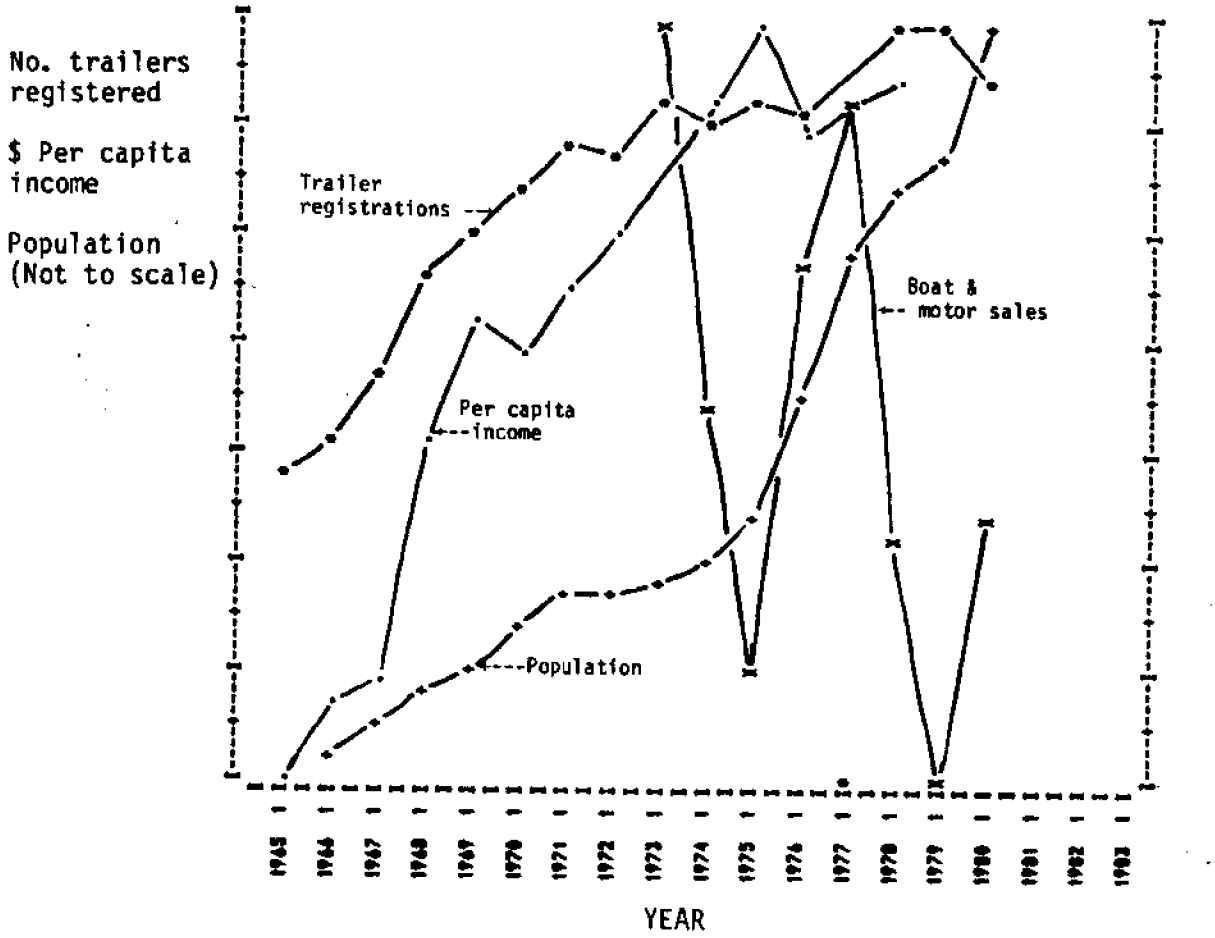
Skagit County boat trailer registrations 1965-1980.

Sources: Washington State Department of Licensing; Washington State Office of Fiscal Management; Washington State Department of Revenue.

ISLAND COUNTY

Regression Equation: No. of registered boat trailers = -10,913 + 0.017 x Pop'n + 1463 x Log PCI

Coefficient of Determination (R^2) = .98
Trailers/1000 population = 35 (1980)



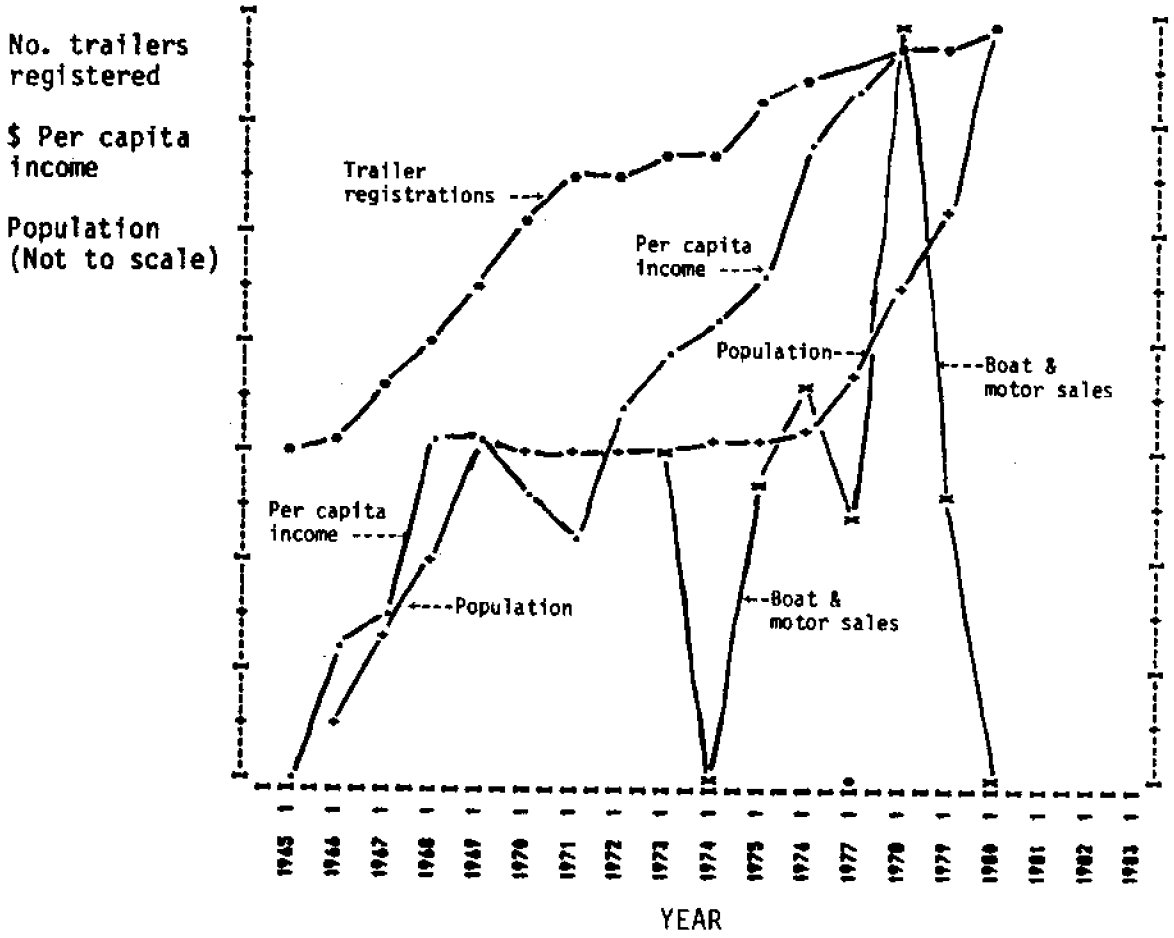
Island County boat trailer registrations 1965-1980.

Sources: Washington State Department of Licensing; Washington State Office of Fiscal Management; Washington State Department of Revenue.

SNOHOMISH COUNTY

Regression Equation: No. of registered boat trailers = -6461 + 0.05 x Pop'n

Coefficient of Determination (R^2) = 0.80
Trailers/1000 population = 27 (1980)



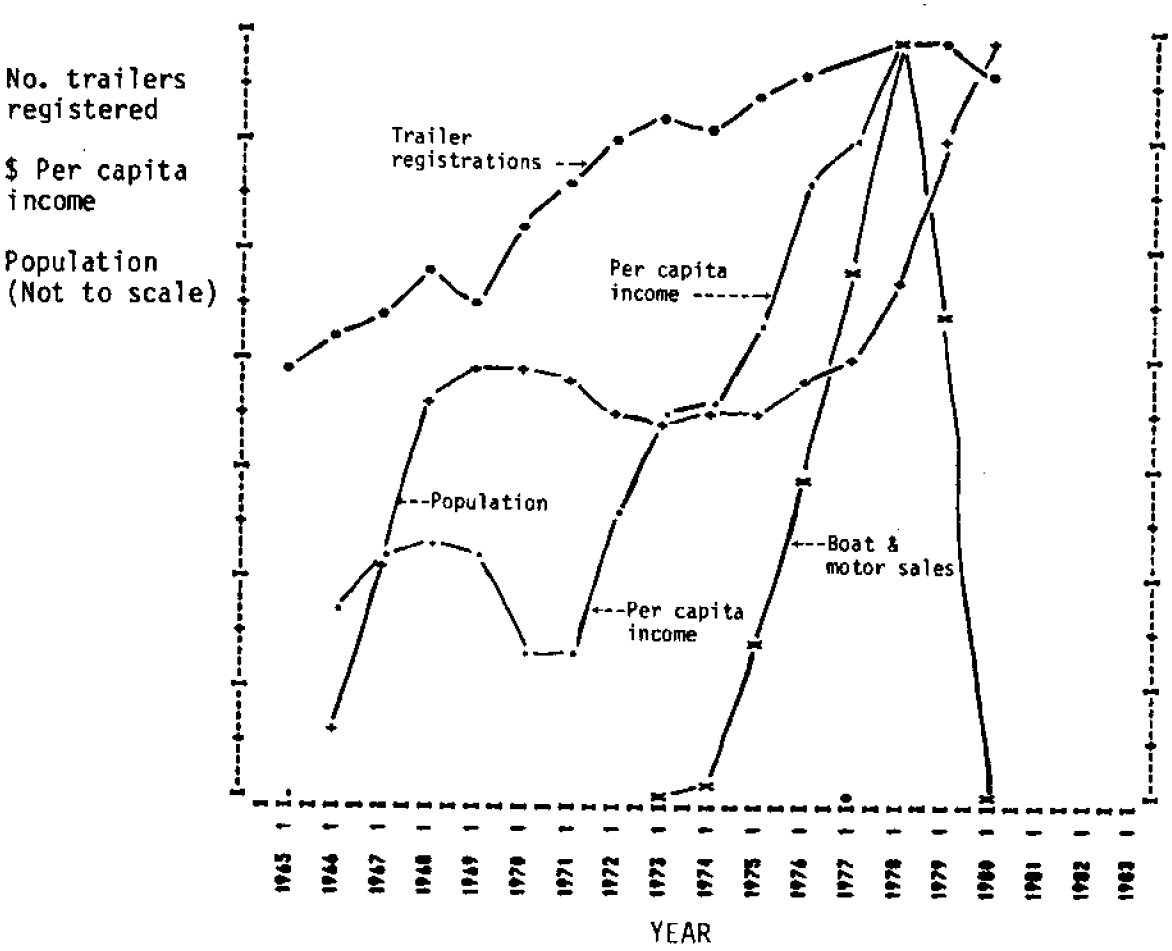
Snohomish County boat trailer registrations 1965-1980.

Sources: Washington State Department of Licensing; Washington State Office of Fiscal Management; Washington State Department of Revenue.

KING COUNTY

Regression Equation: No. of registered boat trailers = -45,220 + 0.033 x Pop'n + 7.23 x PCI

Coefficient of Determination (R^2) = .79
Trailers/1000 population = 23 (1980)



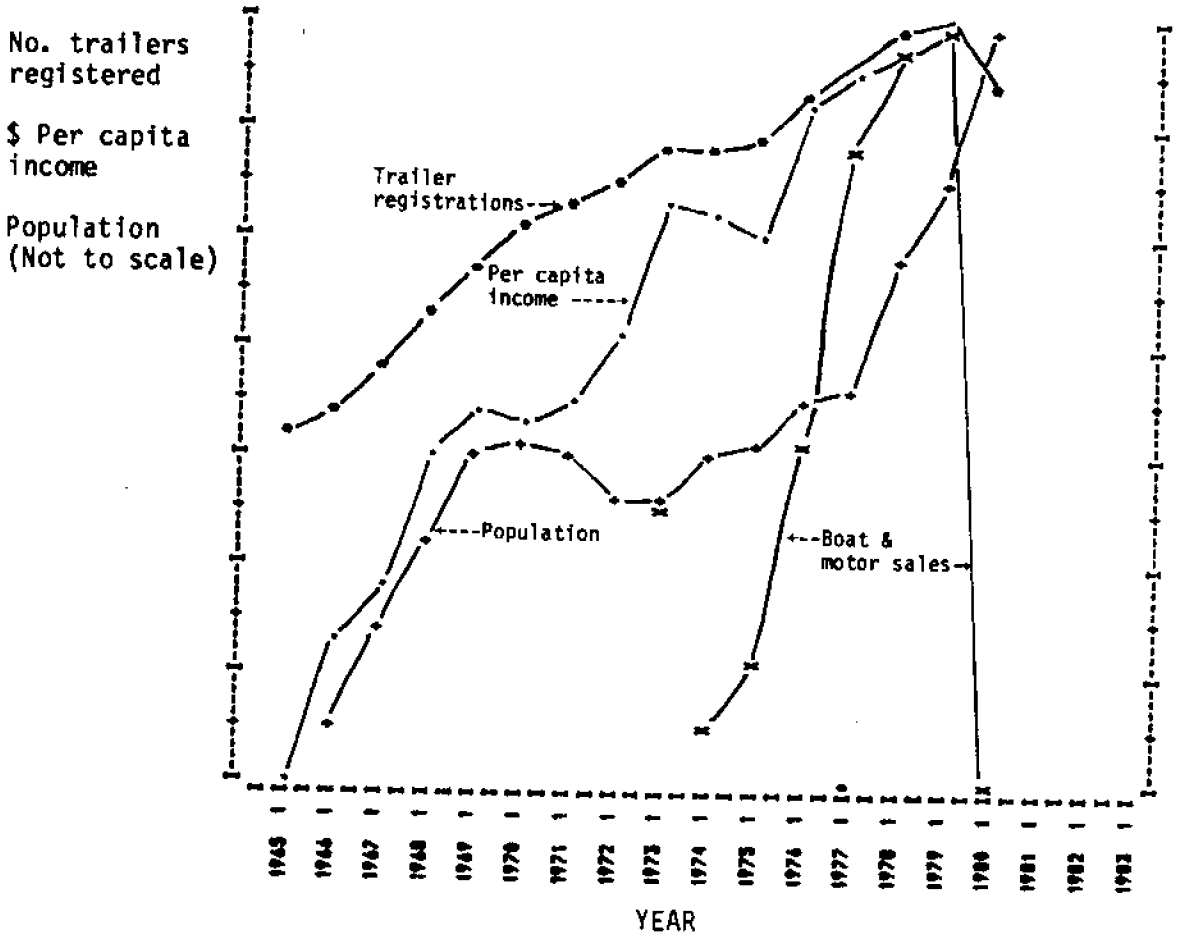
King County boat trailer registrations 1965-1980.

Sources: Washington State Department of Licensing; Washington State Office of Fiscal Management; Washington State Department of Revenue.

PIERCE COUNTY

Regression Equation: No. of registered boat trailers = -11,414 + 5.85 x PCI

Coefficient of Determination (R^2) = .96
Trailers/1000 population = 24 (1980)



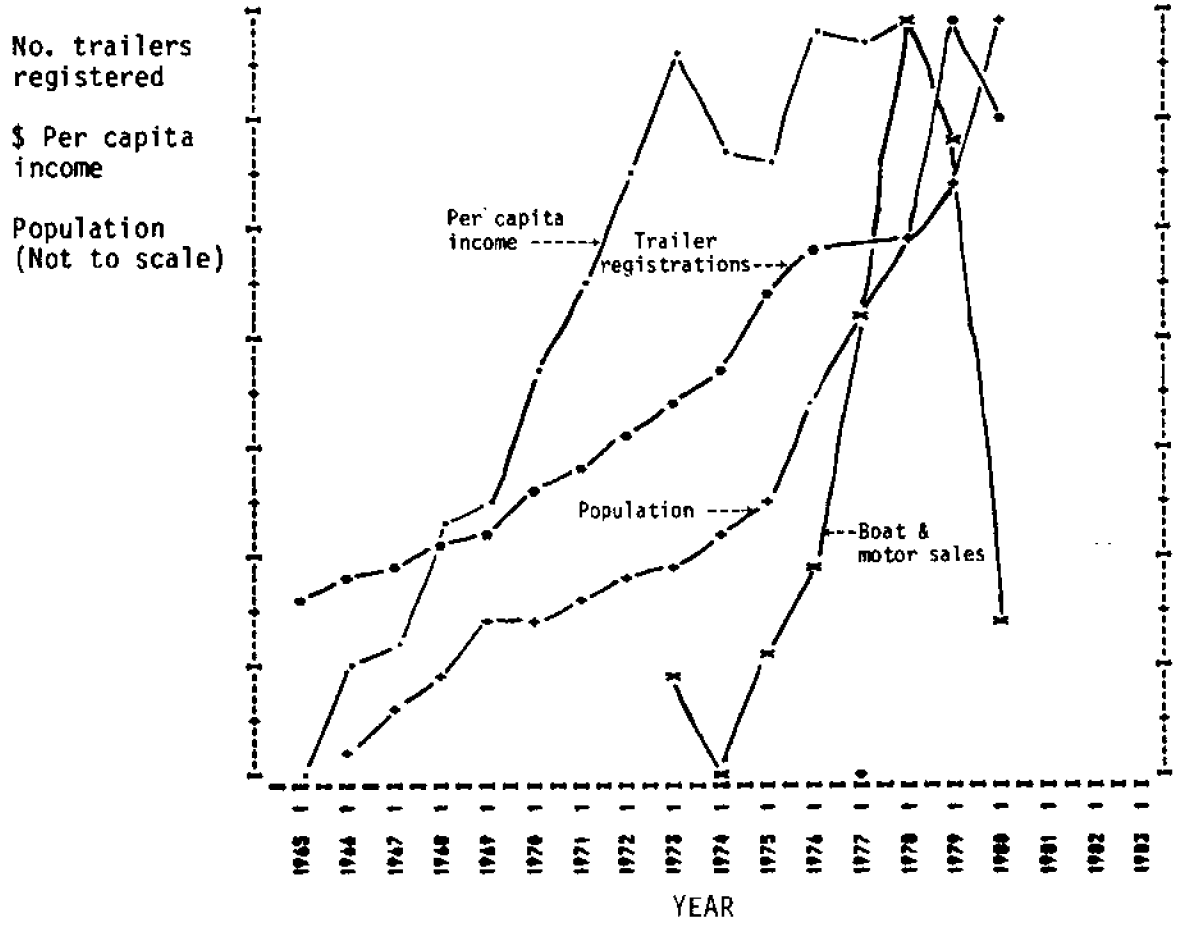
Pierce County boat trailer registrations 1965-1980.

Sources: Washington State Department of Licensing; Washington State Office of Fiscal Management; Washington State Department of Revenue.

THURSTON COUNTY

Regression Equation: No. of registered boat trailers = -3161 + 0.066 x Pop'n

Coefficient of Determination (R^2) = .89
Trailers/1000 population = 32 (1980)



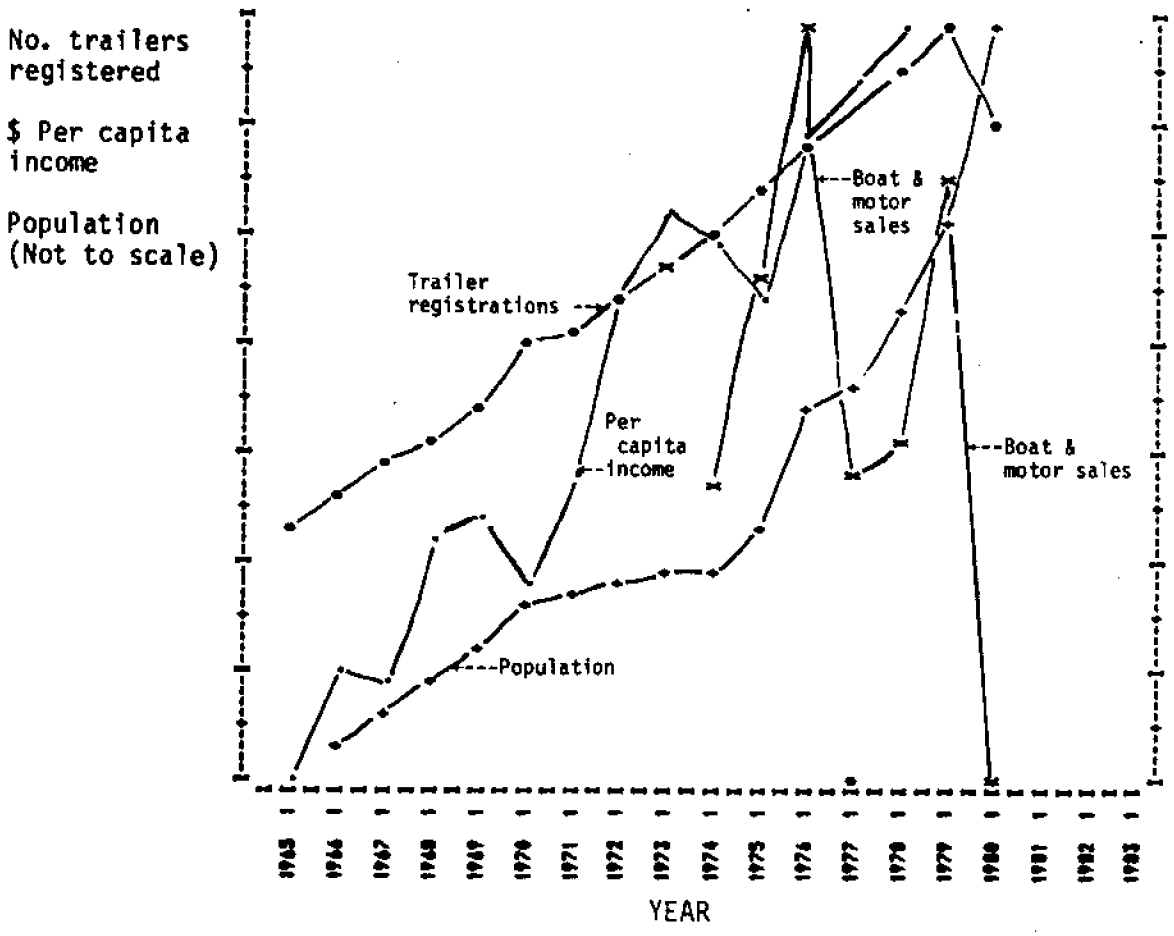
Thurston County boat trailer registrations 1965-1980.

Sources: Washington State Department of Licensing; Washington State Office of Fiscal Management; Washington State Department of Revenue.

MASON COUNTY

Regression Equation: No. of registered boat trailers = -7866 + 0.066 x Pop'n
+ 907.4 x Log PCI

Coefficient of Determination (R^2) = .96
Trailers/1000 population = 40 (1980)



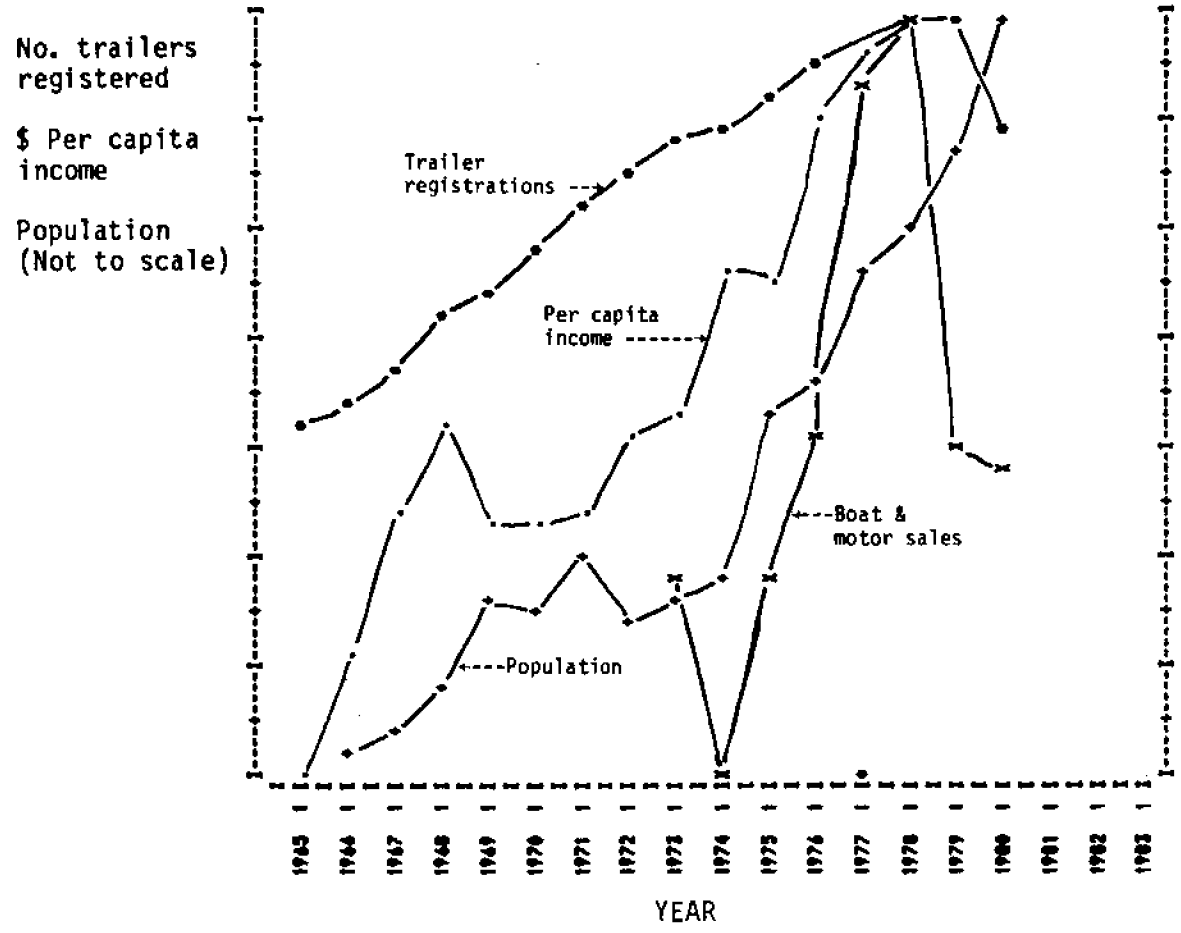
Mason County boat trailer registrations 1965-1980.

Sources: Washington State Department of Licensing; Washington State Office of Fiscal Management; Washington State Department of Revenue.

KITSAP COUNTY

Regression Equation: No. of registered boat trailers = -40,276 + 0.039 x Pop'n
+ 4889 x Log PCI

Coefficient of Determination (R^2) = 0.88
Trailers/1000 population = 31 (1980)



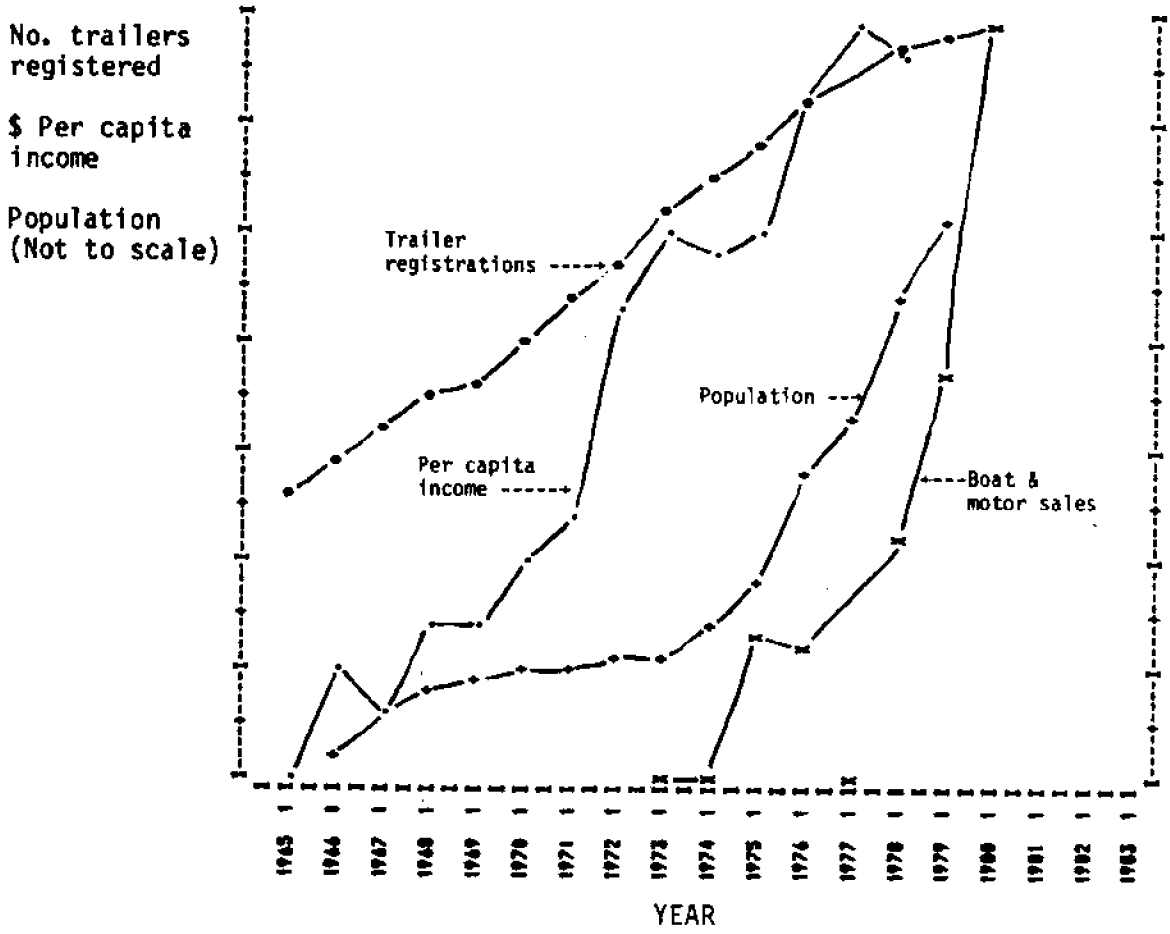
Kitsap County boat trailer registrations 1965-1980.

Sources: Washington State Department of Licensing; Washington State Office of Fiscal Management; Washington State Department of Revenue.

CLALLAM COUNTY

Regression Equation: No. of registered boat trailers = -28,325 + 0.039 x Pop'n + 3574 x Log PCI

Coefficient of Determination (R^2) = .98
Trailers/1000 population = 61 (1980)



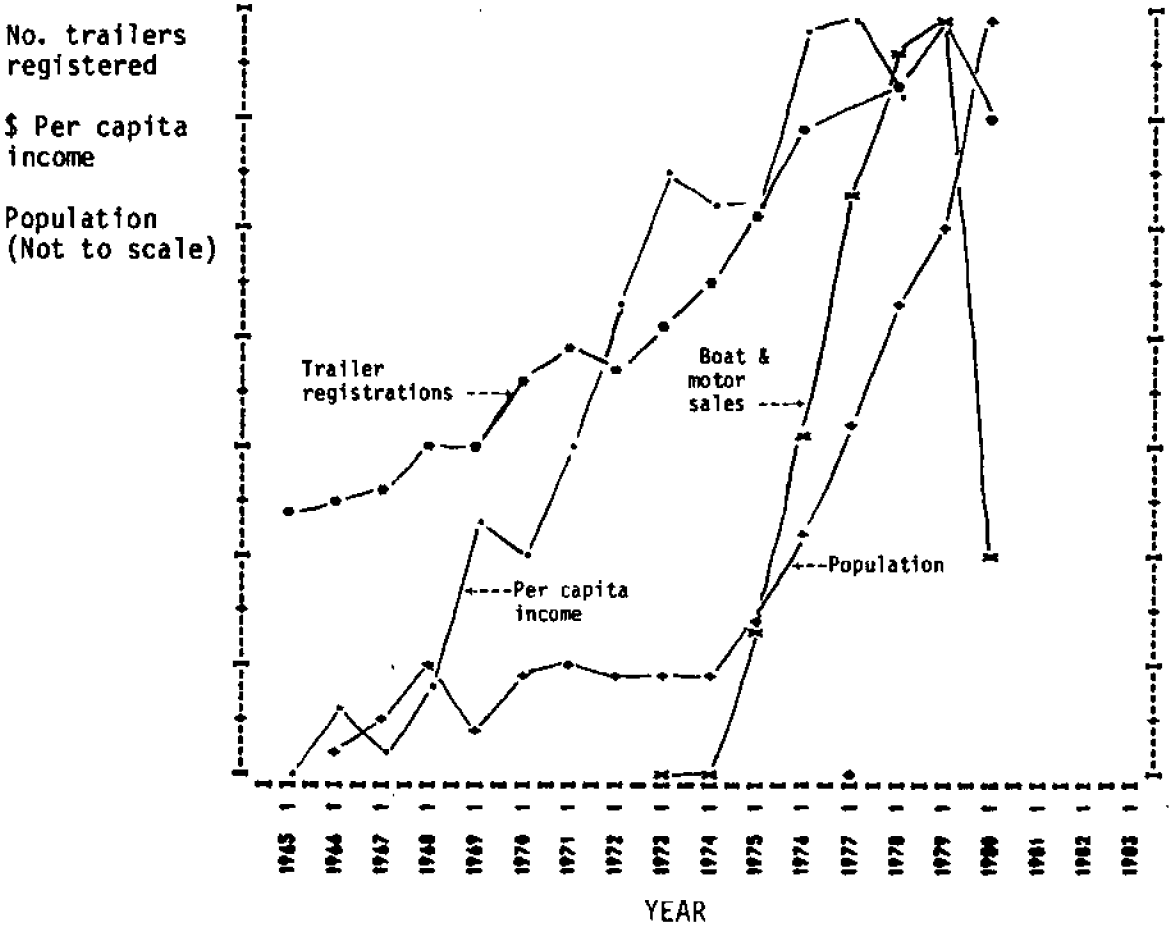
Clallam County boat trailer registrations 1965-1980.

Sources: Washington State Department of Licensing; Washington State Office of Fiscal Management; Washington State Department of Revenue.

JEFFERSON COUNTY

Regression Equation: No. of registered boat trailers = -805 + 0.063 x Pop'n + 0.17 x PCI

Coefficient of Determination (R^2) = .96
Trailers/1000 population = 40 (1980)



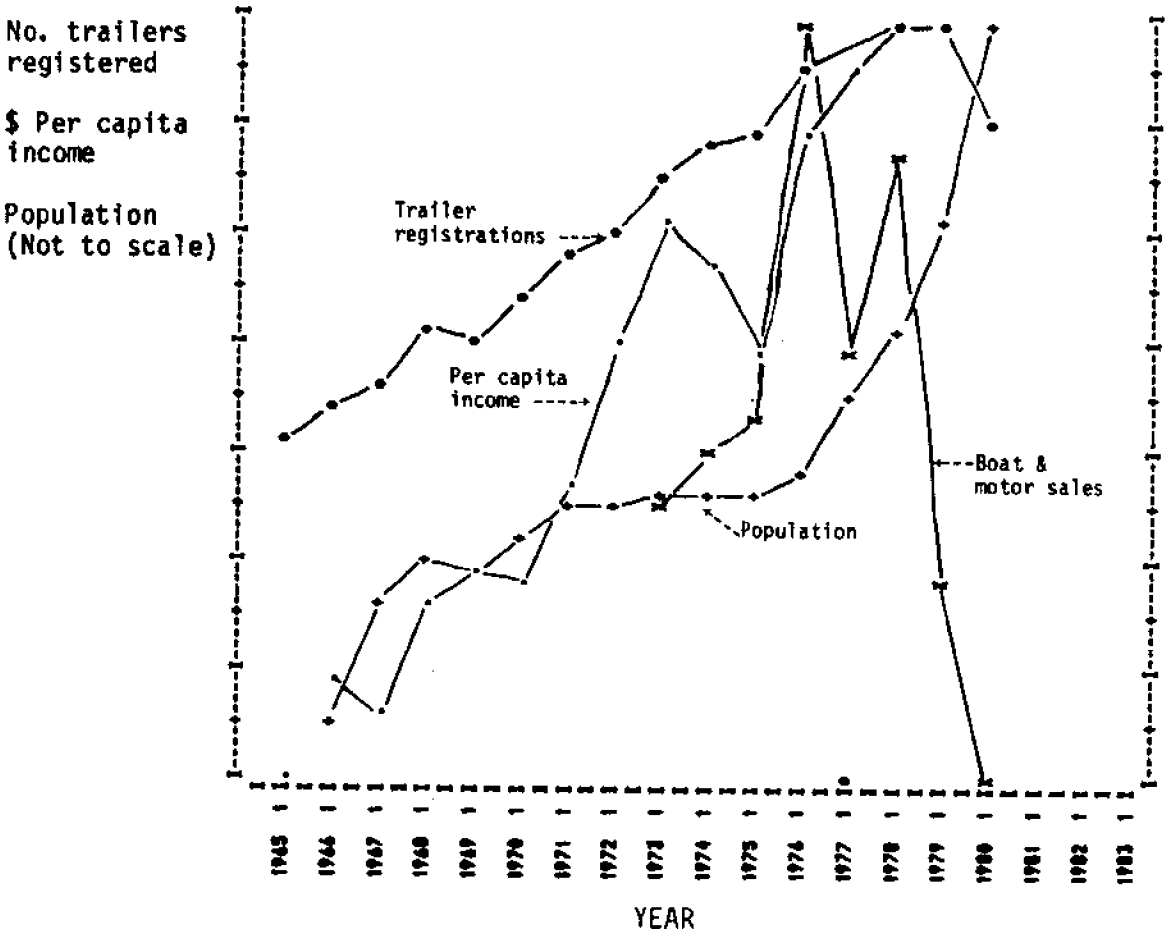
Jefferson County boat trailer registrations 1965-1980.

Sources: Washington State Department of Licensing; Washington State Office of Fiscal Management; Washington State Department of Revenue.

GRAYS HARBOR COUNTY

Regression Equation: No. of registered boat trailers = -18,216 + 2400 x Log PCI

Coefficient of Determination (R^2) = .95
Trailers/1000 population = 24 (1980)



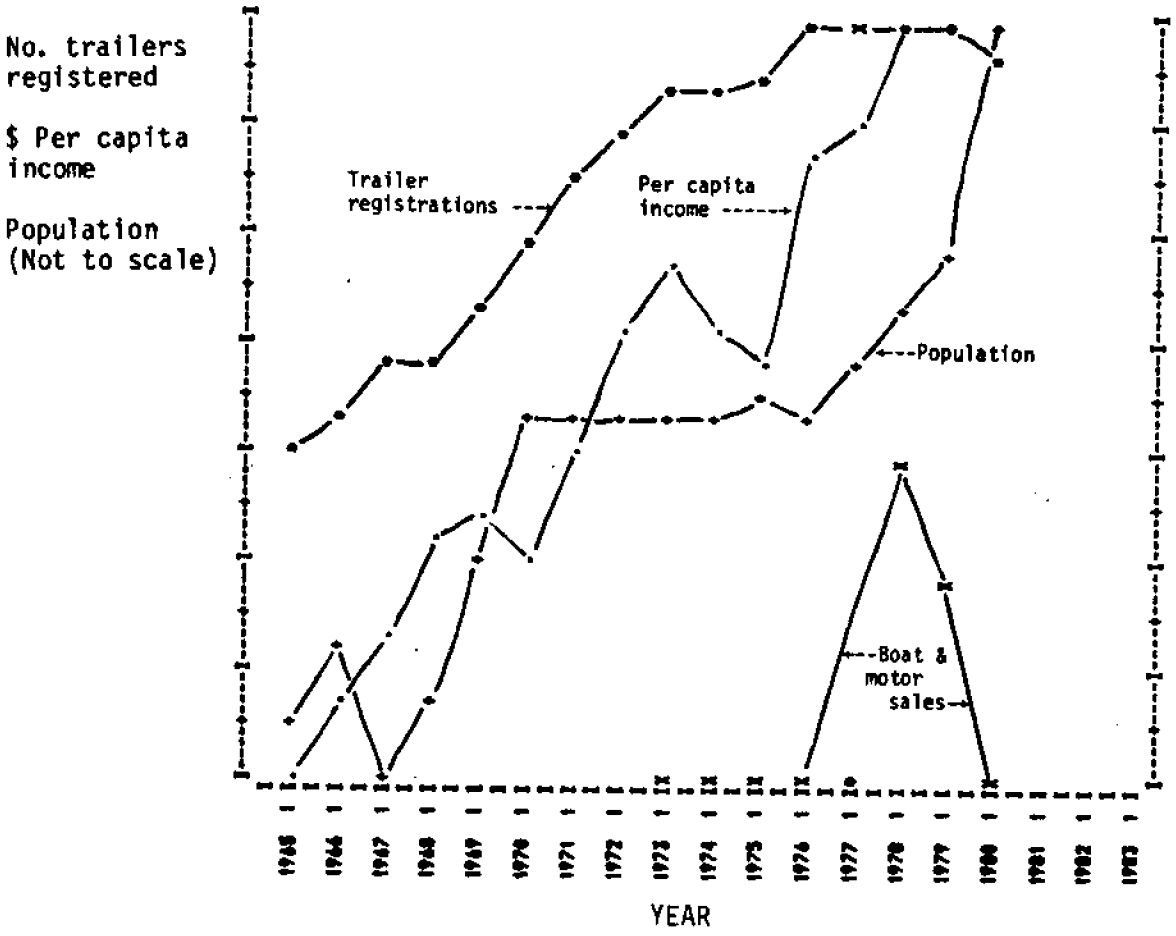
Grays Harbor County boat trailer registrations 1965-1980.

Sources: Washington State Department of Licensing; Washington State Office of Fiscal Management; Washington State Department of Revenue.

PACIFIC COUNTY

Regression Equation: No. of registered boat trailers = -3820 + 0.061 x Pop'n
+ 396.6 x Log PCI

Coefficient of Determination (R^2) = .95
Trailers/1000 population = 26 (1980)



Pacific County boat trailer registrations 1965-1980.

Sources: Washington State Department of Licensing; Washington State Office of Fiscal Management; Washington State Department of Revenue.

APPENDIX C

County Level Moorage Markets: A Theoretical Discussion

County-Level Moorage Markets: A Theoretical Discussion

For a variety of reasons discussed in the text, the stock of moorage in a given county is offered to boaters at a variety of prices. The results are that at some facilities full occupancy and waiting lists are evident, while at others slips are vacant. With few exceptions,[1/] price appears to be the sole determinant of differential occupancy rates.

Consider a hypothetical county with a stock of moorage offered to boaters for rental within three different rate classes. Figure 1 illustrates this situation.

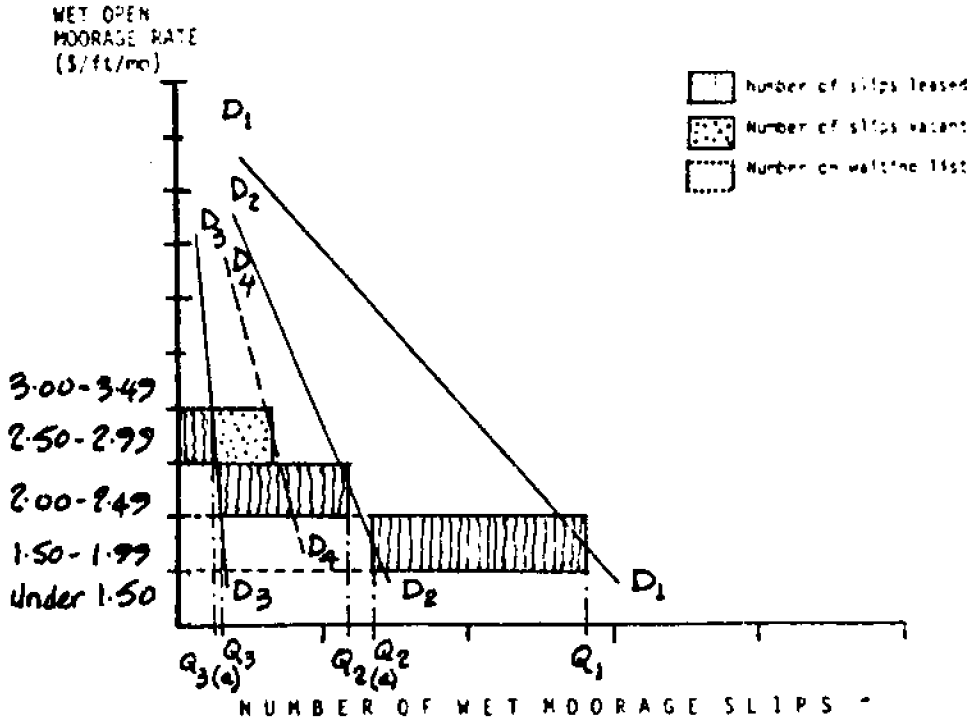


Figure 1.

The aggregate demand for moorage slips in that county (including out-of-county boaters) is given by line D_1-D_1.

1/ For example, in King County, one marina has a significant vacancy rate at a price where waiting lists are elsewhere universal. The cause appears to be a poor location, far upstream on the Duwamish River from saltwater.

At a rate of \$1.50-1.99, the aggregate demand will be Q_1 slips. If the moorage industry in that county provides less than Q_1, slips at that price, those facilities will be full and waiting lists of up to Q_2 boaters will be evident. The unsatisfied demand for Q_2 slips at \$1.50-1.99 per foot/per month will shrink to $Q_{2(a)}$ at the next rate range of \$2.00-2.49 per foot/per month, as shown by the aggregate (unsatisfied) demand curve D_2-D_2. If the supply of moorage in the \$2.00-2.49 per foot/per month is less than $Q_{2(a)}$, an unsatisfied demand of Q_3 boats will appear on waiting lists for facilities at that price. At \$2.50-2.99 per foot/per month, demand will again shrink to $Q_{3(a)}$, on the new (unsatisfied) demand curve D_3-D_3. Now, if the stock of moorage available at \$2.50-2.99 exceeds $Q_{3(a)}$, demand will be totally satisfied and vacancies (shown by the open box to the right of line D_3-D_3) will be evident at those facilities and the market limit will have been reached.

As long as population and real per capita income rise, and real moorage rates do not change, aggregate demand will increase (D_4-D_4) and eventually fill the vacant slips. Meanwhile, any new moorage facility entering the market, must charge less than \$2.50 per foot/per month market limit rate in order to capture existing demand (which must come from equally or higher-priced facilities). To insure adequate revenue initially, and to protect against being undercut, the prudent marina operator will charge below \$2.50 per foot/per month, the market limit rate.

It is easy to see, from this discussion, the consequences of massive increments of moorage supply at subsidized public rates.

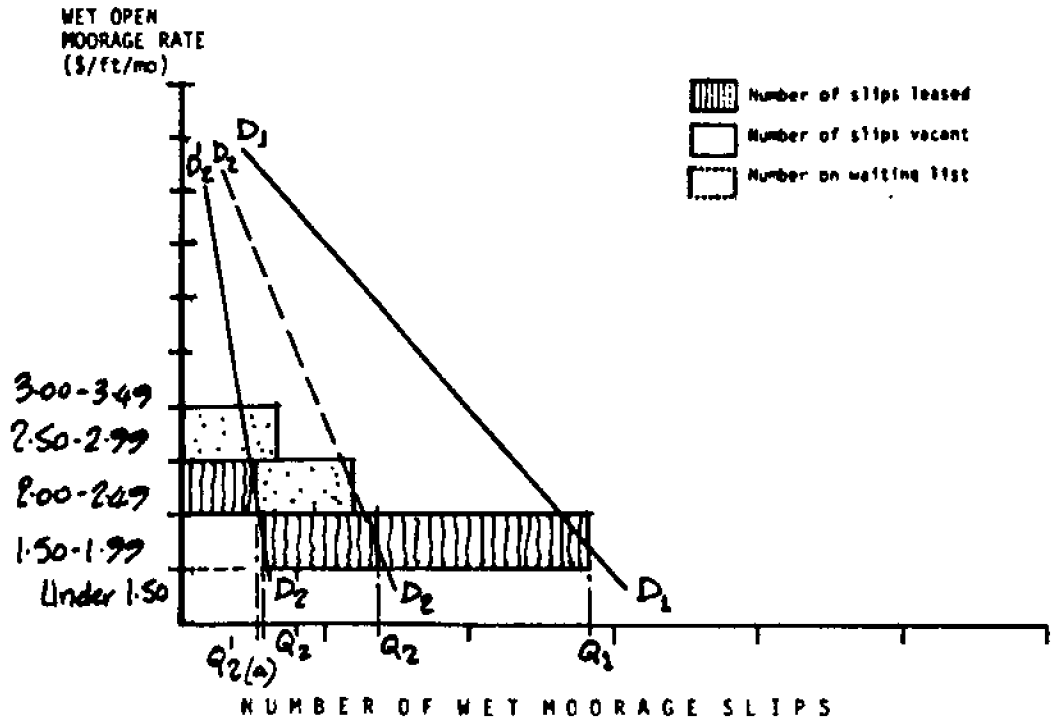


Figure 2.

Figure 2 shows the consequences of a significant increment to the county's supply of moorage at $1.50-1.99 per foot/per month. Aggregate demand D_1-D_1 is unchanged. But unsatisfied demand at <u>above</u> $1.50-1.99 has shifted from Q_2 to Q_2'. Boaters have moved from facilities offering moorage at <u>over</u> $1.50 per foot/per month to fill the new spaces at $1.50-1.99; occupancy rates have fallen in the $2.00-2.49 per foot/per month facilities and the even higher priced marinas have completely emptied. (No demand remains at the $2.50-2.99 price range.) Prices will be forced down, or business failures will occur if supply expands at a rate faster than growth in aggregate demand.

Because the data presented in this report is cross-sectional, it will be important to re-survey the moorage market in future years to document the changes in prices, occupancy rates and waiting lists as new moorage facilities are constructed.

APPENDIX D

Moorage Market Survey, April 1981: Questionnaire

MOORAGE MARKET SURVEY

April 1981

I GENERAL INFORMATION

Name of Facility_____

Address_____

_____

Contact Person_____

Phone ( )_____ _____

OIW Code #_____

II CHANGES IN FACILITY SIZE

1. Has your moorage facility been built or expanded since June 1978? Y/N

   a. If so, how much space has been built, or added

      1. # wet slips _____

      2. # dry spaces_____

      3. ft. of lineal dock_____ft

   b. Was space built or added to serve:

      1. Recreational craft? Y/N

      2. Commercial craft? Y/N

      3. Both recreational and commercial? Y/N

      4. Percentage recreational _____%

      5. Percentage commercial _____%

III OCCUPANCY RATES

1. What percentage of slips were vacant in:

   a. January 1981 _____%

   b. July 1980 _____ %

2. What percentage of dry storage was vacant:

   a. January 1981 _____%

   b. July 1980 _____%

3. What percentage of your total wet moorage is reserved for transient use:

   a. wet slips _____%

   b. lineal dock _____%

4. Is this transient space reserved:

   a. year round Y/N

   b. summer only Y/N # months ____

   c. winter only Y/N # months ____

IV WAITING LISTS

1. Do you maintain a waiting list for space at your facility? Y/N

2. If so, do you require a deposit from boaters wishing to be on use? Y/N $_____

3. How many names are on your waiting list for:
   a. Wet moorage #_____
   b. Dry storage #_____

4. What percentage of these names are for:

   a. Year round moorage storage ___%

   b. Summer only moorage/storage ___%

   c. Winter only moorage/storage ___%

5. When was your waiting list last purged? (names verified or removed from list)

   Date_____

V MOORAGE RATES

1. What rates do you charge per month for permanent

   a. covered wet moorage _____/ft/month

   b. open wet moorage _____/ft/month

   c. dry storage _____ /ft/month

2. Are these rates different for seasonal use Y/N

   a. summer rates_____/ft/month

   b. winter rates_____/ft/month

3. Compared with other similar facilities in the vicinity, do you believe your rates are:

   a. higher _____

   b. lower _____

   c. about the same _____

4. Do you expect to raise your fees during the next twelve months? Y/N

   a. If so, by how much $_____/ft/month increase

   b. Do you believe the increase in moorage fees will affect occupancy rates?

VI NEW FACILITIES IN VICINITY

1. Have any new moorage or storage facilities been constructed in your area since June 1978?

   Facility Name_____

   City_____

   Contact person_____

   Phone_____

Facility Name_____

City_____

Contact Person_____

Phone_____

Facility Name_____

City_____

Contact Person_____

Phone_____

VII NEED FOR ADDITIONAL FACILITIES

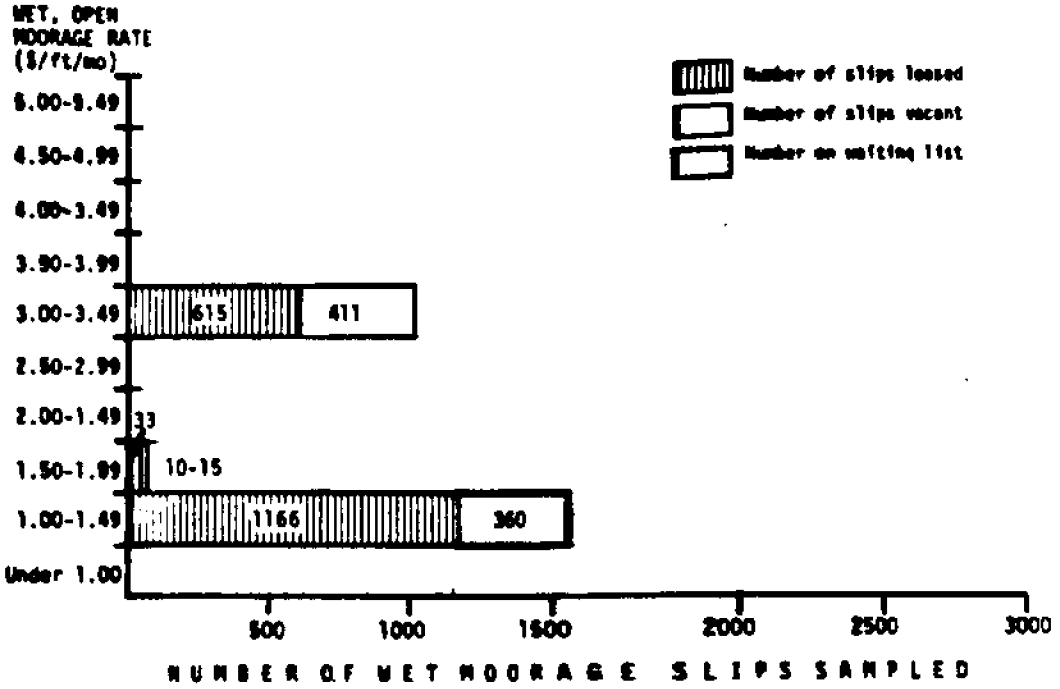
1. Do you believe that the supply of wet moorage in your area is:
   a. too much ____
   b. too little ____
   c. about right ____
2. Do you believe the supply of dry storage in your area is:
   a. too much ____
   b. too little ____
   c. about right ____
3. Do you plan to expand your facilities in:
   a. next 12 months ____
   b. next 2 years ____
   c. next 5 years ____
4. Do you plan to expand your:
   a. wet moorage #_____slips
   b. dry storage #_____spaces
   c. lineal dock #_____ft
5. What percentage of boats moored in your wet slips are trailerable_____%

APPENDIX E

Moorage Market Survey: County Synopses

1981 Moorage Market in Washington's Coastal Counties

Whatcom County



SYNOPSIS

1981 market limit rate: $2.50-3.00/ft/mo

Markets served: Whatcom County, S.W. British Columbia (N. Whatcom County marinas only)

	Public	Private	Total
Total number wet moorage slips - 1981	1,166	1,464	2,630
Percent change June 1978-May 1981	0.0	37.2	17.8
Total number marinas and dry storage facilities - 1981	2	12	14
Percent change June 1978-May 1981	0.0	20.0	16.7
Number wet slips under construction - 1981	--	179	179
Number wet slips planned - 1982	450	--	450
1983	--	--	--
1986	--	544	544
Average wet open moorage rate ($/ft/mo)	1.08	2.63	1.94

OUTLOOK:

Market firm, year-round on mainland, but rates low. Market soft, year-round on Pt. Roberts Peninsula. Slips under construction and planned will probably saturate market by 1983.

SAMPLE SIZE:

Facilities: #, (% of total): Public: 2 (100.0)
Private: 4 (33.3)

Slips: #, (% of total) Public: 1166 (100.0)
Private: 1456 (99.5)

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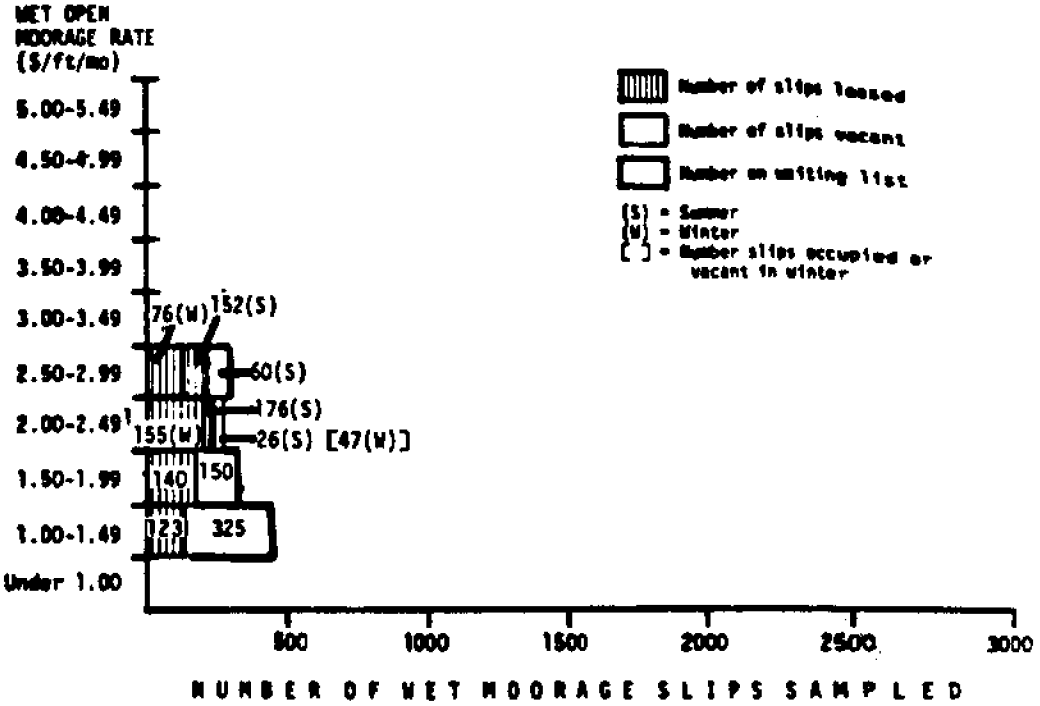
1981 Moorage Market in Washington's Coastal Counties

San Juan County



[1]Rate at one 150-slip marina varies with length of boat: rate tabulated is for 30' boat. Summer seasonal rate $3.50/ft/mo not tabulated.

SYNOPSIS

1981 market limit rate: $3.00-3.50/ft/mo (summer); $2.00-2.50 (winter)

Markets served: Year-round: San Juan County; summer seasonal and transients: Puget Sound, Canada, W. Coast states

	Public	Private	Total
Total number wet moorage slips - 1981	123	841	964
Percent change June 1978-May 1981	0.0	14.1	12.1
Total number marinas and dry storage facilities - 1981	3	18	21
Percent change June 1978-May 1981	0.0	0.0	0.0
Number wet slips under construction - 1981	--	--	--
Number wet slips planned - 1982	--	135	135
1983	290	77	367
1986	--	--	--
Average wet open moorage rate ($/ft/mo)	1.34	2.09	1.99

OUTLOOK:

Market firm summer season; soft winter demand; Skagit County marinas capture mainland year-round market.

SAMPLE SIZE:

Facilities: #, (% of total) Public: 1 (33.3) Private: 8 (44.4)

Slips: #, (% of total) Public: 123 (100.0) Private: 576 (68.5)

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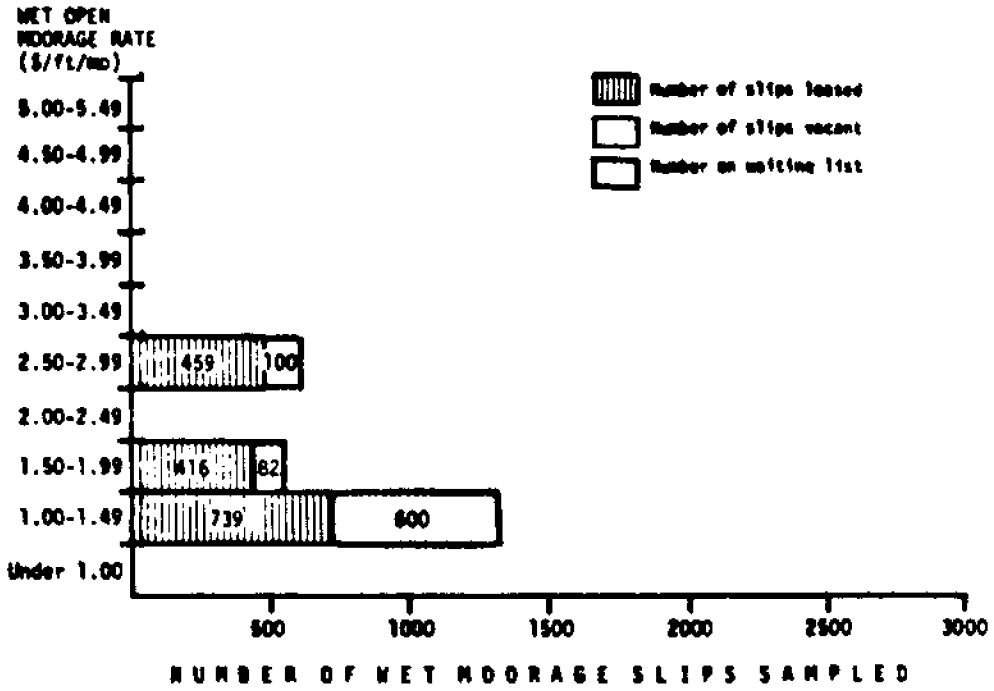
1981 Moorage Market in Washington's Coastal Counties

Skagit County



SYNOPSIS

1981 market limit rate: $3.00-3.50/ft/mo

Markets served: Skagit, Snohomish, King, San Juan Counties

	Public	Private	Total
Total number wet moorage slips - 1981	853	1,325	2,178
Percent change June 1978-May 1981	0.0	29.1	15.9
Total number marinas and dry storage facilities - 1981	2	14	16
Percent change June 1978-May 1981	0.0	7.7	6.7
Number wet slips under construction - 1981	--	167.0	167
Number wet slips planned - 1982	400	--	400
1983	--	105	105
1986	--	2,500-5,000	2,500-5,000
Average wet open moorage rate ($/ft/mo)	1.61	2.06	1.80

OUTLOOK:

Skagit marinas are "gateway" harbors to the San Juans. Firm year-round market benefitting from fuel price increases and auto fleet horsepower reductions. Serious potential for overinvestment by 1986. Public facilities underpriced.

SAMPLE SIZE:

Facilities: #, (% of total): Public: 2 (100.0)
Private: 5 (35.7)

Slips: #, (% of total): Public: 853 (100.0)
Private: 1327 (92.6)

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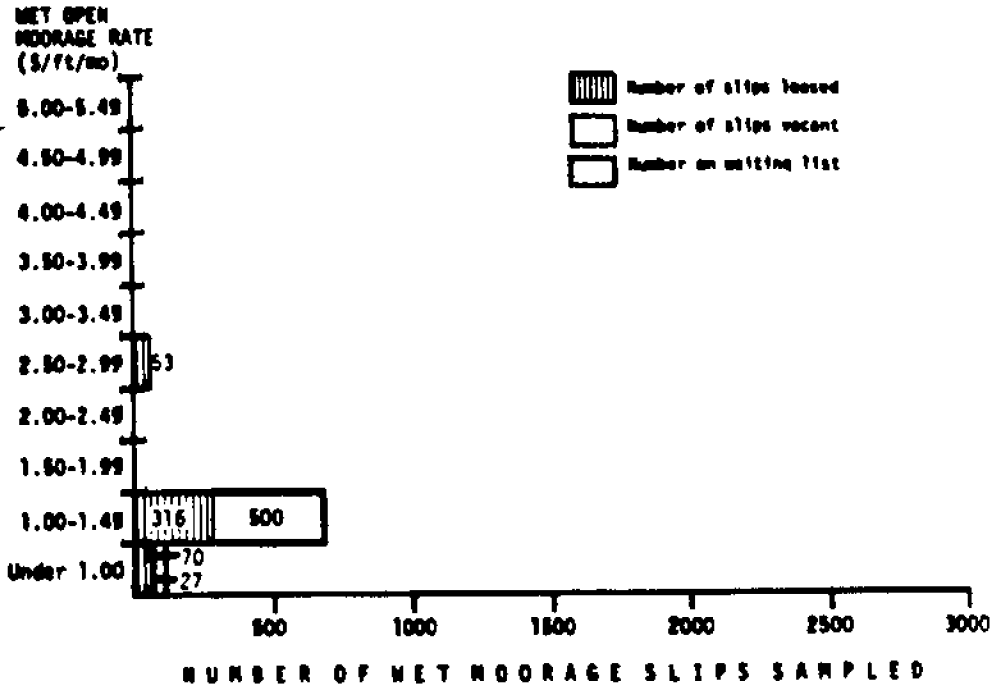
1981 Moorage Market in Washington's Coastal Counties

Island County



SYNOPSIS

1981 market limit rate: $2.50-3.00/ft/mo

Markets served: Predominantly Island County; King, Snohomish (N. Island marinas only)

	Public	Private	Total
Total number wet moorage slips - 1981	316	173	489
Percent change June 1978-May 1981	0.0	0.0	0.0
Total number marinas and dry storage facilities - 1981	3	10	13
Percent change June 1978-May 1981	0.0	0.0	0.0
Number wet slips under construction - 1981	--	--	--
Number wet slips planned - 1982	--	80	80
1983	--	--	--
1986	--	--	--
Average wet open moorage rate ($/ft/mo)	1.40	Insufficient data	--

OUTLOOK:

Firm year-round market, public rates low. Expansion potential limited by Skagit and Snohomish counties supply. Principal demand: in-county residents.

SAMPLE SIZE:
Facilities: #, (% of total): Public: 1 (33.3)
Private: 2 (20.0)

Slips: #, (% of total): Public: 316 (100.0)
Private: 123 (71.1)

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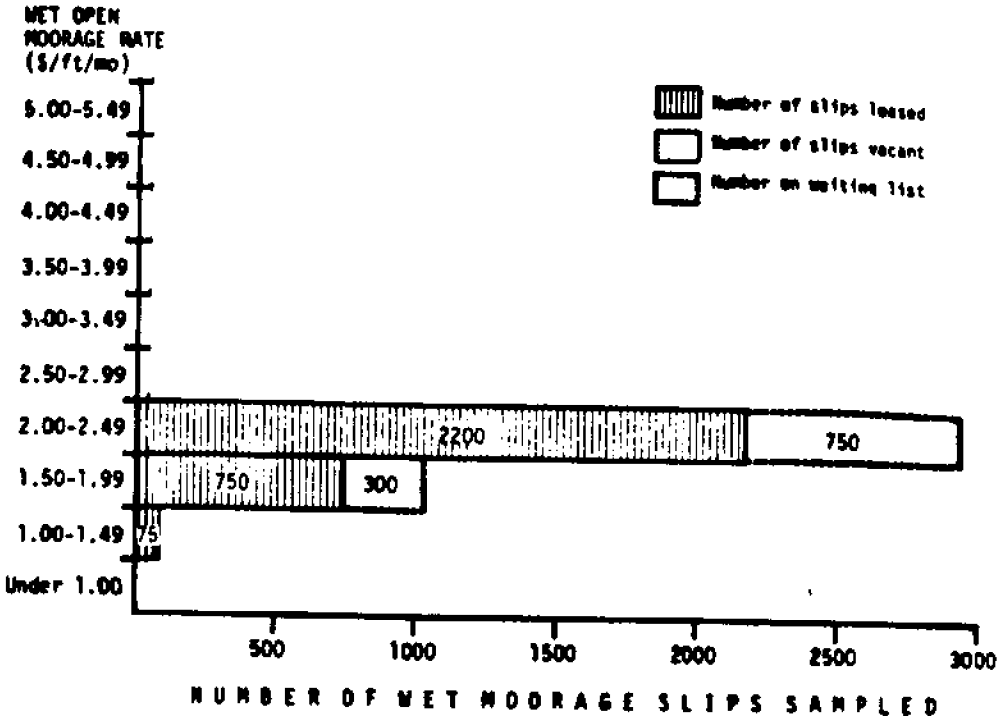
7/8

1981 Moorage Market in Washington's Coastal Counties

Snohomish County



SYNOPSIS

1981 market limit rate: $2.50-3.00/ft/mo

Markets served: Snohomish, King Counties

	Public	Private	Total
Total number wet moorage slips - 1981	2,942	93[1]	3035
Percent change June 1978-May 1981	83.0	0.0	78.4
Total number marinas and dry storage facilities - 1981	2	13	15
Percent change June 1978-May 1981	0.0	0.0	0.0
Number wet slips under construction - 1981	--	--	--
Number wet slips planned - 1982	--	50	50
1983	110[2]	--	110
1986	--	--	--
Average wet open moorage rate ($/ft/mo)	2.15	insufficient data	--

OUTLOOK:

Market firm, year-round; supplied primarily by public sector marinas. Continued strong growth in demand likely.

[1] 1,200-space dry storage facility handling non-trailerable boats not tabulated.
[2] Commercial vessels only.

SAMPLE SIZE:
Facilities: #, (% of total): Public: 2 (100.0)
Private: 2 (15.4)
Slips: #, (% of total): Public: 2942 (100.0)
Private: 75 (80.7)

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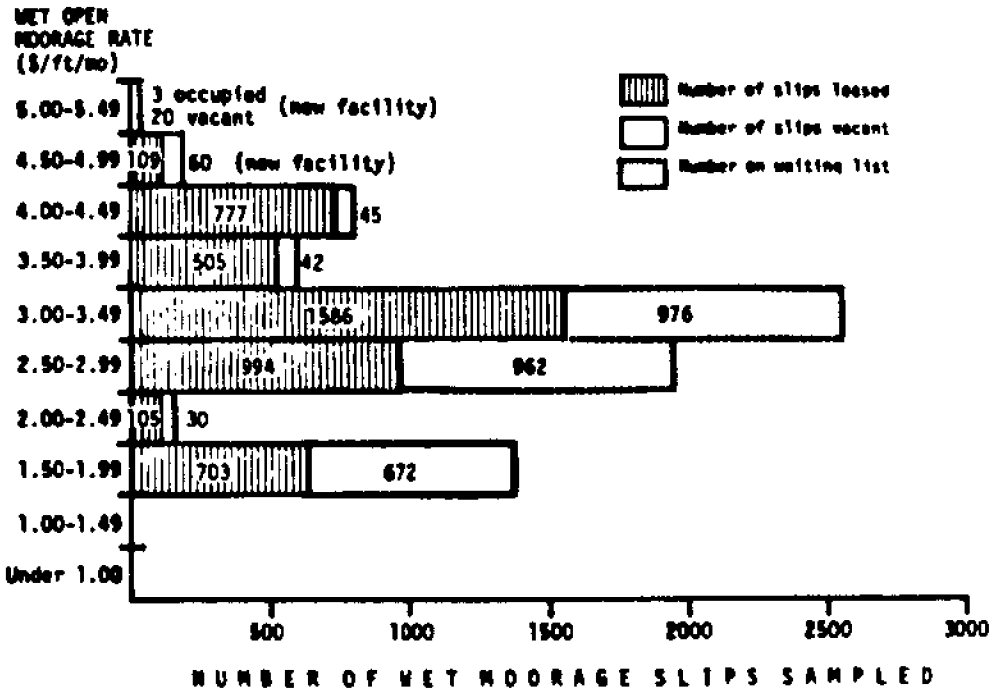
1981 Moorage Market in Washington's Coastal Counties

King County



SYNOPSIS

1981 market limit rate: $4.50-5.00/ft/mo

Markets served: King County

	Public	Private	Total
Total number wet moorage slips - 1981	3,141	4,775	7,916
Percent change June 1978-May 1981	0.0	5.5	5.3
Total number marinas and dry storage facilities - 1981	5	74	79
Percent change June 1978-May 1981	0.0	7.25	6.8
Number wet slips under construction - 1981	--	136	136
Number wet slips planned - 1982	--	35	35
1983	400-600	35	435-635
1986	--	--	--
Average wet open moorage rate ($/ft/mo)	2.53	3.47	3.10

OUTLOOK:

Market very firm, year-round; rates highest in region.

SAMPLE SIZE:
Facilities: #, (% of total): Public: 2 (40.0)
Private: 24 (32.4)
Slips: #, (% of total): Public: 2216 (70.6)
Private: 2881 (87.3)

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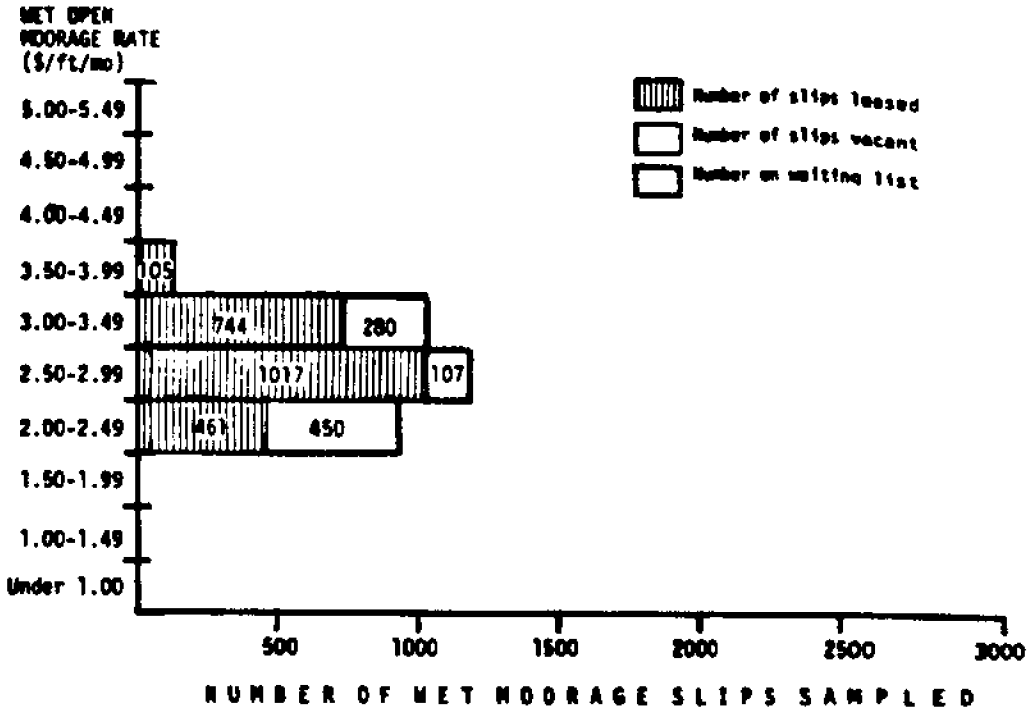
1981 Moorage Market in Washington's Coastal Counties

Pierce County



SYNOPSIS

1981 market limit rate: $3.50-4.00/ft/mo

Markets served: Pierce, South King Counties

	Public	Private	Total
Total number wet moorage slips - 1981	0[1]	3,300	3,300
Percent change June 1978-May 1981	-100.0[1]	43.4	52.6
Total number marinas and dry storage facilities - 1981	0[1]	36	36
Percent change June 1978-May 1981	-100.0[1]	12.5	9.1
Number wet slips under construction - 1981	--	--	--
Number wet slips planned - 1982	--	156	156
1983	--	145	145
1986	--	--	--
Average wet open moorage rate ($/ft/mo)	--	2.79	2.79

OUTLOOK:

Market firm, year-round; continuation of heavy investment in new moorage will saturate market; 575 new stacked dry storage spaces could erode demand for smaller wet slips.

[1] Port of Tacoma Fish Boat Haven leased to private operator.

SAMPLE SIZE:

Facilities: #, (% of total): Public: 0 (—)
Private: 15 (41.7)

Slips: #, (% of total): Public: 0 (—)
Private: 2570 (71.8)

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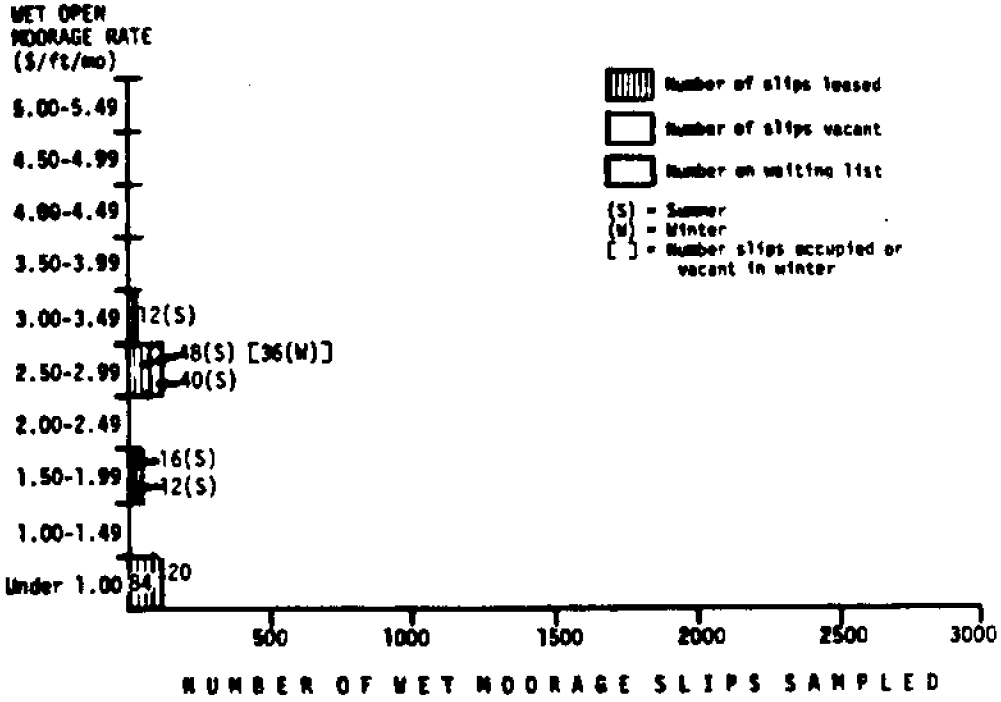
1981 Moorage Market in Washington's Coastal Counties

Mason County



SYNOPSIS

1981 market limit rate: $3.00-3.50/ft/mo (summer); $2.00-2.50 (winter)

Markets served: Mason, King (second homes in Mason) Counties

	Public	Private	Total
Total number wet moorage slips - 1981	96	109	205
Percent change June 1978-May 1981	0.0	36.3	16.5
Total number marinas and dry storage facilities - 1981	5	9	14
Percent change June 1978-May 1981	0.0	0.0	0.0
Number wet slips under construction - 1981	--	--	--
Number wet slips planned - 1982	--	44	44
1983	--	--	--
1986	--	51	51
Average wet open moorage rate ($/ft/mo)	0.56	2.49	1.59

OUTLOOK:

Market firm, summer seasonal; soft, winter months; 80% trailered boat market, dry-stored in winter.

SAMPLE SIZE:

Facilities: #, (% of total): Public: 1 (20.0)
Private: 4 (44.4)

Slips: #, (% of total): Public: 84 (87.5)
Private: 76 (69.7)

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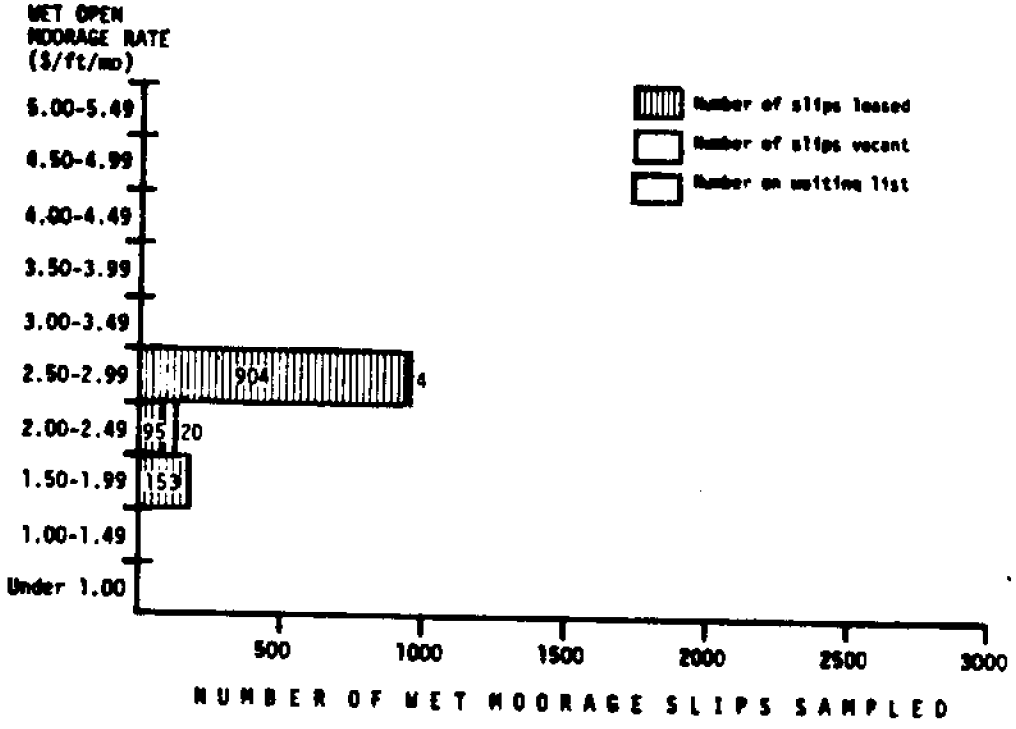
1981 Moorage Market in Washington's Coastal Counties

Thurston County



SYNOPSIS

1981 market limit rate: $2.50-3.00/ft/mo

Markets served: Thurston County

	Public	Private	Total
Total number wet moorage slips - 1981	--	1,433	1,433
Percent change June 1978-May 1981	--	43.0	43.0
Total number marinas and dry storage facilities - 1981	1	11	12
Percent change June 1978-May 1981	∞	57.1	71.4
Number wet slips under construction - 1981	800	--	800
Number wet slips planned - 1982	--	--	--
1983	--	--	--
1986	--	--	--
Average wet open moorage rate ($/ft/mo)	--	2.44	2.44

OUTLOOK:

Market firm year-round; future growth in demand slow; new Port of Olympia East Bay Marina could disrupt private market if slips are priced below market limit rate.

SAMPLE SIZE:

Facilities: #, (% of total) : Public: 1 (100.0)
Private: 7 (63.6)

Slips: #, (% of total) : Public: 0 (—)
Private: 1152 (80.4)

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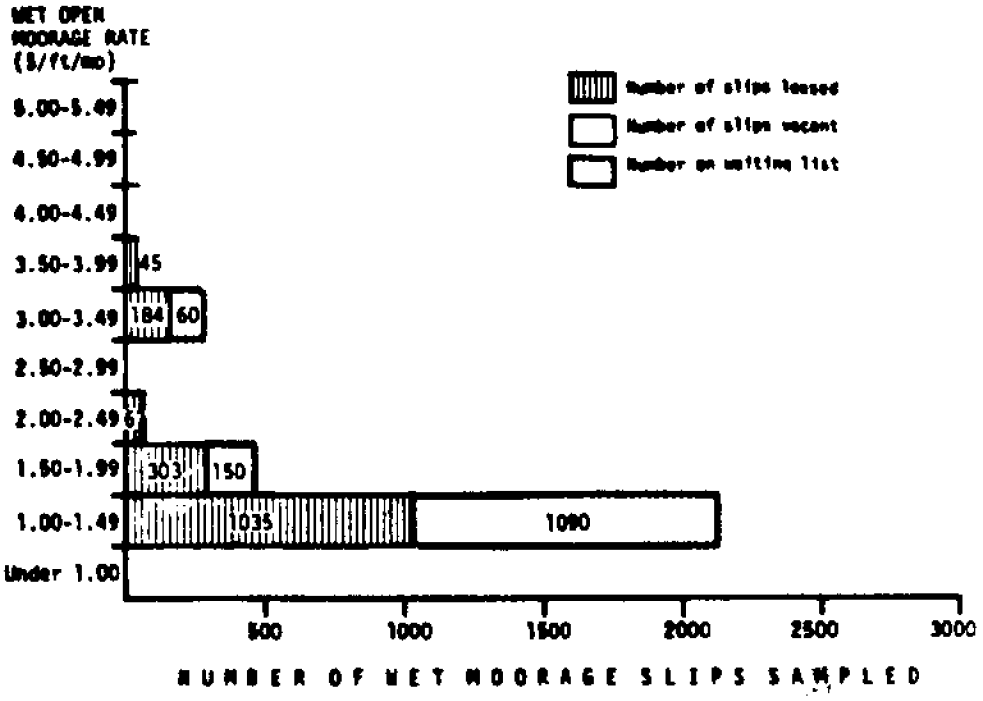
1981 Moorage Market in Washington's Coastal Counties

Kitsap County



SYNOPSIS

1981 market limit rate: $3.50-4.00/ft/mo

Markets served: Kitsap, King Counties

	Public	Private	Total
Total number wet moorage slips - 1981	1,069	940	2,009
Percent change June 1978-May 1981	0.0	25.3	10.5
Total number marinas and dry storage facilities - 1981	8	21	29
Percent change June 1978-May 1981	0.0	16.7	11.5
Number wet slips under construction - 1981	--	120	120
Number wet slips planned - 1982	145	110	255
1983		18	18
1986	100	63	163
Average wet open moorage rate ($/ft/mo)	1.33	2.27	1.77

OUTLOOK:

Market firm, year-round.

SAMPLE SIZE:
Facilities: #, (% of total): Public: 4 (50.0)
Private: 8 (38.1)

Slips: #, (% of total): Public: 1035 (96.8)
Private: 633 (67.3)

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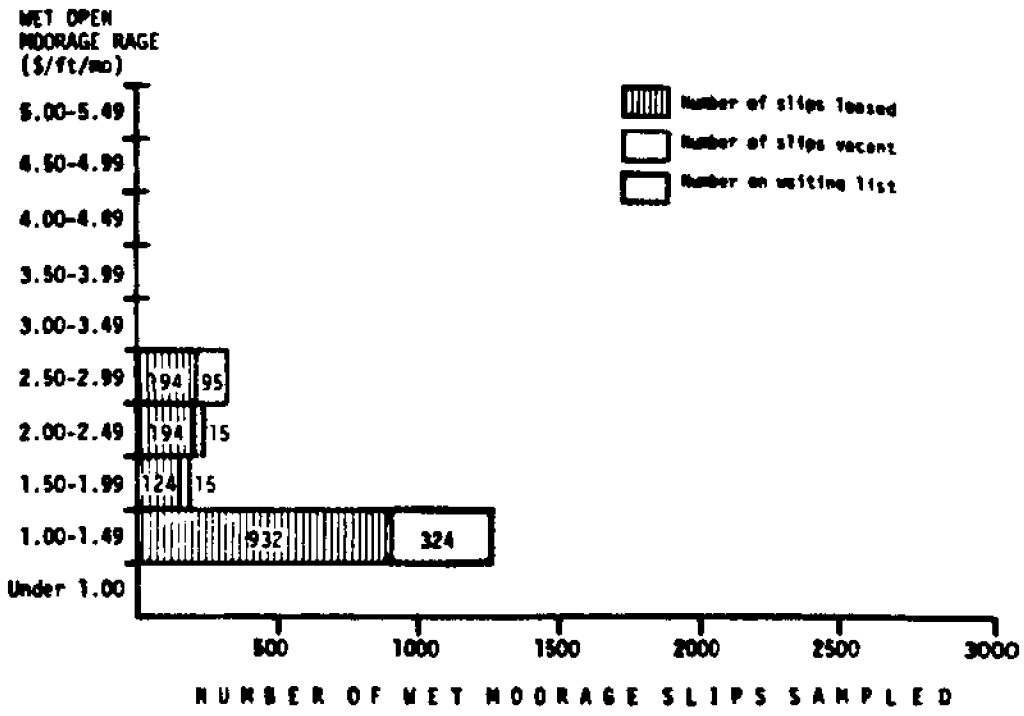
1981 Moorage Market in Washington's Coastal Counties

East Clallam and East Jefferson Counties



SYNOPSIS

1981 market limit rate: $2.25-2.50/ft/mo year-round: Strait of Juan de Fuca and Puget Sound; Hood Canal, summer seasonal

Markets served:
Year-round: E. Clallam, E. Jefferson
Summer season: Central Puget Sound Counties

	Public	Private	Total
Total number wet moorage slips - 1981	932	849	1,781
Percent change June 1978-May 1981	3.3	66.8	26.2
Total number marinas and dry storage facilities - 1981	2	10	12
Percent change June 1978-May 1981	0.0	11.1	9.1
Number wet slips under construction - 1981	--	--	--
Number wet slips planned - 1982	422	--	422
1983	--	--	--
1986	--	--	--
Average wet open moorage rate ($/ft/mo)	1.23	2.28	1.75

OUTLOOK:

Market soft above $2.50 ft/mo; Hood Canal seasonal; proposed Sequim Bay Marina could weaken Jefferson County private market if slips priced below $2.50 ft/mo (expect slow fill-up and seasonal occupancy)

SAMPLE SIZE:
Facilities: #, (% of total): Public: 2 (100.0)
Private: 5 (45.5)
Slips: #, (% of total): Public: 932 (100.0)
Private: 622 (73.3)

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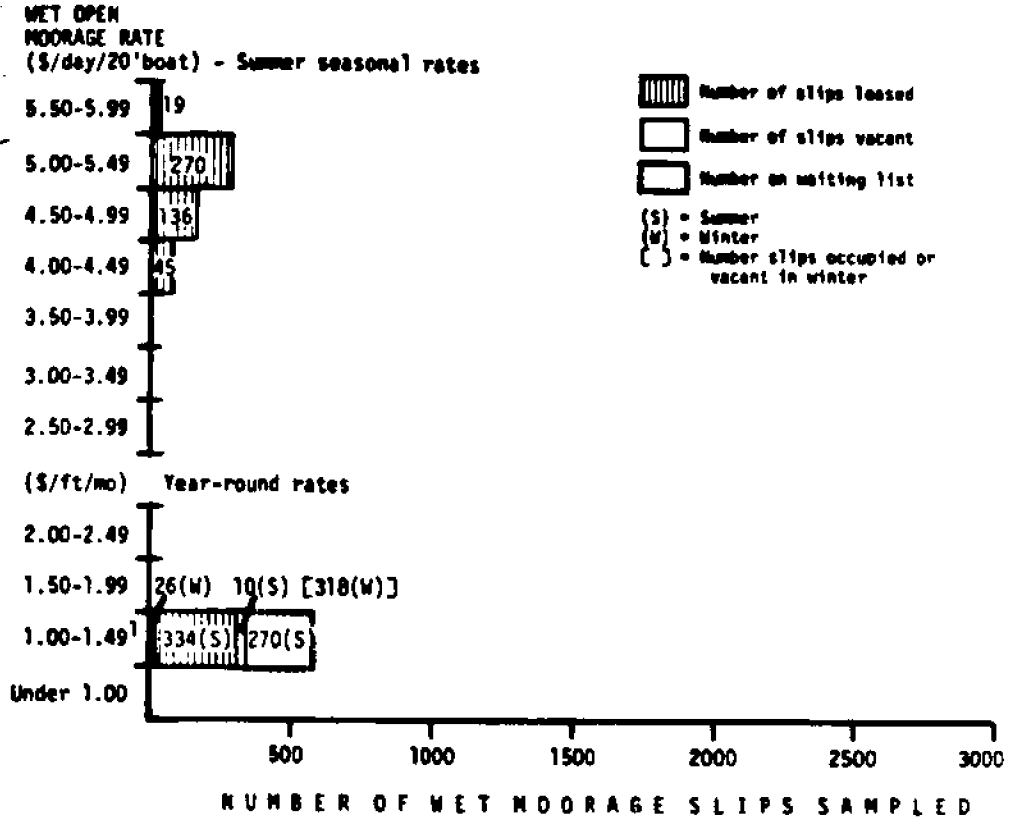
1981 Moorage Market in Washington's Coastal Counties

West Clallam County



[1]Year-round moorage: $1.29/ft/mo

SYNOPSIS

1981 market limit rate: $5.00-5.50 per day (20' boat equivalent) (summer)
Markets served: Clallam, Jefferson and Puget Sound Counties

	Public	Private	Total
Total number wet moorage slips - 1981	344	510	854
Percent change June 1978-May 1981	0.0	0.0	0.0
Total number marinas and dry storage facilities - 1981	1	18	19
Percent change June 1978-May 1981	0.0	0.0	0.0
Number wet slips under construction - 1981	--	--	--
Number wet slips planned - 1982	--	--	--
1983	--	100	100
1986	--	--	--
Average wet open moorage rate ($/day/20ft boat)	--	5.00	--

OUTLOOK:

Summer season (4 mos.) only. Growth limited by loss of Hood Canal Bridge, rising fuel costs and reduction in sports salmon catch limit.

SAMPLE SIZE:
Facilities: #, (% of total): Public: 1 (100.0), Private: 6 (33.3)
Slips: #, (% of total): Public: 344 (100.0), Private: 498 (86.7)

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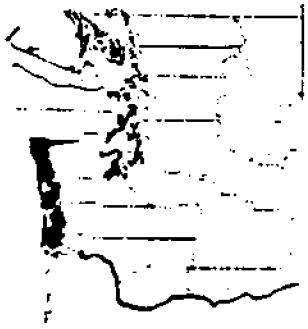
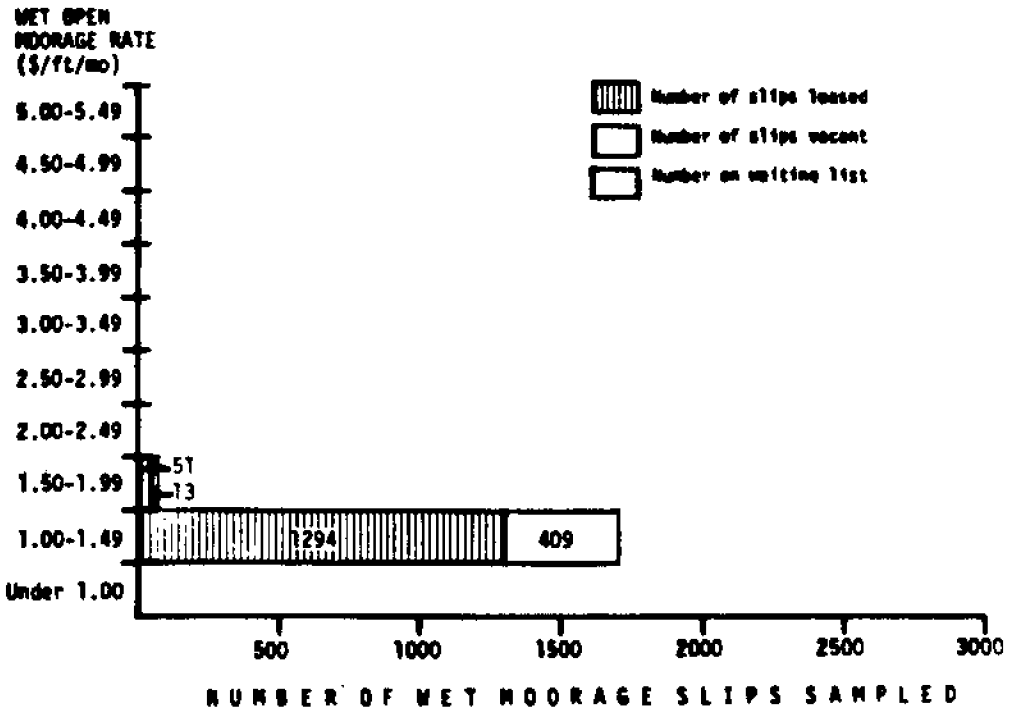


1981 Moorage Market in Washington's Coastal Counties

Grays Harbor and Pacific Counties



SYNOPSIS

1981 market limit rate: Less than $1.00/ft/mo

Markets served: Year-round: Grays Harbor and Pacific Counties, Portland/Vancouver metropolitan area, south and central Puget Sound; summer seasonal: eastern Washington and out of region (California and southern Oregon)

	Public	Private	Total
Total number wet moorage slips - 1981	1,750	131	1,881
Percent change June 1978-May 1981	1.3	20.2	2.4
Total number marinas and dry storage facilities - 1981	7	9	16
Percent change June 1978-May 1981	0.0	0.0	0.0
Number wet slips under construction - 1981	--	--	--
Number wet slips planned - 1982	--	--	--
1983	--	--	--
1986	--	--	--
Average wet open moorage rate ($/ft/mo)	1.26	Insufficient data	

OUTLOOK:

Depressed market, year-round, due to restrictions on sports and commercial ocean salmon fisheries, fuel cost increases; supply overcapitalized.

SAMPLE SIZE:
Facilities: #, (% of total): Public: 3 (42.9)
Private: 2 (22.2)
Slips: #, (% of total): Public: 1703 (97.3)
Private: 94 (71.8)

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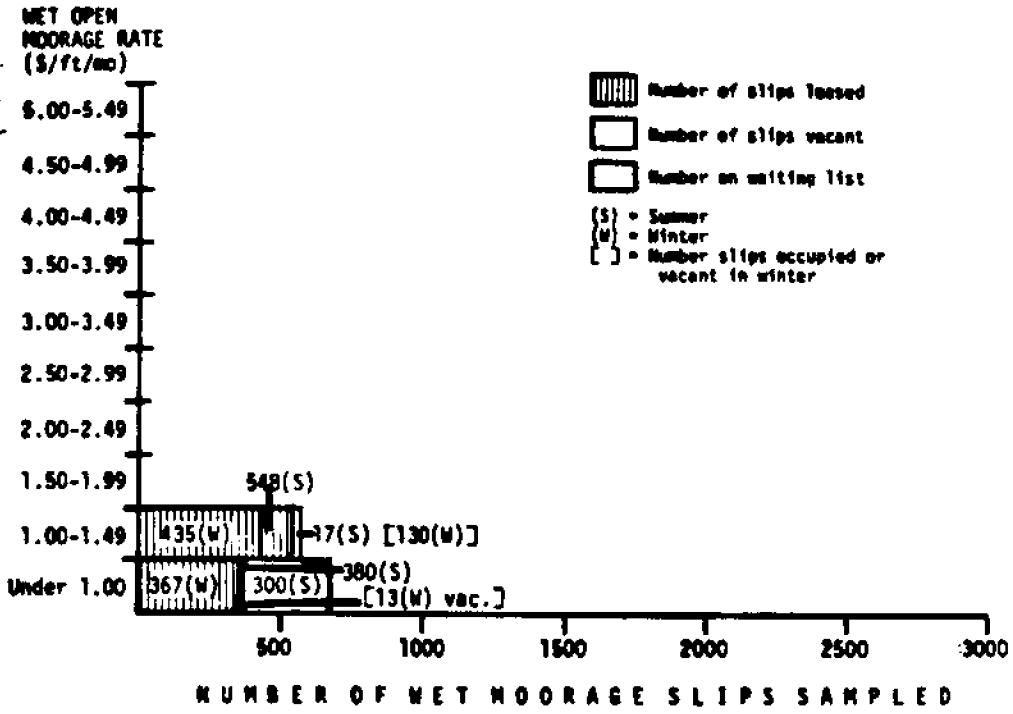
1981 Moorage Market in Washington's Coastal Counties

Wahkiakum, Cowlitz and Clark Counties



SYNOPSIS

1981 market *limit* rate: Summer: $1.25-1.50/ft/mo; winter: less than $1.00 ft/mo

Markets served: Local counties and Portland/Vancouver metropolitan area

	Public	Private	Total
Total number wet moorage slips - 1981	944	70	1,014
Percent change June 1978-May 1981	5.8	(-63.2)[1]	(-6.3)
Total number marinas and dry storage facilities - 1981	5	3	8
Percent change June 1978-May 1981	0.0	(-25.0)[1]	(-11.1)
Number wet slips under construction - 1981	--	--	--
Number wet slips planned - 1982	--	--	--
1983	--	--	--
1986	--	--	--
Average wet open moorage rate ($/ft/mo)	0.87	Insufficient data	--

OUTLOOK:

Depressed market with high winter vacancies and lowest rates in region; competition emerging from new moorage on Willamette River, Portland.

[1] One marina destroyed by Mt. St. Helens eruption

SAMPLE SIZE:
Facilities: #, (% of total): Public: 4 (100.0)
Private: 0 (—)
Slips: #, (% of total): Public: 944 (100.0)
Private: 0 (—)

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