

ABSTRACT

This study attempted to analyze the effects of boats on the orcas of Johnstone Strait. Much of the behavioral data has not been analyzed at this time so only a minimum can be said on behavioral responses and changes. It was found that splash rates were higher with boats present during the data session than with boats not present, 33.4 splashes per hour with boats present to 19.6 splashes per hour with no boats present. Respiratory rates were lower with boats present than with boats not present, however, 84.9 breaths per hour with boats present to 98.6 breaths per hour with no boats present.

Analysis of the boat data showed that Johnstone Strait received fairly constant and regular boat traffic during the study period. Commercial fishing boats were most numerous and especially so on the designated fishing periods, of which there were 7 during the study period. Recreational boats were second most numerous while tankers, tugs and ocean-liners had a regular, if small in number, presence in the strait. Research boats were not always easily identifiable but Jacobsen and the Tesseract II were and they had a regular presence throughout the study period.

TABLE OF CONTENTS

Introduction.....	1
Methods.....	1
Boat Types.....	1
Behavior Code.....	2
Results.....	4
Boat Data.....	4
Percent Seen by Time of Day.....	4
Percent Seen by Day of the Study.....	5
Average Count by Time of Day.....	7
Average Count by Day of the Study.....	9
Maximum Count by Time of Day.....	11
Maximum Count by Day of the Study.....	12
Behavior Data.....	14
Discussion.....	14
Plots.....	16
Number of Scans By Time of Day.....	16
Number of Scans By Day of the Study.....	16
All Boats Combined Plots.....	17
Percent Seen By Time of Day.....	19
Percent Seen By Day of the Study.....	26
Average Count by Time of Day.....	33
Average Count by Day of the Study.....	40
Maximum Count By Time of Day.....	47
Maximum Count By Day of the Study.....	52
Splash Rates.....	57
Respiratory Rates.....	58

- 5- military boats (mb): included coast guard and other military type boats.
- 6- ocean liners (ol): included all "cruise-ship" type ocean liners.
- 7- large pleasure craft (rl): included all large (over 30'), motorized pleasure craft.
- 8- small pleasure craft (rs): included all small (under 30'), motorized pleasure craft; often many research boats (John Ford, Graeme Ellis) and film crews (NBC and the Japanese crew) were included because of the difficulty of identifying them at long distances.
- 9- sailboats (sb): included all boats under sail with engine off.
- 10- tugboats with barges (tb): included tugs towing any number of barges.
- 11- tankers and cargoships (tc): included all tankers (oil, etc.), freighters and cargoships (except tugs).
- 12- tugboats towing logs (tl): included all tugs towing floats of logs.
- 13- tugboats (tu): included all single tugs with no barges or logs.
- 14- Tesseract II (t2): David Bain's boat.
- 15- unidentified boats (ub): included any which could not be classified into the above 14 categories.

Behavioral data was also observed with a spotting scope and binoculars. Respirations were recorded for a focal animal and various behaviors were observed and recorded for the focal and for nonfocal animals as well. The behaviors and their symbols are the following:

- a- at the surface, or hanging
- b- breach
- c- looping or porpoising
- d- head dip

A boat was considered present if it was within a mile of the whale and then if it was moving toward the whale, the above information would continue to be taken until the boat moved off.

RESULTS

1) BOAT DATA

Note: Data for August 26 is not used because only one scan was made.

A) Percent of Counts Made At Least One Boat Present By Time of Day:

These results are from scans made from 0600-2100.

More than 70% of the scans made for all times included at least one boat. The peak was at 0800 and 1300 in which 100% of the scans made at those times included at least one boat. Results by boat type are the following:

- a- cb: 70% of the scans made for all times included a cb with a peak of 100% of the scans at 1300 including a cb.
- b- gi: More than 10% of the scans made from 1100-1900 included the Gikumi with a peak of 17.5% of the scans made at 1500 including the Gikumi.
- c- jj: More than 5% of the scans made from 1100-2000 with a peak of 18% at 1500 included a sighting of Jeff Jacobsen.
- d- t2: More than 5% of the scans made from 0600-2000 with a peak of 25% from 1100-1200 included the Tesseract II.
- e- jj & t2 combined: More than 10% of the scans from 0600-2000 with a peak of 35% at 1200 included either Jeff Jacobsen or the Tesseract II.
- f- kc: More than 5% of the scans from 0900-1900 with a peak of 26% at 1700 included a kc.
- g- rl: More than 40% of the scans from 1000-1600 with a peak of 55% at 1500 included an rl.

More than 90% of the scans made for any day (except July 18) included at least one boat. Most days had 100% of the scans made including at least one boat. Results by boat type are the following:

- a- cb: More than 70% of the scans made from July 11-September 1 (except July 18 and August 31) included at least one cb.
A peak of 100% of the scans for a single day which included at least one cb was most common (41 of 53 days).
- b- gi: Percent of the scans by day which included the Gikumi was variable with a peak of 42% on July 30.
- c- jj: Percent of the scans by day which included Jeff Jacobsen was variable with a peak of ~ 37% on July 27.
- d- t2: Percent of the scans by day which included the Tesseract II was variable (but more than 10% on most days) with a peak of 40% on August 18.
- e- jj & t2 combined: Variable (although usually over 10%) with a peak of 50% of the scans on August 18 including either Jeff Jacobsen or the Tesseract II.
- f- kc: More than 10% of the scans on most days with a peak of 42% on July 15 included a kc.
- g- rl: More than 15% of the scans made from July 26 -September 1 with a peak of 80% on August 20 included an rl.
- h- rs: More than 5% of the scans on most days from July 21-September 1 with a peak of 65% on August 20 included an rs.
- i- sb: Variable with a peak of 38.5% on July 12.
- j- all recreational craft combined: More than 40% of the scans on most days with a peak of ~92% on August 27 included a recreational craft.

- c- jj: An average of more than 0.1 for the scans from 1200-1900 with a peak of 0.18 at 1500.
- d- t2: An average of more than 0.1 for the scans from 0600-2000 (except for 0900) with a peak of 0.25 at 1100 and 1200.
- e- jj & t2 combined: An average of more than 0.1 for the scans 0600-2100 with an average of 0.4 at 1200.
- f- kc: An average of less than 1.0 for the scans from 0600-2100 with a peak of 0.6 at 1700.
- g- rl: An average of 0.3-1.0 for the scans from 0900-2000 with a peak of 1.0 at 1500.
- h- rs: An average of less than 1.0 for the scans from 0600-2100 with a peak of 0.8 at 1300 and 1500.
- i- sb: An average of less than 0.5 for the scans from 0600-2100 with a peak of 0.3 at 1400.
- j- all recreational craft combined: The peaks were more than 0.8 for the scans from 0900-1900 with a high of 2.7 at 1500.
- k- tb: An average of more than 0.1 for the scans from 0700-2100 with a peak of 0.38 at 1100.
- l- tc: An average of more than 0.5 for the scans from 0600-2100 with a peak of 0.2 at 1300.
- m- tl: An average of less than 0.1 for the scans from 0600-2100.
- n- tu: An average of less than 0.5 for the scans from 0600-2100.
- o- tb,tc,tl & tu combined: An average of more than 0.1 for the scans from 0600-2100 with a peak of 0.4 at 1100.
- p- ol: An average of less than 0.3 for all scans from 0600-2100.
- q- mb: An average of less than 0.1 for the scans from 0600-2100.
- r- ub: An average of less than 0.1 for the scans from 0600-2100.

- g- rl: Average counts were variable with three peaks: July 12-16 with 0.2-0.4, July 26-August 2 with 0.5-1.5 and August 9-September 1 with 0.3-1.6 average sightings.
- h- rs: Average counts were variable with three peaks: July 22-August 6 with 0.2-1.8, August 9-14 with 0.2-0.6 and August 17-30 with 0.2-1.7 average sightings.
- i- sb: Average counts were variable with six peaks: July 11-17 with 0.1-0.49, July 19-22 with 0.05-0.4, July 29-August 2 with 0.1-0.5, August 9-11 with 0.1-0.5, August 14-17 with 0.1-0.4 and August 19-21 with 0.2-0.3 average sightings.
- j- all recreational craft combined: Variable with five peak periods: July 12-16 with more than one, July 26-August 5 with more than one, August 9-15 with more than one, August 19-24 with more than one and August 25-29 with more than one. The high count was 4 on August 27.
- k- tb: Average counts were less than 0.8 on all days with a peak period being July 26-August 18.
- l- tc: Average counts were less than 0.6 on all days with a peak of 0.5 on August 5 and 19.
- m- tl: Sightings occurred only on 8 days (as noted above in section B) with a peak day on August 31 with 0.35 average sightings.
- n- tu: Sightings occurred only on four days (as noted above in part B) with a peak day on August 29 with 0.5 average sightings.
- o- tb,tc,tl & tu combined: Variable, but less than 0.9 on all days with a peak period being July 25-August 19 with 0.2-0.8 average sightings.
- p- ol: Average counts were less than 0.3 for all days.

count of 3 occurring at 1400 and 1500.

j- all recreational craft combined: Maximum counts were more than one from 0600-2100 with a peak period being 0800-2000 with counts of 4-16 with the maximum count of 16 occurring at 1300.

k- tb: Maximum counts were more than one from 0600-2100 with a peak count of 3 occurring at 0900, 1100 and 1400.

l- tc: Maximum counts were more than one from 0600-1900 with a peak count of 2 occurring at 0800-1100, 1300 and 1600.

m- tl: Maximum counts were one and were recorded at 0600, 0700, 0900-1200, 1400, 1600, 2000 and 2100.

n- tu: Maximum counts were one and occurred at 0700, 1100, 1400-1600 and 1900-2000.

o- tb,tc,tl & tu combined: Maximum counts were more than one from 0600-2100 with a peak count of 3 occurring at 0900-1100 and 1300-1400.

p- ol: Maximum counts were one from 0600-1300, 1600-1900 and 2 at 2000.

q- mb: Maximum counts were 2 at at 0700 and 0800 and 4 at 1300.

r- ub: Maximum counts were 3 at 1200-1400.

F) Maximum Counts of Boats By Day of the Study:

Maximum count of all boats by day show the same seven peaks discussed earlier (in section D). The maximum counts on these days are then influenced by the maximum number of commercial fishing boats present on that day. Maximum counts were 95 on July 23 and August 18, 100 on August 5 and 24, 120 on July 15, 130 on August 11 and 141 on July 29. The results by boat type are the following:

a- cb: Maximum counts are the same as discussed above, only a few boats less.

2) BEHAVIORAL DATA

A) Splash rate:

a- With boats present: The splash rate with boats present was 33.4 splashes per hour.

b- With boats not present: The splash rate with boats not present was 19.6 splashes per hour.

B) Respiratory rate:

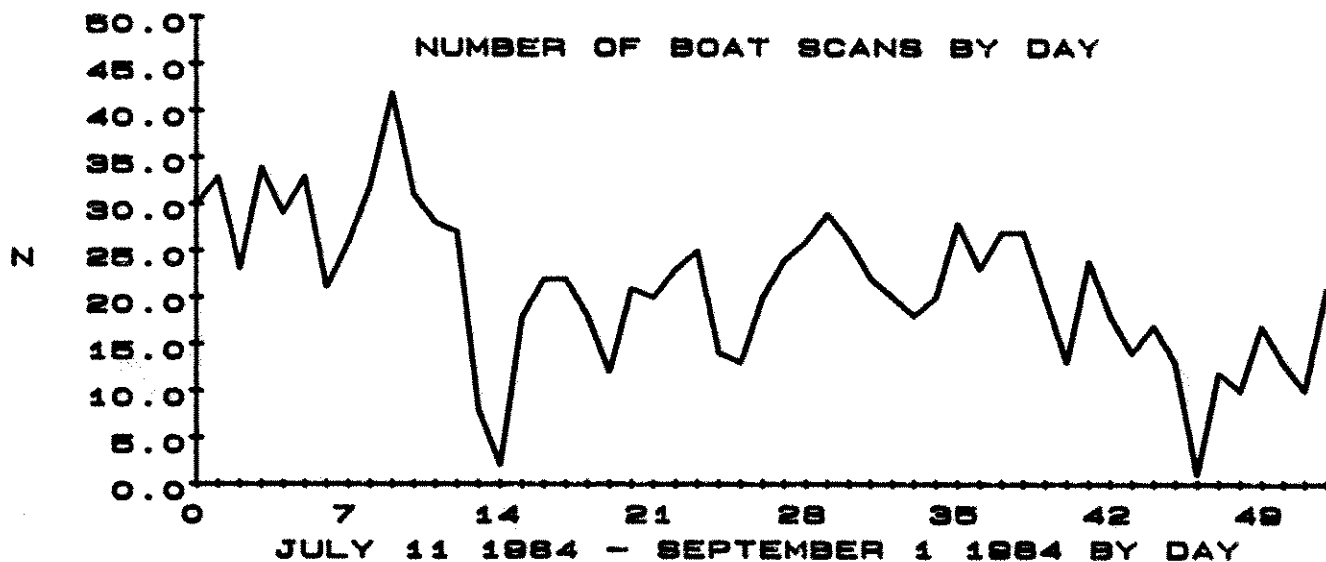
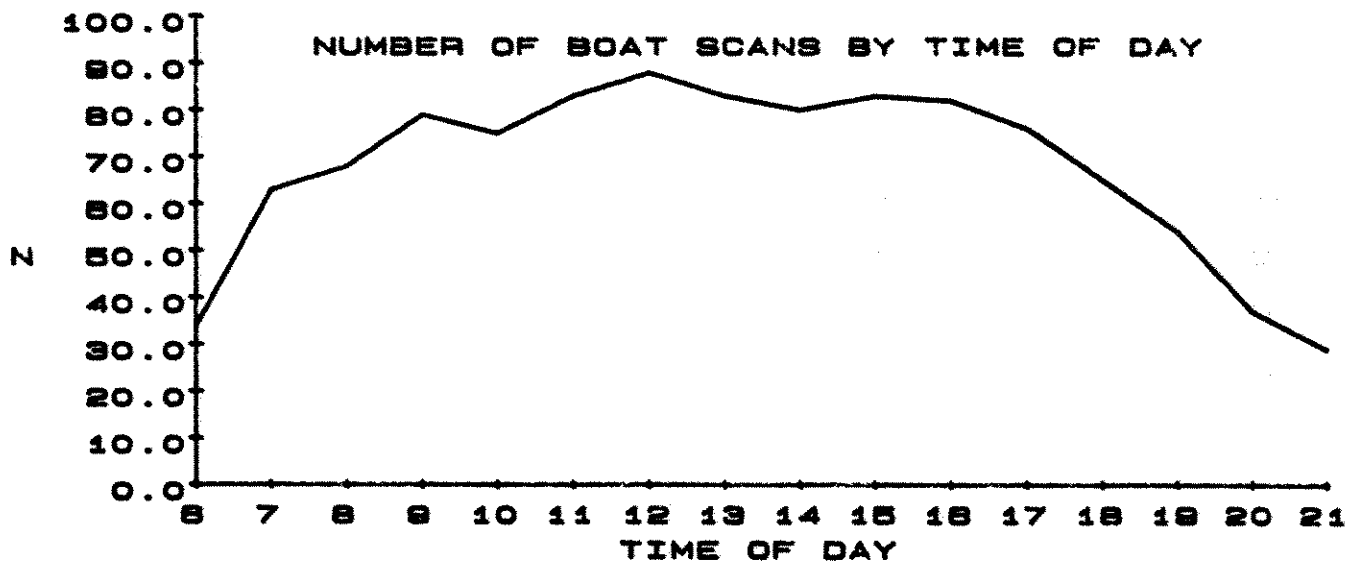
a- With boats present: The respiratory rate with boats present was 84.9 breaths per hour.

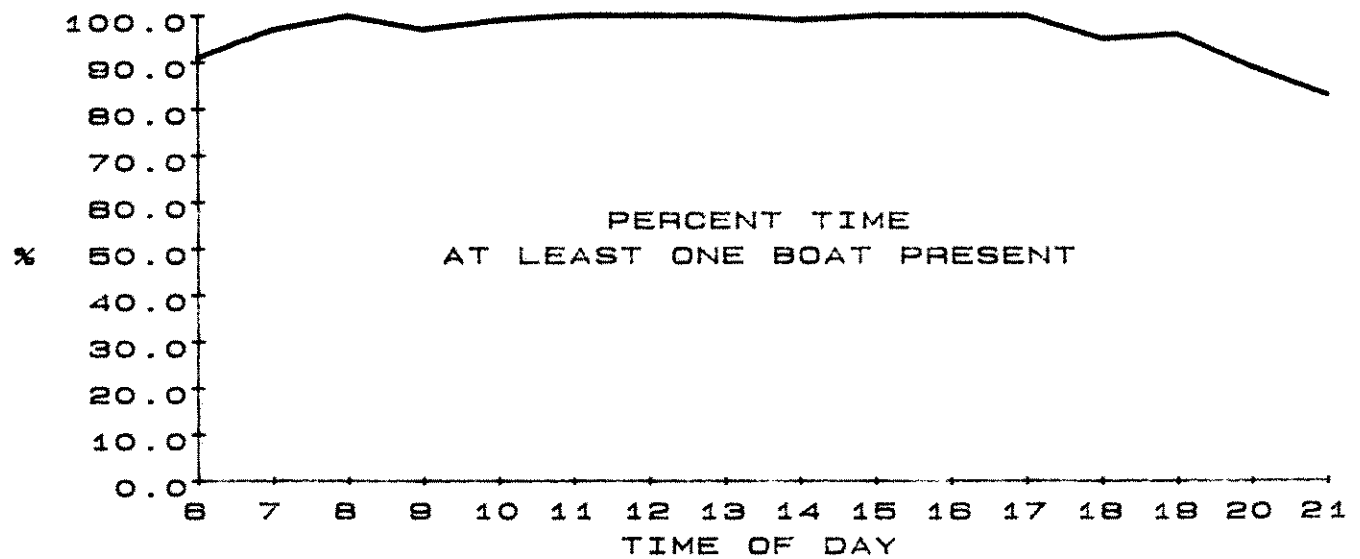
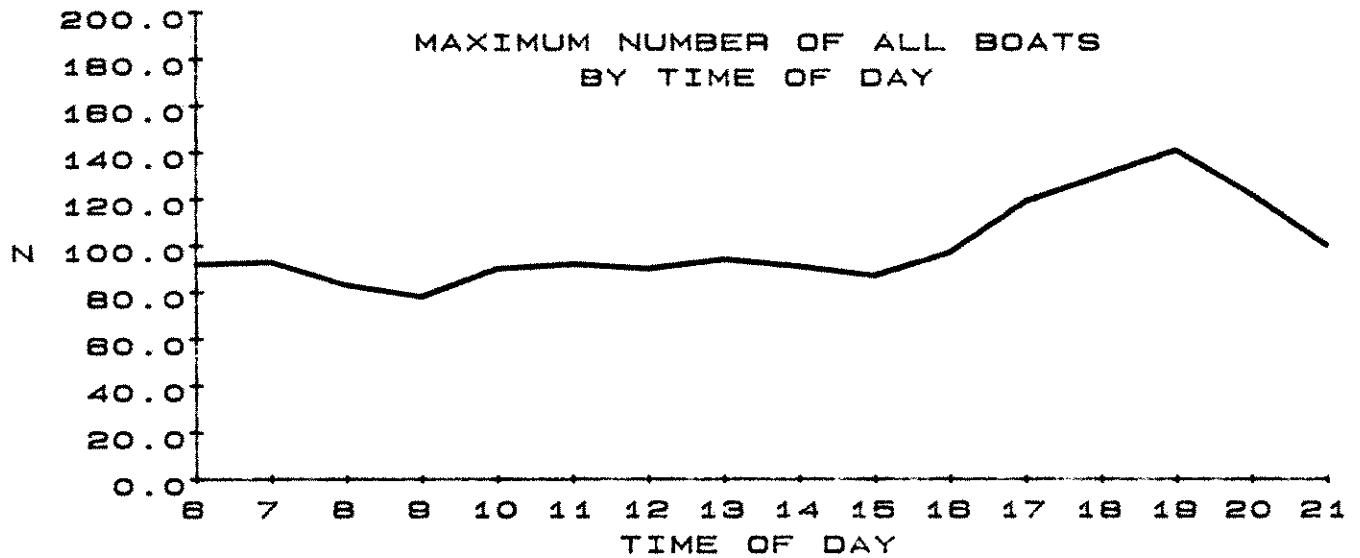
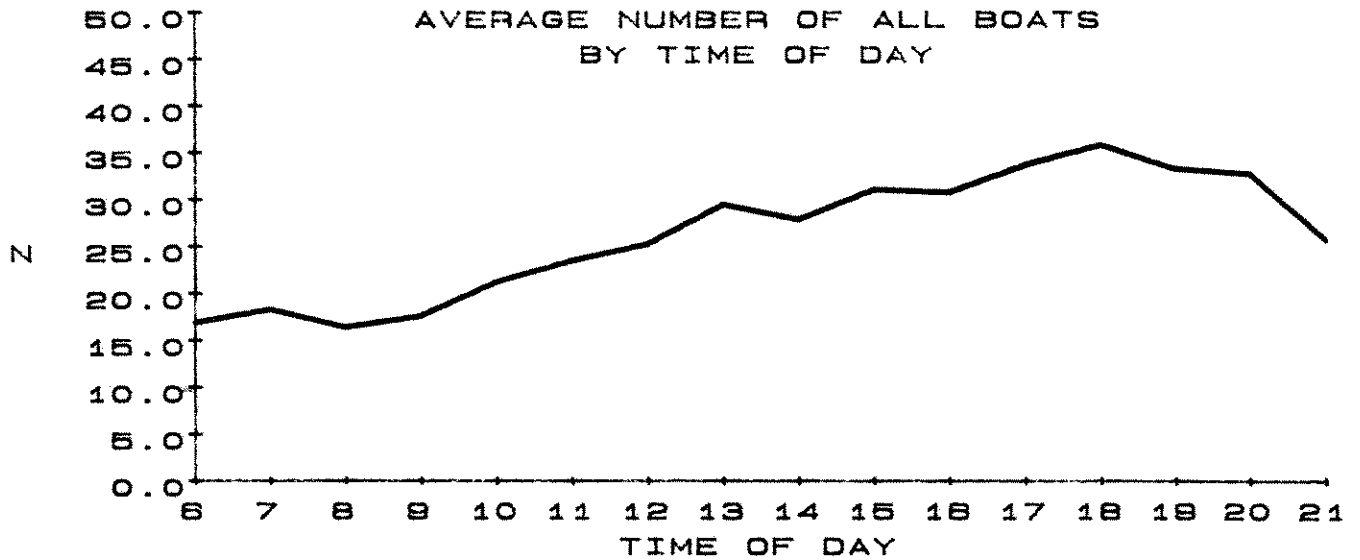
b- With boats not present: The respiratory rate with boats not present was 98.6 breaths per hour.

DISCUSSION

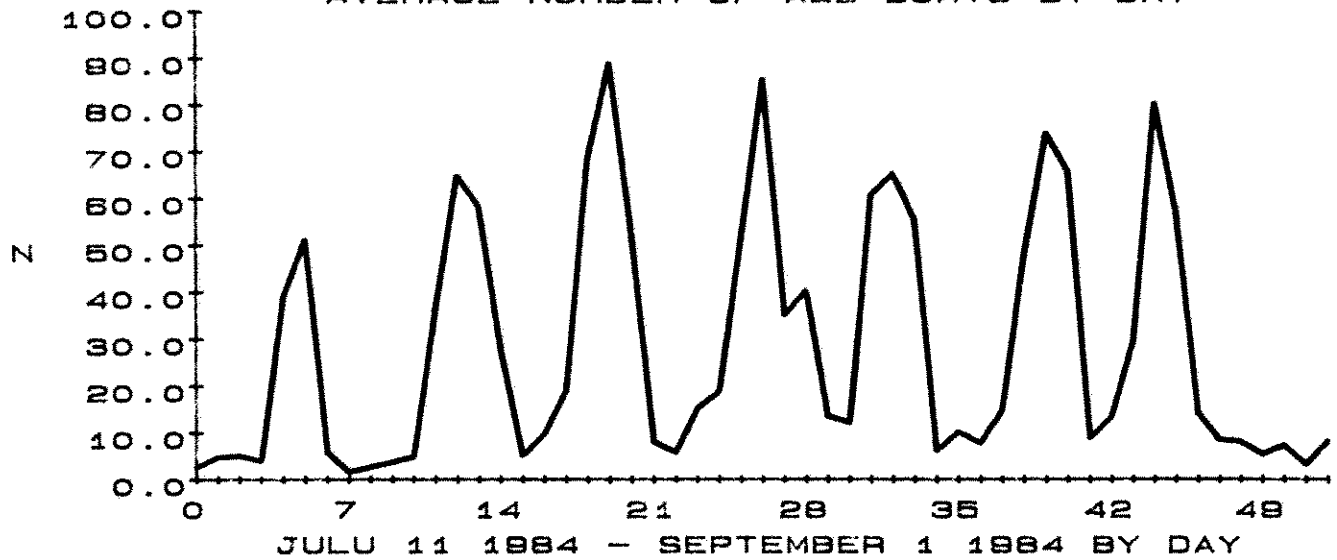
At this time, very little on the effects of boats on the orcas can be discussed. The higher splash rate when boats were present may indicate a possible behavioral response to the presence of boats. One would expect a higher respiratory rate along with the increased splash rate but this was not observed. This may be due to faulty observational techniques from researchers who were relatively inexperienced in observing orca respiratory rates or to errors in the data analysis. As soon as the analysis of the behavioral is complete, more will be able to be said about the effects of the boat traffic on the orcas.

The analysis of the boat data proved that the Johnstone Strait area had boat traffic fairly constantly throughout the study period. Days of commercial fishing proved to be the times of highest numbers of boats. It appeared that the recreational boats were most common during days of nice weather, as would be expected, and that some were avoiding the strait during days of heavy commercial fishing, especially

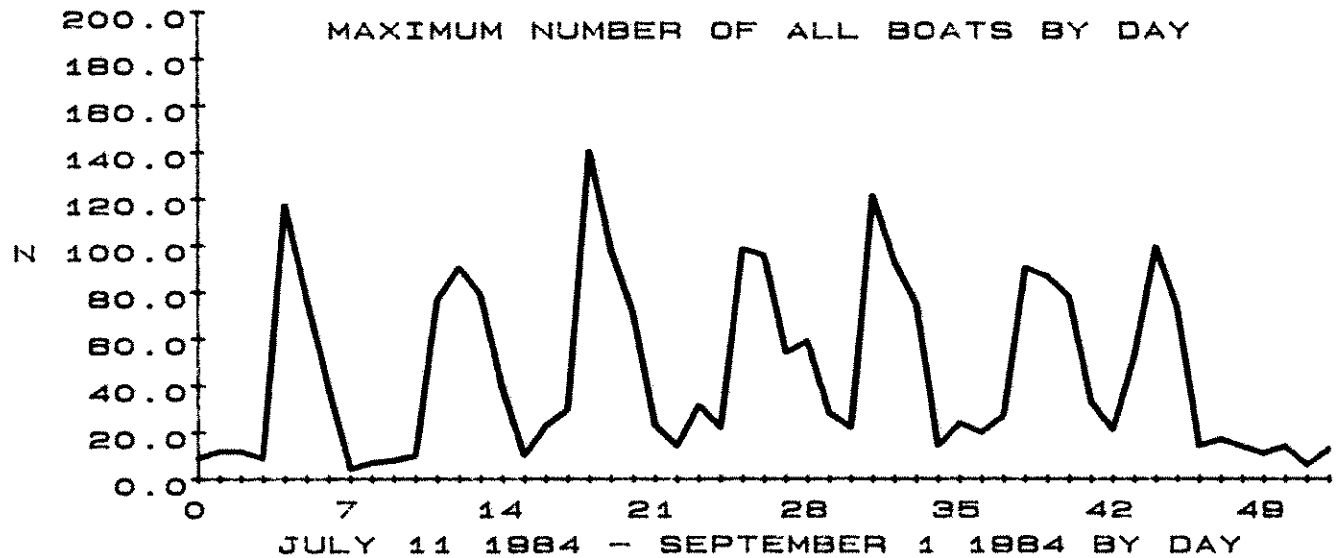




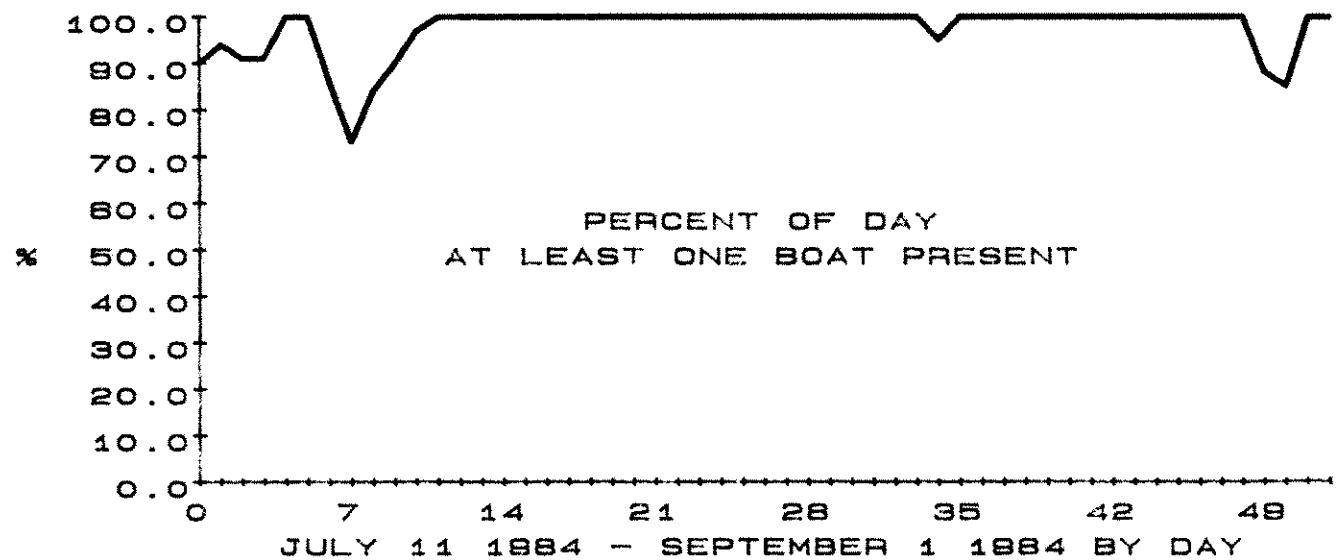
AVERAGE NUMBER OF ALL BOATS BY DAY

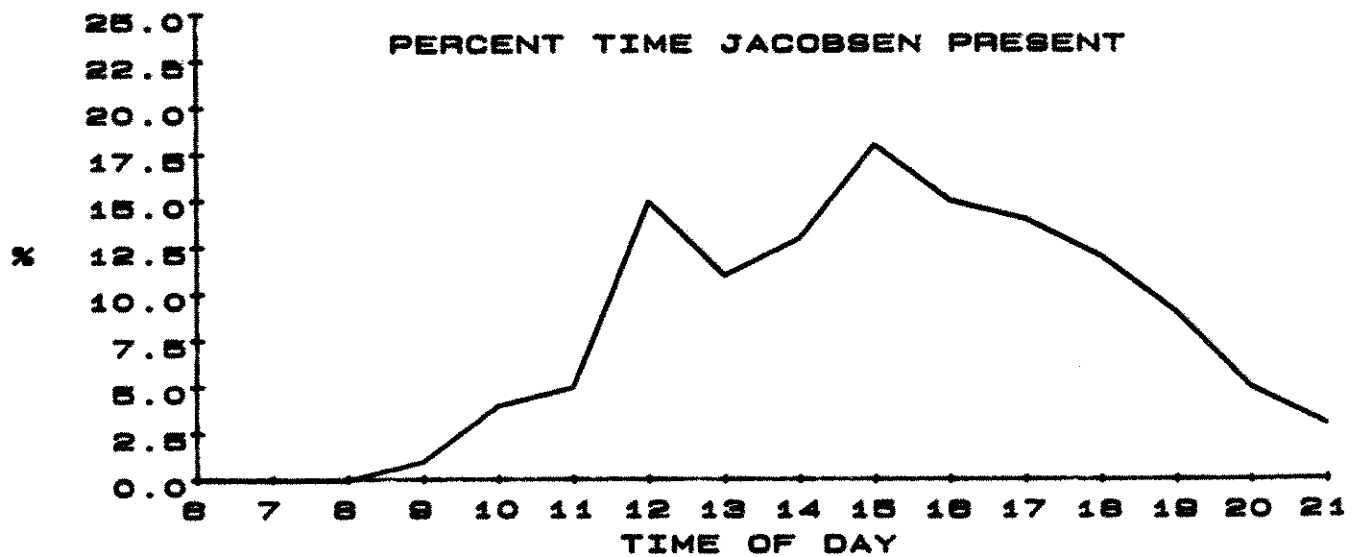
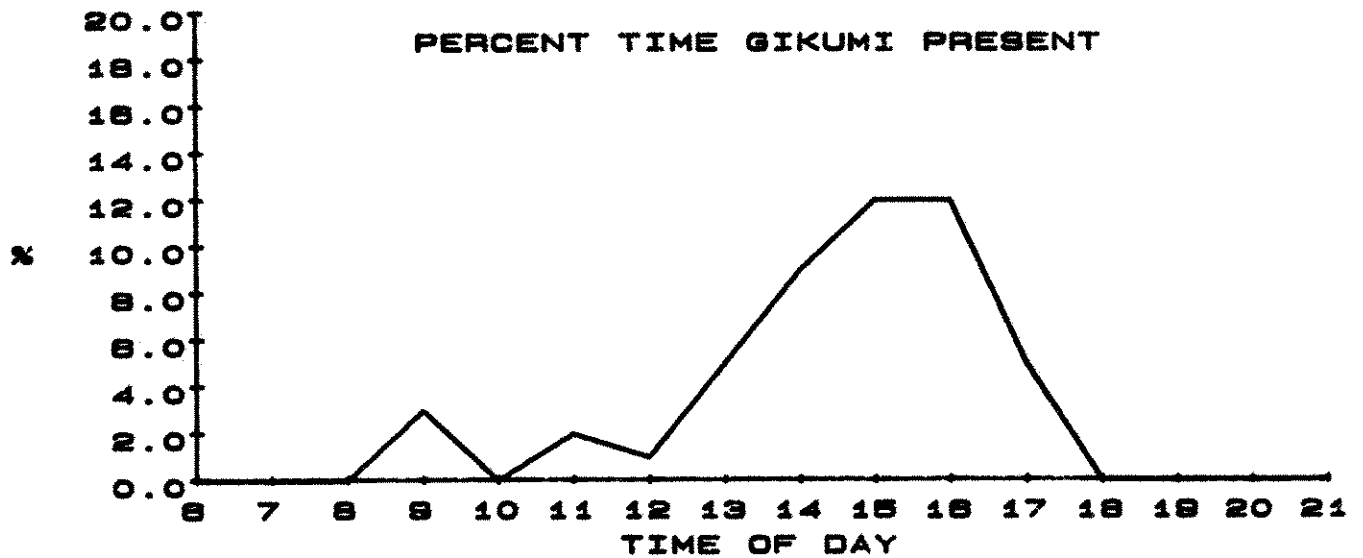
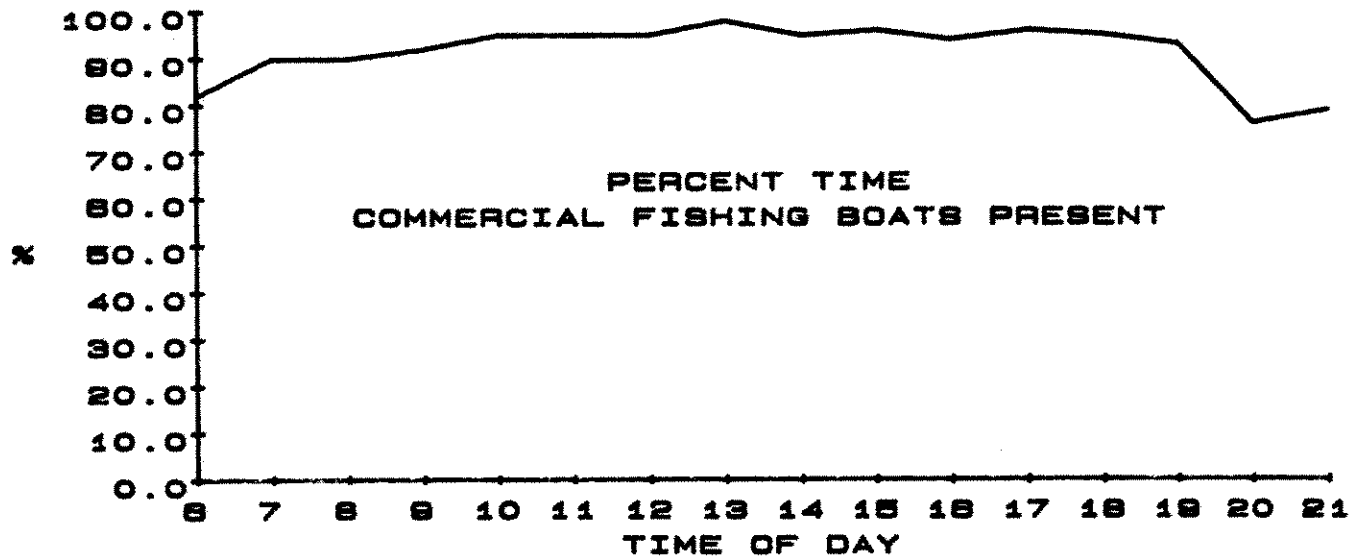


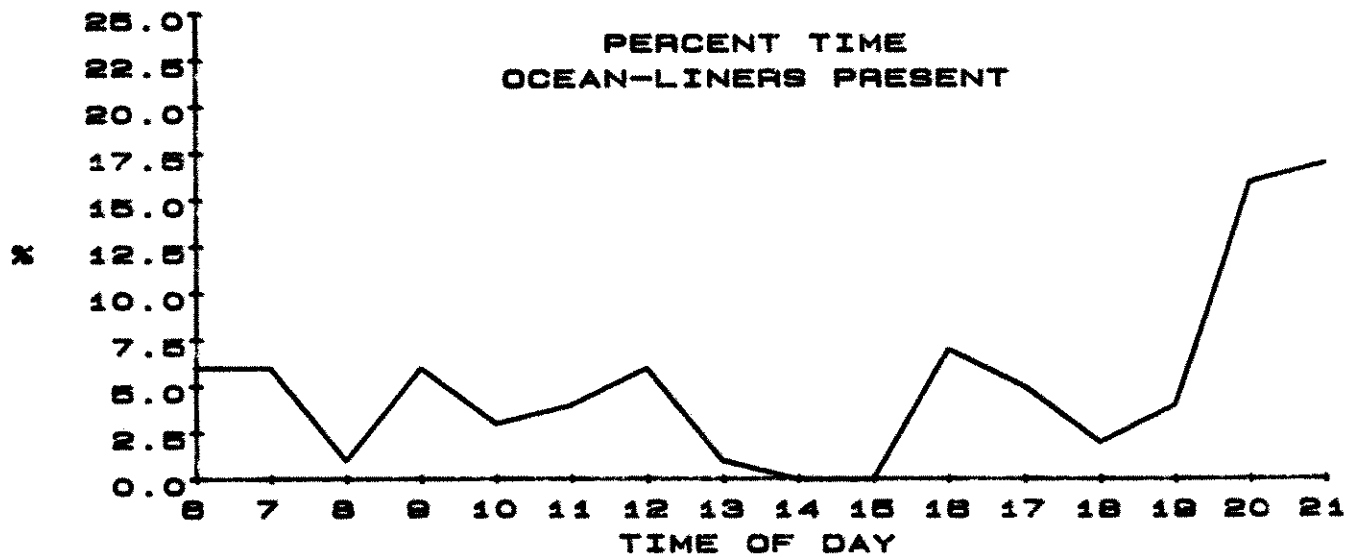
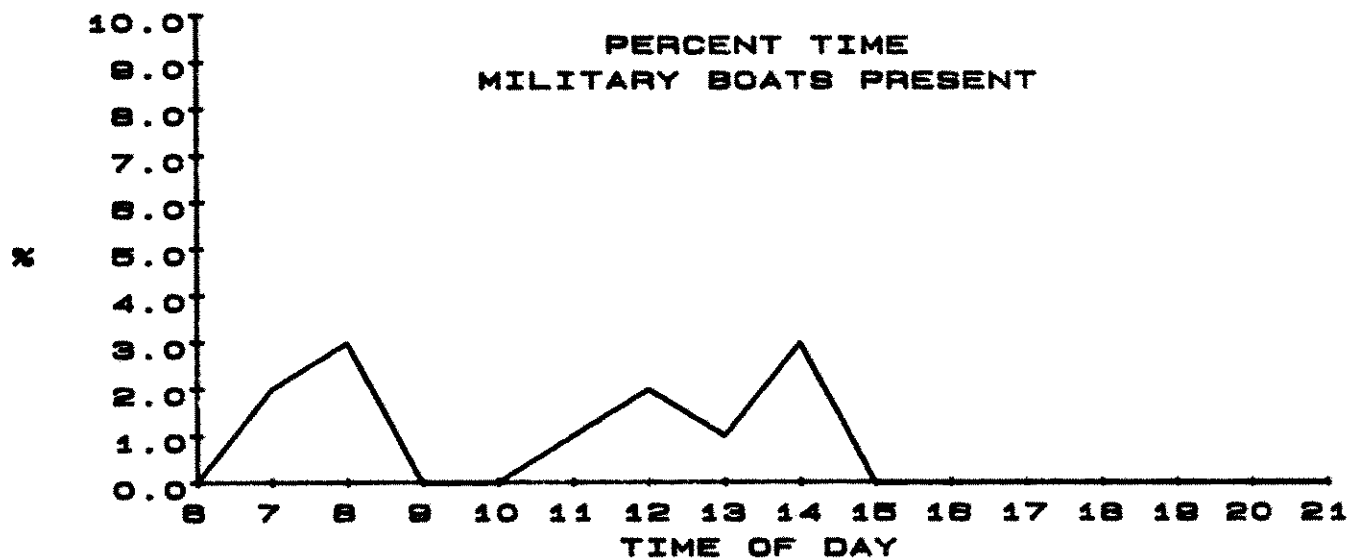
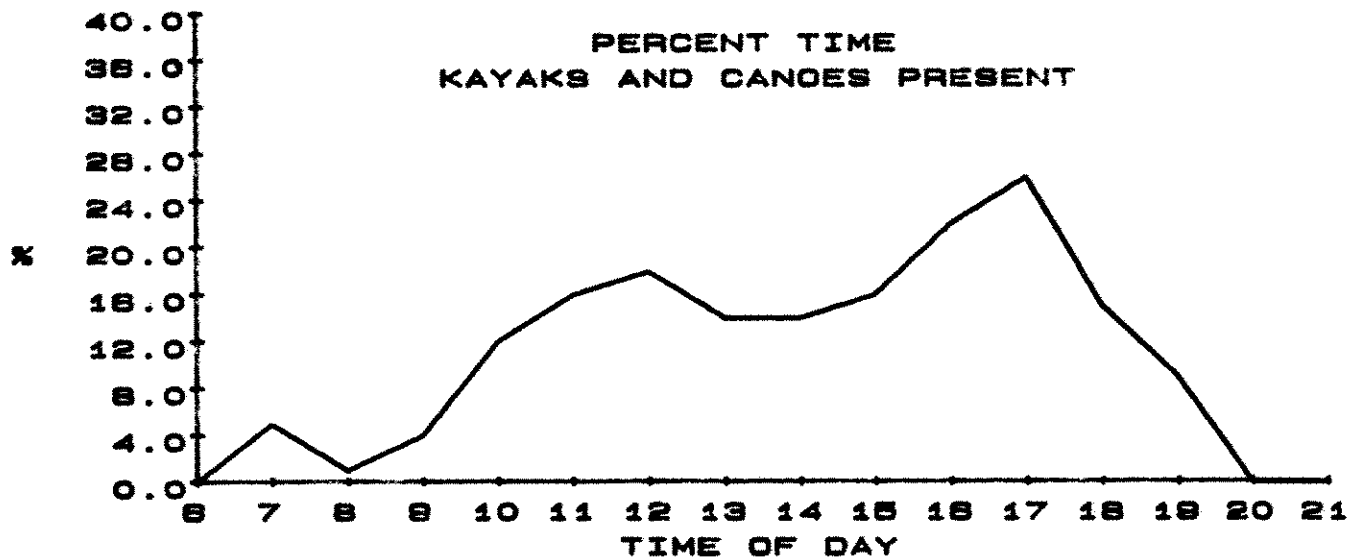
MAXIMUM NUMBER OF ALL BOATS BY DAY



PERCENT OF DAY
AT LEAST ONE BOAT PRESENT







-27-

