2003 Bottomfish Recovery Zone Fishing Pressure Assessment

Prepared for
San Juan County Marine Resources Committee

Prepared by
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September 28, 2003

This report was funded in part through a cooperative agreement with the National Oceanic and Atmospheric Administration.

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*photo of vessel bottomfishing inside Limekiln Pt. BRZ

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Introduction

In 1996, the Marine Resource Committee (MRC) of San Juan County established eight (8) voluntary Bottomfish Recovery Zones (BRZ's) to protect the diminishing stocks of Bottomfish species in the San Juan Islands (Kaill 2001). Since 1996 the MRC has carried out efforts to educate the public about the existence of these voluntary protected areas through on the water education, full-page advertisements in the Washington State fishing guide, and through brochure distribution. (Koski 2001 and personal communication with MRC Chairman Jim Slocomb). Furthermore, the MRC has contracted with local scientists to gather data necessary to determine the effectiveness of these voluntary marine reserves.

The purpose of this study was to evaluate the effectiveness of the BRZ's by comparing fishing effort in voluntary no-bottomfishing areas with effort in nearby reference zones. It is of particular interest to determine if the non-regulatory nature of the BRZs is effective. This study also serves as an exploratory analysis to collect data on the nature of the fishery to help with the design of future studies.

Materials and Methods

During the period of May 1, 2003 to June 15th, 2003 a fishing pressure assessment of three (3) BRZ's and six (6) corresponding reference zones was undertaken. An aluminum motor skiff with 130hp four-stroke engine was used to circumnavigate San Juan Island on 38 days (out of 46 possible) during the sampling period. A random sample table was used to determine the departure time of the observation vessel on each sampling day and to determine days with no sampling. Departure times of 8:00 a.m., 12:00 noon, or 4:00 p.m. were possible. Days with no sampling were assigned at random only to weekdays. The period of May 1st to June 15th was chosen because it coincided with the lingcod (*Ophiodon elongates*) opening. Anecdotal data suggested that there would be a higher likelihood of encountering bottom fishermen in the sample areas during this time. In addition, the area was closed to salmon fishing during the sampling dates.

Sampling areas consisted of three (3) BRZ's –Kellet Bluff, Lime Kiln, and Pile Point (Map 1). These BRZ's were chosen because they have been used for studies done in the past and thus there is a growing data set being compiled on these areas (see Koski 2001, Kaill 2001, Eisenhardt 2002). The study also included six (6) reference zones: Danger Shoal, McCracken, Open Bay, Craig's Point, Edward's Point, and Eagle Point. (Map 1). The reference sites were chosen due to their inclusion in previous studies, and also because of their similarity to the BRZ's of the study. Underwater topography, general abundance of bottom fish, and total area were all considered in determining these reference sites. Although there were six (6) total reference sites, three (3) reference sites were determined to be the best matched pairs for the BRZ's of the study. These were:

- McCracken to Kellet Bluff BRZ,
- Edward's Pt. to Pile Pt. BRZ, and
- Eagle Pt. to Pile Pt. BRZ.

A 1/4 mile adjacent zone was set up around all BRZ's and reference zones to determine if fishermen were fishing adjacent to the BRZ's in the hopes of catching fish that might transit out of the protected areas.

The sampling skiff was equipped with a WAAS enabled GPS (Global Positioning System) with chart-plotting capability. The boundaries of the BRZ's, reference sites, and adjacent zones were entered into this GPS so that the observer could determine with accuracy if a vessel was in these areas. As the sampling skiff entered the sampling sites a 'begin time' was entered onto the data sheet and vessel activity was recorded. The sampling skiff made its way to the center of the sampling sites and stopped to record: current speed and direction, wind speed and direction, visibility, and sky condition. For an average of 11 minutes, the observer tracked and recorded the vessel activity in the site. If a vessel was bottomfishing, the observer would maneuver the sampling skiff within 100 yards to determine how many lines were fishing and if the vessel was inside or adjacent to the zone. If the vessel was close to this line, the observer would maneuver the skiff so as to site down the line and determine accurately if the vessel was inside or outside the zone. The observer did not interact with the fishermen in an attempt to keep the data unbiased and not to influence the actions of the fishermen.

During the observer's travel between sampling sites, bottomfishing activity was recorded and plotted using the GPS. To acquire the GPS coordinates, the observer would maneuver the sampling skiff within 100 yards, determine the number of lines in the water, and then estimate the position on the chart plotter. The accuracy of these GPS coordinates is plus or minus fifty (50) yards.

Results

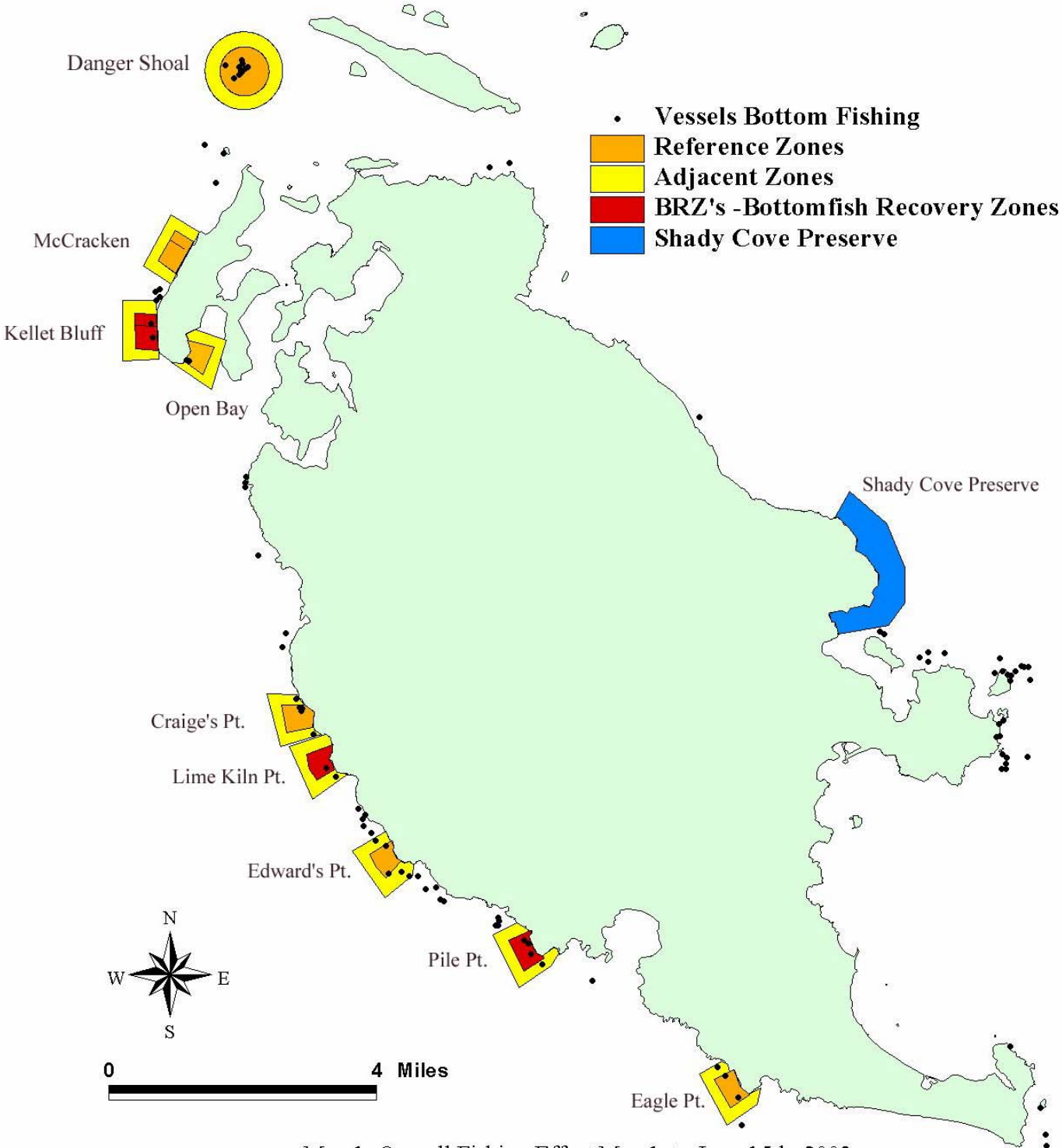
No significant difference between fishing pressure in BRZs and reference sites was found in this study. Overall, seven (7) vessels were observed fishing in the BRZ's, and twenty (20) vessels were found fishing in the reference sites. This ratio (7 of 27 = .259) is not statistically significant compared to the ratio that would be expected if the probability of observing fishing in the BRZs and reference sites were equal (3 of 9 sites = .3333), based on a binomial test (1-tailed exact p = .2755). Previous studies done by (Koski 2001), (Kaill 2000), and (Eisenhardt 2002) show no significant difference in fishing behavior or fish stock in the BRZ's as compared to their reference zones. Although this study and those previous may not statistically show that the BRZ's are ineffective, they do demonstrate that more work needs to be done to persuade bottom fisherman to stay clear of the BRZs. The number of bottom fishermen fishing inside the BRZ's in the study was still higher than ideal. More data points would be required to detect a statistical difference in fishing pressure between the BRZs and references sites, if one exists.

Comparisons between each individual BRZ and its best corresponding reference site could not be made in this study due to the low number of data points. However, if future studies are made with these same sites, a sufficient data pool may be amassed such that comparison of individual BRZ's and their reference sites could be made.

An observation of interest is that no vessels fished inside the Shady Cove Marine Preserve (Map 1). The Shady Cove Preserve was legally protected by the State of Washington and Treaty Tribes in 1990 and is legally closed to all bottomfishing (Eisenhardt 2001). This is of interest in that it may show the effectiveness of an established legally protected no-take area that is highly monitored, in comparison to the voluntary no-take zones of the study.

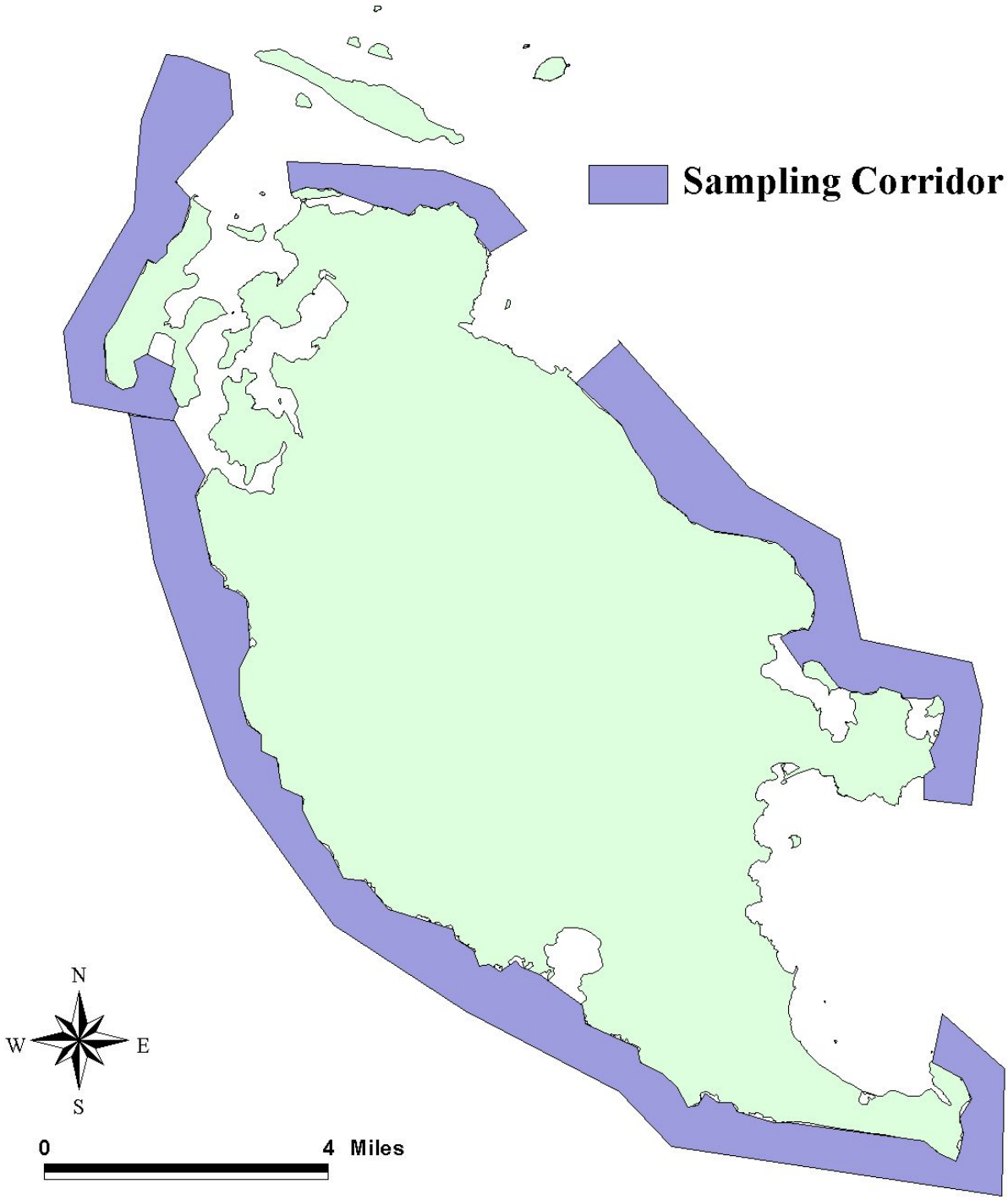
There was a clear difference in fishing effort between weekends and weekdays during the period of this study. On 14 weekend days, there were 19 observations of fishing in BRZs and reference sites, for an average of 1.36 observations per weekend day. In contrast, on 25 weekdays there were only 8 fishing observations, for an average of only 0.32 observations per weekday. Thus, 19 of 27, or 70% of the fishing observations were made on weekend days, which constituted only 14 of 39, or 36%, of the days sampled. The observed proportion of fishing observations on weekend days is significantly greater than the proportion that would be expected if fishing effort was the same on weekends and weekdays (one-sided binomial test, exact p-value = .0003), suggesting that fishing effort per day is greater on weekends than weekdays, at least during May and June.

Overall Fishing Effort

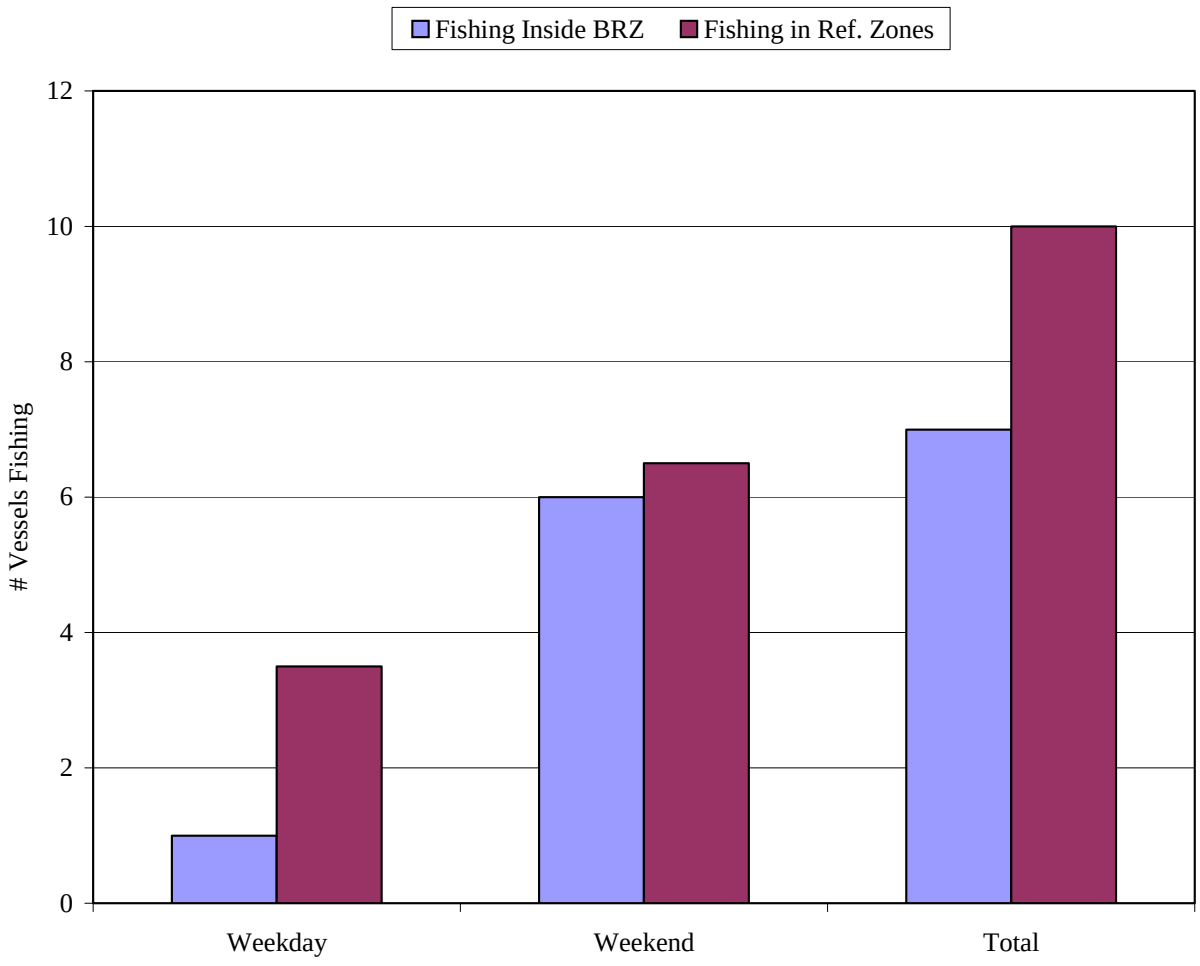


Map 1: Overall Fishing Effort May 1st - June 15th, 2003

Sampling Corridor



Map 2: Sampling Corridor used for Fishing Pressure Assessment - May 1st through June 15th, 2003



	Total	Weekends	Weekdays
Fishing in BRZ	7	6	1
Fishing in Ref. Zone	20	13	7

Table 1 – Comparison of fishing effort in BRZ's to fishing effort in all reference zones. Reference zone numbers in the chart are adjusted for comparison- there were twice as many total reference sites as there were BRZ's.

Recommendations

1. Public education and outreach is vital for the success of the BRZ's of San Juan County. Fishermen need to know that it is in their best interest to stay clear of protected areas and to discourage their fellow fishermen from fishing in these areas. On the water education of fishermen such as performed by SoundWatch in the past, is a critical element in this education and can also serve to discourage the few fishermen that may be slow learners. Therefore, I would recommend funding for on the water education as a key element of future success of the BRZ's.

2. After carrying out this study, it is my belief that a chart of the Marine Protected Areas of the San Juan Islands would be a highly effective means of boater education. Such a chart, as currently being discussed by the MRC, could include ALL protected areas and BRZ's in the area, along with threatened eelgrass sites, and other information that the individual boater can use to help protect the area. Currently, this information is scattered on numerous handouts, charts, and postings that the average vessel operator is unlikely to posses. By putting this information in one place, we can greatly increase the likelihood that the average boater will have easy access to it.

3. After adequate investment in these aforementioned educational programs, it would again be time to do more directed research to monitor the performance of the BRZ's. During this study, fishermen were more likely to be fishing during the weekend than during weekdays (Table 2). Therefore, in future studies of relative fishing pressure during this time of year, it would be more efficient to target the sampling only during the weekends for maximal sampling efficiency. Furthermore, it would be beneficial to carry this study through the summer months, incorporating research on bottomfish by-catch by salmon fishermen.

4. The location of the sign marking the northern boundary of the Kellet Bluff BRZ does not agree with the BRZ brochure given to the public. I would recommend moving the current location of this sign 200 yards north to agree with the brochure. This will enlarge the BRZ, and eliminate any confusion about the BRZ's boundaries. Also, by moving the sign, a large breeding colony of Pelagic Cormorants would then be inside the BRZ's boundaries.

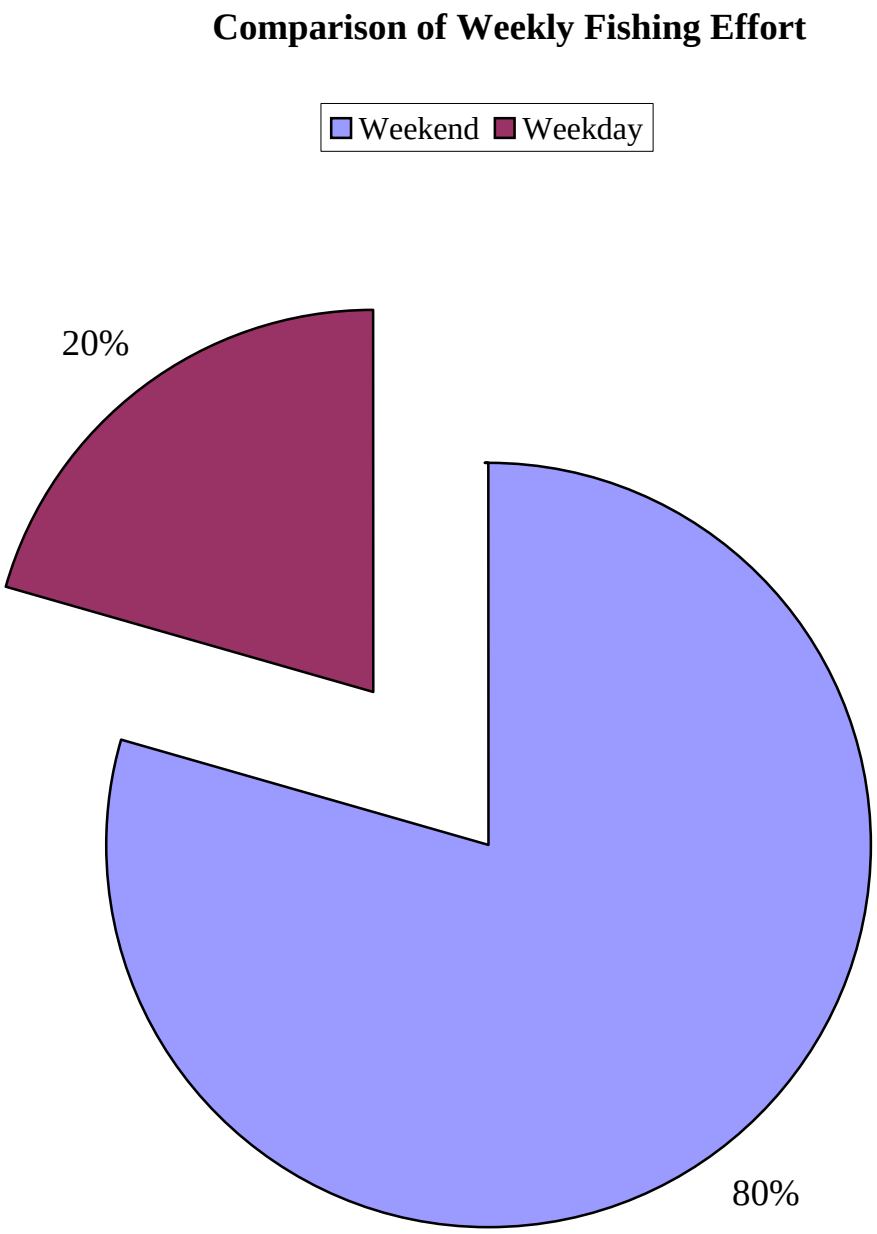


Table 2- Comparison of total boats bottomfishing on weekdays as opposed to weekends. There were 24 weekdays sampled and 14 weekend days. Numbers in chart have been weighted as such for comparison.

Acknowledgements

Much thanks to David Loyd for his kind donation of the use of his 22' aluminum skiff for 45 days of sampling- without his help this study could not have been completed.

Thanks also to Kit Rawson and Eric Eisenhardt for their technical assistance in designing the study and final report preparation.

Technical assistance by Jim Slocomb in compiling data in GIS format is also highly appreciated.

Also, thank you to the Northwest Straits Commission for funding this research.

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