

Recreational Kayak Visitor Use, Distribution, and Financial Value of Beaches in Western Prince William Sound, Alaska, Between 1987 and 1998

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Abstract—Visitor use data was collected for the years 1987 to 1998 from sea kayak guide/outfitters, charter boats, lodges and rental businesses operating in western Prince William Sound, Alaska. The majority of the Sound is part of the Chugach National Forest and includes the 2.1 million-acre Nellie Juan Wilderness Study Area, where most recreational use examined in this study is concentrated. Results show that use increased from 6,646 visitor-days in 1987, at an annual rate of 7.5%, to approximately 12,786 visitor-days per season in 1998. Concurrently, gross revenues per beach for guide/operators and charters grew at a rate of 22% annually.

Prince William Sound (PWS), Alaska, is located roughly at 61° N, 148° W and spans a large geographic area of over 4,000 mi². The PWS is remote and accessible by road only from Valdez, by train from Whittier, and boat from Cordova, Tatitlek and Chenega. The region is well known for the principal economic activities of commercial fishing and crude oil transportation, but more recently, tourism and recreation activities have increased, with commercial sight seeing tours, cruise lines and sea kayak outfitters now operating in the area. Many of the visitors are drawn by the wild nature and wilderness character of the Sound—huge mountains and glaciers, abundant wildlife and opportunities for solitude.

Although the PWS retains an outstanding wilderness character, the area has a long history of human use, starting with Natives using open boats and kayaks for travel and subsistence (living based on hunting, gathering, and fishing). Today, human activities continue with recreation (hunting, fishing, boating and camping) mining, subsistence and logging all occurring in areas of the Sound. The Chugach National Forest manages most of the uplands, including the 2.1-million acre Nellie Juan Wilderness Study Area. In addition to the National Forest lands, there are State Marine parks, Alaska native village and regional corporation

lands, municipal lands, private lands and University of Alaska lands adjacent to the Sound.

The management of visitor use is complicated by the large and geographically complex nature of the region. While there are few access points, there are 4,400 miles of shoreline, of which 2,240 miles are in the Wilderness Study Area. Most of this shoreline consists of rocky cliffs interspersed with beaches consisting of a gray sandstone (graywacke) and slate (Lethcoe, 1990). Upland visitation, in the temperate spruce/hemlock rainforest, is limited due to the boggy nature of most soils above the beaches. The majority of use in the western PWS occurs in the summer months due to the wet, windy and cold conditions between September and April, although hunting may be a substantial off-season use. In May of 2000 a new road will open to Whittier, which is currently served only by railroad. This increased access is expected to result in an immediate and dramatic increase in use from nearby Anchorage, the major population center in the state.

In 1989, the tanker Exxon Valdez ran aground on Bligh Reef and the resulting spill oiled approximately 500 mi of shoreline (Neff, et al. 1995). As a consequence of natural processes and cleanup efforts, little observable surface oil remained two years after the spill (Wiens, et al. 1996), though the long-term effects to the ecosystem remain a controversy some ten years later (Exxon Valdez Oil Spill Trustees 1999). Nonetheless, the cleanup efforts themselves had an effect on the beaches by the introduction of many thousands of workers and boats in areas that had previously received little (if any) human activity and impacts such as the trampling of beach vegetation were observed.

Lack of Data on Recreational Use in Prince William Sound

As with most wilderness areas in the United States, field data on recreational use is lacking in the Sound (Mackey 1998). Some estimates of certain types of use have been made, which are useful for comparison purposes. For example, between 1989 and 1997, sport-fishing in the sound increased at an annual rate of 8%, and tourism in Alaska grew at an annual rate of 10% (Exxon Valdez Oil Spill Trustees 1999). In a summary of use of the National Wilderness Preservation System between 1965 and 1994, Cole noted the average annual increase in use was 6.3% (Cole 1996). Management of recreation by the Forest Service in Prince William Sound has been minimal, limited to recreational cabins and irregular field patrols. Furthermore,

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Forest Service staff have been unwilling to share use information from permitted guides and outfitters, citing confidentiality.

In contrast to the lack of information on visitation, extensive work has been conducted on the degree of campsite impact from recreational use (Monz 1998). To date, campsites at over 100 beaches in the western and northern sound have been assessed for the degree and total areal extent of impact. In general, campsites in PWS tend to fall in the moderately to highly impacted range, showing a high level of cover loss, damage to adjacent trees, and a significant number of additional trails. However, established sites and areas of exposed beach gravel are highly resistant to use and camping exclusively on these areas will limit additional impacts to acceptable levels. This work has established a baseline for monitoring changes in impact as a consequence of future changes in visitor use levels and management actions.

The visitor use study began in 1991 as an attempt to quantify both recreational kayak use and gross revenue generated by kayaking for individual beaches in the western sound from 1987 to the present. Our goal was to quantify recreational visitor days and gross outfitter revenue for specific beaches. In addition, we examined sea kayak use patterns and visitor distributions and obtained a limited amount of data on hunters, U.S. Forest Service cabin users and lodge use. These data are an important contribution to the forest plan revision process currently underway in the Chugach National Forest. The revision will include how many acres the Forest Service will recommend to Congress for designated wilderness. By quantifying the wilderness-dependent use in the Sound, the data in this study can provide a basis for these important land allocation decisions.

Methods

In 1992, use and revenue data for the years 1987 to 1991 was collected from the business records of contributing outfitters/guides, charter boat operators, and sea kayak rental businesses. Starting in 1992, data was collected yearly from operators who willingly contributed for each year until 1998. In addition, we obtained data from one private lodge and the Forest Service public use cabins in the western Sound. Each year, following the season, letters were sent to all known sea kayak outfitters, charter boat operators and lodges in the Glacier Ranger district. Contact lists were developed through Forest Service permittee lists, Alaska Pacific University/Alaska Sea Kayaking Symposium databases, Alaska Wilderness Recreation and Tourism Association membership lists, Anchorage, Whittier and Valdez visitor information services, local stores, and word of mouth. The number of businesses responding varied from year to year as operators went out of business, did not respond or new businesses started. Response rates varied with operator type. All charter boat operators in Whittier supplied information for each year of operation. All Forest Service cabin data was collected and one out of the two operating lodges responded. Due to confidentiality of Forest Service records, no exact yearly number of guides/operators are known, thus no definitive response rate is possible. However, based on our knowledge of the PWS, we estimate that

approximately an average 90% of the guides and operators responded each year. Guides/outfitters reported the number of nights clients stayed on specific beaches. Use numbers are based on client numbers, as guides and instructors are not included because the guide/instructor use is not reported to the Forest Service and they do not contribute to the gross revenue of the business. Charter boat operators reported the number of visitors dropped off or picked up at specific beaches per trip. Guided groups that were chartered were counted under the respective guide/outfitter number, not with the charter data. Each night spent or person chartered equaled one Forest Service's 12 hour recreational visitor day (RVD) making two assumptions. The first is that the guided/outfitter users spent some of their time off Forest Service land kayaking each day they traveled between beaches, the other is that charter boat users stayed at least one night at their drop off or pick up beach. We did not attempt to guess where the charter boat users went after they were picked up or before they were dropped off. An estimate of trip length for charter boat users was made by counting the number of days between drop off and pick up for each group. Data were summarized for each beach on a yearly basis.

Forest Service cabin use was added to the RVD numbers. In the western sound there are six public use cabins. The data is reported as number of people per year per cabin (P), number of nights used per year per cabin (N) and number of reservations per year per cabin (R). To determine RVD's an average group size per reservation per cabin was multiplied by the number of nights reserved:

$$(P \div R) \times N = \text{Recreational Visitor Days per cabin}$$

No analysis of the type of cabin user (that is, whether they travel by sea kayak or power boat) can be done because of lack of data, though sea kayakers commonly use them.

The lodge is a combination of a day lodge and overnight cabins. Since most day use is limited to one to two-hour stays, only overnight use was included, with each nights stay equaling one RVD. A yearly report use was sent to contributing operators to help guide their use for the following year.

Each guide/outfitter also reported the per person rate charged for each trip per year. A per day charge was determined and applied to the use at each site. Charter boat operators submitted their charges per trip which were multiplied by the number of trips per site. Forest Service cabin revenue was figured at \$25/night/group (the fee the Forest Service collects per reservation) and lodge revenue was based on per night charges for each year. Where charter boats dropped visitors off at a Forest Service cabin both the revenues were counted, as was revenue from both the charter and outfitter/guide when a guided group was chartered. Each year's data was adjusted by the Anchorage Consumer Price Index for inflation to 1998 dollars. The guide/outfitter use figures were totaled by individual beach.

This study looked at recreational sites of three types: camping beaches, Forest Service cabins and one private lodge. Although most recreational use in the sound takes place on the water, one significant use of the uplands is overnight camping by sea kayakers, hunters and others on beaches above high tide. Camping beaches were identified by the outfitters/guides and charter boat operators, the author's personal experience on the sound over the past 15

years, the campsite assessment study (Monz 1998) and historical information from the National Outdoor Leadership School. Though camping may exist at some beaches not reported in this study, our personal experience and the findings of the campsite study (Monz 1998) indicate that this use is probably minimal. Beaches in the eastern part of the sound were not included as guide/outfitters and charter boat operators did not report any use in the area for the duration of the study. Although some visitors do travel in the eastern part of the Sound, lack of any reported data confined this study to the western areas.

In the summer of 1998, a count of kayakers arriving in Whittier by train (the only current access in Whittier) was completed to determine a ratio of nonguided and nonchartered use to guided/chartered use. During the months of June, July and August trains were met according to a schedule designed to meet a sample of approximately 22% of the trains arriving in Whittier. The observer recorded the number of double, single, and folding kayaks, the number of people associated with the kayaks, and the number of people associated with rental and/or guided groups. The sampling procedure was designed to meet every train an equal percent of arrival times each month. Charter figures indicate that visitor use numbers were consistent over the days of the week.

The total observed use for each arrival time was averaged per month for an average number of people per train. For the months of June, July, and August the average number of people for each arrival time observed was extrapolated to the whole month by dividing each total by the proportion of trains met for each arrival time as follows:

(total number of people per train per month observed ÷ number of trains observed) ÷ proportion of trains observed per month = total use per month by train.

Since no trains were observed in May or September, we estimated use for May and September by 1) calculating a summer monthly average by totaling use for each train for June, July, and August and dividing by three, and 2) multiplying the summer average by a factor of .33 for May and .16 for September to estimate visitation during these months. These factors (.33 and .16) are the proportion of sea kayakers

served by charters during May or September compared to the average number served during the summer.

For this study it was assumed that the ratio of guided versus nonguided use exists as charter versus noncharter use. To use a different ratio creates the possibility of double counting nonguided kayakers. We estimated total use for all years using the proportion of non guided/ nonchartered to total visitors observed in the 1998 Whittier study and increasing the available guide and charter numbers accordingly. This assumes that the ratio of charter versus noncharter use that we determined in 1998 has stayed the same over the previous 12 years. Forest Service cabin and lodge use was not corrected as it is assumed that those figures capture all use at those locations.

Results

With 11 years of data collected, 282 sites have been identified as either camping beaches, public use cabins and one lodge. It was estimated that 2,433 individual kayak visitors used the Whittier train, the only access to and from the western sound, in the summer of 1998. From charter boat use figures, we know that 2,054 kayakers used charters, leaving 379 visitors not using charters, or approximately 18% of the charter use. The results of both the use and the revenue studies show consistent growth of use in western Prince William Sound between 1987 and 1998 (table 1). Recreation user days grew at an average annual rate of 7.5%. Dips in use during 1989 can possibly be attributed to the negative publicity from the Exxon Valdez Oil Spill. Use quickly rebounded in 1990, indicating that the effect from the spill on visitation was temporary. Other year to year changes in use can be attributed to a varying number of guide and charter operators, possible effects of a tourism boycott of tourism due to the State of Alaska's wolf control program (1992/1993), and the anticipated opening of the Whittier road. These effects are anecdotal and would be worth more analysis and study.

Out of the 282 sites in the study, the six Forest Service cabins had 35% of the total use, camping beaches 60%, and

Table 1—Recreational visitor days by use sector and year.

Year	Guided use	Chartered use	F.S. cabins	Lodge	Total counted ¹	Estimated total ²
1987	3340	191	2479	0	6010	6646
1988	3035	310	2173	0	5518	6120
1989	1651	401	2104	0	4156	4525
1990	3005	754	2233	0	5992	6669
1991	3884	894	2579	0	7357	8217
1992	4342	822	2504	0	7668	8598
1993	2755	948	2932	0	6635	7302
1994	2782	1500	2681	0	6963	7734
1995	3027	1523	3078	0	7628	8447
1996	2368	1527	3403	400	7698	8399
1997	3877	2293	1835	1200	9205	10316
1998	5256	2482	2150	1505	11939	12786
Overall totals	39250	13645	30151	3105	86223	95672

¹Sum total of all use measured.

²Overall estimated total including nonguided/nonchartered use = [(Guided + Chartered) x 1.18] + (Lodge + F.S. Cabins).

the lodge 3%. The location of the remaining 2% is unknown due to outfitters who were unwilling or unable to specify exact locations of their camping sites. Forty-six percent of the total known use occurred on just one quarter of the beaches with the remaining beaches having just 15% of the known use. When analyzed by Forest Service planning area, 18% of the areas have 60% of the use (table 2). Total use of specific beaches tends to decrease as total round trip distance from Whittier increases ($r = -0.26$, $p < 0.001$, fig. 1).

Using a 18% multiplier for nonguided/nonchartered use, but not Forest Service Cabin and lodge use, the total recreational visitor days for 1998 is 12,786. If charter use is multiplied by the average trip length of 6.5 days per user, RVD's for 1998 jump to 26,194. If the same average charter trip length is applied to all years of the study use, the use increases by an annual rate of 20%. This is, however, speculative because it assumes that the average charter trip length stays the same from year to year.

Total revenue has also increased (fig. 2), with annual average growth of 22% between 1987 and 1998. Revenue for 1987 was \$318,013 and increased to \$1,092,536 in 1998 with the sum total for the period between 1987 and 1998 being \$5,508,405. The rapid growth of revenue in 1997 and 1998 can be attributed to the increase in operator rates, increased kayak rental businesses, and the dramatic increase in lodge guests. These results can be looked at as an estimate displacement costs per beach. For example, if a mariculture operation applies for a permit at Meares Point, effectively displacing camping use, operators would potentially lose \$10,600 per year if no nearby beach were to be available.

Analysis of drop-off and pick-up data indicates that the average charter group size was 4 people and average trip length was 6.5 days for 1998. Although length of wilderness stays seem to be decreasing in the lower 48 (Manning 1985, Hammitt and Cole 1998), this may not be the case for Alaska where the remote nature of the wilderness areas often results in higher access costs. Nonresident visitors, in particular, may prefer to stay longer as a consequence.

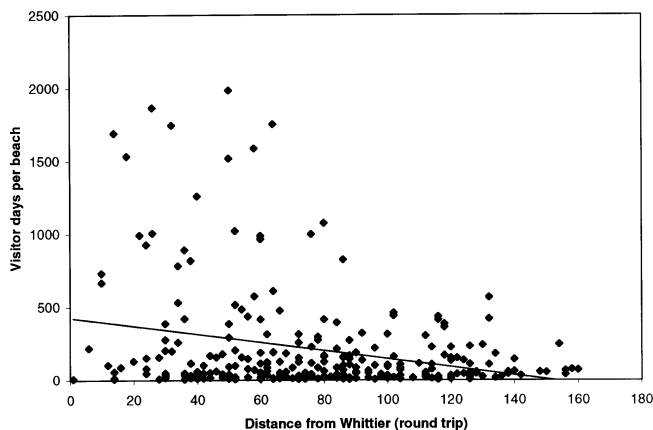


Figure 1—The relationship between total visitor use days and the round-trip distance from Whittier to individual beaches.

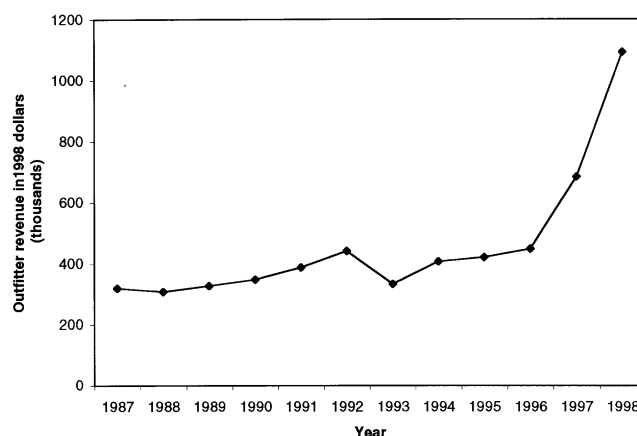


Figure 2—Total reported revenue from outfitters and guides for 1987–1998.

Table 2—Visitation by Forest Service area.

F.S. area	1987	1998	Percent change	Cumulative use (1987-98) ¹	Percent of total ²
Culross Passage	1195	1461	22	17375	18
Barry Arm	593	882	48	9867	10.2
Bettles	492	817	66	8744	9
Passage Canal	485	847	74	7139	7.4
Lower Cochrane	475	389	-18	6297	6.5
Lower College	422	428	1	5141	5.3
Blackstone Bay	57	498	774	4070	4.2
Surprise Cove	162	340	109	3520	3.7
Glacier	16	1529	9456	3479	3.6
Nellie Juan	197	493	150	3363	3.5
Eshamy	333	187	-43	2875	2.9

¹Overall estimated cumulative use for the period using correction for nonguided/nonchartered use.

²Use as a percentage of corrected total which included nonguided/nonchartered use. Destinations of nonguided/nonchartered visitors are unknown and therefore these percentages are probably an underestimate.

Discussion

This study is an initial effort in understanding recreational use in Prince William Sound. The beach by beach data provides useful information for land managers as they make decisions on what type of use should be allowed and how it is managed. As use in the Sound increases, managers should be aware that certain beaches and areas have most of the sea kayaking use, and it is arguably appropriate to manage these areas for these kind of experiences. Furthermore, development attracts use and encourages more use by those who want the amenities provided. The same development, however, changes the nature of the area and may have unforeseen side effects. The limited number of beaches that have adequate campsites suggests that managers should consider concentrating development to beaches that are not adequate for camping, thus maintaining the number of available campsites.

This study has certain limitations:

- The Chugach National Forest has been unwilling to share permittee user or revenue numbers citing confidentiality. Therefore the exact number of outfitters and guides operating in the area is not known.
- Some operators have been unwilling to share their client and revenue numbers.

As with many studies of wilderness use (for example, Cole 1996), measuring nonguided, private use is a significant challenge.

These limitations suggest that our revenue and use numbers are probably underestimated. Further studies are needed to eliminate some of the assumptions in this work. A more thorough examination of current use and patterns of nonguided and nonchartered use to determine group size, destinations and length of stay would be very useful. The study should also be expanded to all of Prince William Sound, especially the eastern Sound, where use may increase as the tourism and kayaking industry matures.

By applying the Forest Service fee structure to the revenue figures, an estimate can be made as to the amount of fees paid to the Forest Service by outfitter/guides for permits by beach and/or area. This can provide an estimate of the fee generation value of the current Wilderness Study Area has to the Forest Service. Though the Forest Service has data per permittee, they do not have data per beach or area. Since charter boat operators don't use Forest lands, they do not have Forest Service permits. Without including charter, Forest Service cabin or lodge figures, and using the 3% of gross figure used to determine permit fees, permittees could have paid a total of \$22,078 to the Forest Service (3% of \$735,941) for 1998. Cabin revenues add another \$49,012. Without complete guide and outfitter figures, this number is undoubtedly low. The point is made, however, that the Wilderness Study Area does have some economic value to the Forest Service, and that value is increasing with increasing wilderness use.

The most useful information in this study is the percent of growth in visitation and the distribution of use. Although new data from the Forest or reluctant operators would increase the actual numbers of use and revenue, the estimated sample of contributing guide/outfitters is high enough that the overall percent of use and distribution would probably

not change dramatically. The observed trends suggest that the growth of sea kayaking will likely continue, barring catastrophic events (such as an oil spill) or if activities that displace wilderness visitors are allowed to expand considerably. Moreover, the opening of the Whittier road in the year 2000 will also contribute to the growth of kayaking as the area becomes more accessible to visitors. This will provide an opportunity to study changes in visitor use as a result of a dramatic change in access. Our observations indicate that some increase in use may already be occurring as users who value wilderness characteristics visit the Sound before the road opens.

Surveys done as part of the state's most recent State Comprehensive Outdoor Recreation Plan indicate that sea kayaking is the third most likely activity that respondents would want to try next year if they had the opportunity (Alaska Department of Natural Resources 1998). This indicates the potential continued growth in interest in sea kayaking among residents. In addition, if tourism in Alaska continues to grow, nonresident use of the Prince William Sound is likely to also increase. As a consequence, the revenue generated from guide/outfitter fees for the Forest Service will continue to rise if the wilderness characteristics that the operators and their clients value are maintained.

Conclusion

This study has attempted to quantify the extent of visitor use in western Prince William Sound between 1987 and 1998. The use of PWS by sea kayakers has increased 7.5% per year over the past 12 years, with dramatic increases in the past 2 years. Outfitter/guide revenue has grown faster at an average annual rate of 22%. With the increase in recreational use and related economic value, Prince William Sound needs careful management of its wilderness characteristics. The value and extent of wilderness recreation is significant in the Sound and arguably justifies management of the Sound to this end.

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