

A SURVEY OF NESTING HERRING GULLS ALONG THE  
NORTH SHORE OF LAKE SUPERIOR FROM KNIFE RIVER  
TO THE PIGEON RIVER, DURING THE PERIOD 1977-1984

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## SUMMARY

What initially was an effort to document the number of nesting Herring Gulls on BLM administered islands along the North Shore of Lake Superior, quickly became an inventory of all breeding colonies.

Following full counts of nests during 1978 and 1979, the North Shore between Duluth and the Pigeon River, was divided into eleven nesting groups and a base population of breeding pairs established for each group.

Fifteen islands were selected, within eight of the groups, to be monitored over the next four years. (1980-1983) Full counts were conducted (on the original 87 sites) during the 1984 nesting season. The 1984 counts would provide the data to verify the accuracy of the monitoring system.

The estimated North Shore breeding population for 1984 was 7,748 nesting pairs of Herring Gulls. This number was arrived at by expanding the nest count on the 15 monitor sites and is within 1% of the actual number of nesting pairs which was 7,738.

Six of the 11 groups were within 2%; three groups were between 6 and 10%; and two groups varied between -27% and +15%. One island within the Suzie group has never been counted and the estimated number of breeding pairs increased from 500 in 1979, to 900 this year. If in error, this estimate could cause a greater difference between the estimated and actual breeding population for the North Shore.

The analysis of the year to year changes taking place on individual nesting sites becomes difficult when these changes are expressed in numbers. To permit a comparison of the changes occurring within both large and small colonies, percentages have been substituted for the actual nest numbers.

During the survey period, nest numbers fluctuated on most sites, with very few sites showing a sustained increase or decrease over more than a two year period. An increase or decrease is generally followed by a reversal to what occurred the previous year, and the magnitude of this change appears to be in proportion to the previous years change. The number of nesting pairs of Herring Gulls on the North Shore of Lake Superior has increased by 25% over the period 1973-1984.

The western colonies have been more successful over the survey period, than those to the east and have increased the number of nesting pairs by 41%. Eastern colonies have experienced a 13% increase. Within the eastern groups, four of six have experienced declines in the number of breeding pairs, while within western groups, all five have experienced increases.

Nesting conditions during the survey period are thought to be near normal, except for the 1980 season. A severe storm on June 1st of that year caused near catastrophic losses of chicks from the Taconite Harbor group west. The vast reduction in the 1980 chicks offered an opportunity to analyze the distribution patterns of returning three year old birds during the 1983 nesting season. From this analysis, it appears that the three year olds (first year breeders) are filtering east along the North Shore, utilizing the first available nesting site they encounter. These birds show little, if any, attraction for the site they were fledged from.

In an effort to explain these year to year increases and decreases of nesting birds on a given site, population models were constructed. I feel these changes are a response to changing require-

ments for territorial space by breeding Herring Gulls of different ages. Over the breeding life of a Herring Gull (10-15 years), a change takes place in its demand for territorial space. First year breeders are satisfied with much less space than birds who have nested previously. As older birds are lost from the breeding population, they are replaced by younger birds with a reduced requirement for space, and the colony increases in population.

Once a bird has been a successful nester it returns to that site for the remainder of its breeding life. I feel second year breeders require more space and are responsible for drastic decreases in nest numbers in years following large increases.

Hatching on the North Shore occurs earliest within western colonies and progresses eastward. Average peak hatching dates take place on Knife Island about May 27th and occur on the Suzie Islands about June 2nd.

The average number of eggs in each nest was between 1.7 on island #37, and 2.7 on Knife Island during the 1984 season. This average was highest at Knife Island and showed a gradual decline as you went east along the North Shore, through the Grand Marais group. The three most eastern groups made some what of a recovery, but fell short of the western group average.

Although numbers of eggs per nest were not recorded prior to the 1984 season, notes on the field forms suggest the 1984 averages may be low. Past years averages appear to be close to 3.0 eggs per nest, and possibly higher, as many nests contained three and four eggs.

Crows account for the majority of the predation occurring within

North Shore colonies, as they rob unguarded nests of eggs. Other predators are fox, coyote, bear, and avian predators thought to be owls. Predators do not appear to be a serious threat to Herring Gull population.

The monitoring procedure appears to yield data which permits a very close approximation of the total North Shore breeding population of Herring Gulls. A continuation of the present monitoring system, or some modification, is mandatory if long term changes in the breeding population are to be detected.

Some sequence of full counts seems advisable to insure the validity of the monitoring data. The longer the time frame between full counts, the higher the risk of obtaining meaningless data.

However the future system is designed, I feel the following items should be included:

- A count of site #11 in the Suzie group. This must be accomplished at least once, and if a way is found to count this site with an acceptable level of effort, site #11 could become a valuable monitor site.
- Add site #68 to the Silver Bay group as a monitor site.
- Continue to record the number of eggs in each nest and the number of nests hatching in each class.
- An evaluation and inventory of North Shore dump sites. This should include changes in location, method of treatment, and volume of material available to gulls.
- A location of active commercial fisheries along the North Shore, and a determination of the volume of waste, place of disposal, method, and the period of disposal.

-- During the survey, 88 sites were examined at least three times during the period 1977-1984. A few of these sites have never been occupied by nesting Herring Gulls. Others have provided habitat for one or two pairs, but were void of nesting gulls on several occasions. Future surveys should be confined to 48 sites which have contained breeding Herring Gulls throughout the survey period.

## INTRODUCTION

The effort to establish the number of herring gulls nesting in the vicinity of the North Shore of Lake Superior was begun in the spring of 1977. The objective was to determine the number of birds using Bureau of Land Management administered islands as nest sites, and to identify the major colonies of this species on BLM lands.

The procedure was simply to walk each island and record the number of occupied nests and to gather physical data on each island. The physical data would be used to identify those characteristics most sought after by nesting herring gulls.

Following a mid May start, inclement weather forced a delay in the survey and when resumed, at a later date, hatching was at its peak. Continued cold, damp, and windy weather prevented the crew from disturbing the nesting birds and a number of sites were estimates, rather than an actual count of nests. Surveys the following year would indicate these estimates were in error and the procedure of estimating nest numbers to be very inaccurate. During the first years survey, it was found that only a small portion of the herring gull nesting was taking place on BLM islands, and that other islands were providing the major portion of the nesting habitat.

The procedure and scope of the survey were changed during the winter, and during the nesting season of 1978 all occupied nests on all sites were counted and the population of nesting herring gulls along the North Shore was established. This procedure was continued in the 1979 nesting season and at that time fifteen sites were chosen to be monitored for the next four years. (1980-1984) It was hoped the monitoring procedure would provide an accurate



account of what was taking place within all nesting colonies along the North Shore. To validate the accuracy of the monitoring system, a complete survey of all North Shore sites would be conducted during the 1984 breeding season. During the monitoring visits additional information was gathered which might be useful at some later date.

#### THE MONITORING PERIOD

The following reports summarize each years survey between 1980 and 1984.

##### 1980 Survey

##### SUZIE ISLAND GROUP - Date visited: 6-4-1980

- Hatching & acour<sup>f</sup>ing in a large number of nests.
- A number of nests with one & two eggs on #16.
- No dead chicks on #12 & #13; some on #16.
- All three islands showed an increase in number of nests.
- This island group shows little effect from the June 1st storm.

The storm may not have been as severe here as it was on the western end of the lake.

##### BLUEBERRY ISLAND GROUP - Date visited: 6-3-1980

- 50% of the nests on island #24 have hatched.
- Chicks were small.
- No dead chicks were found.
- #23 showed a small increase in nest<sup>s</sup>, while #24 showed a small decrease. (five nests in each instance)
- June 1st storm had little effect.

##### MARR ISLAND GROUP - Date visited: 6-2-1980

- 50% of the eggs were hatched and the chicks were small.
- Very few dead chicks were found, and that number is normal.
- A decrease of 30 nests.
- The June 1st storm had little effect on this group.

GRAND MARAIS ISLAND GROUP - Date visited: 6-2-1980

- Hatching taking place on both #36 & #37, and the chicks are very young. Taking place in only 8% of the nests on #37.
- No dead chicks were found on #37, while #36 had three or four. (not a significant number).
- 90% of the nests on #37 had only one & two eggs.
- Island #36 increased by nine nests, while #37 showed a decrease of 13 nests.

TACONITE HARBOR GROUP - Date visited: 6-3-1980

- Only a few nests contained unhatched eggs.
- Nest unhatched had two eggs.
- Several unhatched eggs contained fully developed embryos which were dead.
- #48 had a decrease of 59 nests from last year. (15%)
- The high number of dead chicks and the unhatched eggs with dead embryos suggests the June 1st storm had a detrimental effect.

SILVER BAY GROUP - Date visited: 6-5-1980

- A large number of dead chicks.
- Island #70 had a large number of nests with unhatched eggs.
- Island #64 decreased while #70 increased. Both changes were 7.5%.
- The storm of June 1st had a detrimental effect.

SPLIT ROCK GROUP - Date visited: 6-5-1980

- A very large number of dead chicks.
- The "renesting" noted may be two egg nests, which would be high.
- Island #77b hardest hit.
- Both islands showed a decrease in nest numbers.
- June 1st storm could have removed nest by complete wave roll over.

KNIFE RIVER GROUP - Date visited: 6-2-1980

- No dead chicks.
- 100% hatched on the above date.
- Chicks were very large and a few were showing large feathers on wings, indicating they hatched some time ago.
- June 1st storm had little effect.

GENERAL COMMENTS

The June 1st storm that hit the North Shore appears to have been confined to those islands south and west of island #37 in the Grand Marais group. All islands to the southwest had large numbers of dead chicks, with the exception of Knife Island.

I believe these deaths occurred as a result of the cold, hard driving rain, which accompanied the storm and the high waves must have over rolled some nest sites, such as #37, #77a, and #77b. Early hatching on Knife Island produced chicks that were highly mobile and could find cover in the abundant vegetative growth of the island.

Several reports contain comments regarding renesting attempts. This is in reference to those nests with two eggs which I felt at the time of survey were nests where egg laying had not yet been completed. I now feel these are two egg nests and not attempts to renest, nor new birds who have moved into the colony. This is based on the date of the visit which was only a few days to four days following the storm. Birds who were well into incubation on June 1st could not have made that quick of a transition and now be laying eggs. The storm may have a drastic effect on the number of three year olds returning in the 1983 nesting season.

OTHER WILDLIFE SEEN

- Island #13: Two Ruddy Turnstone and two Dunlin.
- Island #16: One Black Duck nest located with nine eggs. Three Red Breasted Mergansers near island.
- Island #37: Three Ruddy Turnstone on island.
- Island #80: Nine Cormorants seen flying by the island. Two Spotted Sandpipers on island.

1981 Survey

SUZIE ISLAND GROUP - Date visited: 5-27-1981

- All but a few nests contained three eggs and 23% had hatched on May 27th.
- Island #13 is composed of five separate islands. The most easterly of the group has always had the majority of the nesting birds. The hatched eggs within this group this year were all on this easterly island.
- Nest numbers about the same as last year - within 3%.

BLUEBERRY ISLAND GROUP - Date visited: 5-27-1981

- 20% of the nests showed signs of hatching on May 27th. Most hatching on island #25 was taking place on the seaward (SE) of the island.
- Nest numbers on island #23 were up slightly over last year and because #25 was not counted, no comparison can be made.

MARR ISLAND GROUP - Date visited: 5-28-1981

- The nests on Marr Island were very short of material. Many were not much more than a ring of grass with eggs on bare rock.
- Most nests contained one or two eggs rather than the usual three and four eggs.
- Less than 20% were hatching on May 28th.
- Several shorebirds were seen within this group of islands. Sanderlings, Dunlin and 52 ~~Wimberalls~~ <sup>Wimberalls</sup>.
- Nest numbers were down by 25% from last years count. This is the second consecutive year of decline.

GRAND MARAIS ISLAND GROUP - Date visited: 5-26-1981

- Island #36 was 15% hatched on May 26th with all hatching taking

place on the highest elevations - most nests had three large eggs.

- Island #37 is composed of five separate rock outcrops. Nesting occurs on the two highest outcrops centrally located within this group. On May 26th this year, no nests were hatching and these two islands showed a marked difference in the number of eggs in the nests. On the highest outcrop which normally has 75% of the nests, most nests contained three very large eggs. Nests on the other island contained fewer eggs with most having only one egg.
- Nest numbers were down 12% on the two islands, however, #36 showed a 21% decline while #37 showed an 11% increase.

TACONITE HARBOR GROUP - Date visited: 5-28-1981

- Within this group 50% of the eggs had hatched on May 28th.
- On island #48, 90% of the hatching was occurring on the seaward side of the island, while the majority of the nests on the landward side were still being incubated.
- On island #49, there was a wide range of hatching percentage between the three distinct habitats. On the high central ridge, only 40% had hatched, on the seaward rock rubble only 45% had hatched, and on the low grass flat towards the mainland, 70% were hatching.
- A number of dead chicks were found on island #49, with eyes and head pecked. Notes did not specify which area they occurred in.
- Several Dunlin were seen.
- Island #48 showed an 18% increase over last year.

SILVER BAY ISLAND - Date visited: 5-29-1981

- Island #64 showed signs of hatching in 50% of the nests, while on

island #70, only 25% of the nests were hatching.

-- Very few dead chicks - five chicks on #64 and a few on #70.

-- Nest numbers were up 3% over last years count.

SPLIT ROCK GROUP - Date visited: 5-29-1981

-- Hatching within this group was taking place in 80% of the nests and the chicks were very active.

-- No dead chicks were found.

-- This group showed a 22% increase in nest numbers over last years count, and was within one nest of the 1979 count preceeding the 1980 June 1st storm which drastically reduced numbers.

KNIFE ISLAND GROUP - Date visited: 5-28-1981

-- On May 28th, 80% of the nests were hatching and the chicks showed a very wide range of ages.

-- Five dead adults were found and very few dead chicks.

GENERAL COMMENTS

## 1982 Survey

### SUZIE ISLAND GROUP - Date visited: 5-26-1982

- Most nests with three eggs, a few had two eggs.
- There was no hatching taking place.
- Two nests on island #16 had been destroyed by a predator. The eggs were broken and eaten. (Could have been a crow).
- Nests were in fair to good condition.

### BLUEBERRY ISLAND GROUP - Date visited: 5-25-1982

- Most nests had three eggs, while the remainder had one or two eggs.
- On island #25 there were an abundance of one and two egg nests on the east end of the island.
- Less than 2% of the nests showed signs of hatching.

### MARR ISLAND GROUP - Date visited: 5-25-1982

- Most nests had two or three eggs.
- Nest were in good condition.
- There was no hatching occurring.

### GRAND MARAIS GROUP - Date visited: 5-26-1982

- Island # 36 had two or three eggs per nest, while #37 had mostly three egg nests.
- No hatching taking place.
- On island #37 there were a number of empty nests.

### TACONITE HARBOR GROUP - Date visited: 5-24-1982

- On island #48 most of the nests contained two eggs, and there were quite a few one egg nests.
- No hatching on island #48.
- On island #49 most nests on the high central ridge contained three eggs, as did the rock rubble area toward seaward. The central portion of the large flat on the land side contained nests with primarily two eggs and nests were spaced wider than seemed normal.



- Some hatching occurring in two egg nests on the high central ridge.
- No hatching occurring elsewhere.
- A number of dead adults found. Five each in the areas to either side of the central ridge, while only one was found on the ridge.

SILVER BAY GROUP - Date visited: 5-27-1982

- On May 27th island #70 had 5-10% of the nests hatching.
- Most of the nests contained three eggs; however, several had only one egg.
- On June 18th island #64 was 100% hatched and there appeared to be two or three chicks present in the nest.

SPLIT ROCK GROUP - Date visited: 5-20-1982

- Most nests contained three eggs, while a few were empty.
- There was no hatching occurring.

KNIFE ISLAND GROUP - Date visited: 6-18-1982

- The side of the island facing land had already hatched and a few chicks were very old, showing wing feathers. On the seaward side of the island hatching was just starting to occur.
- Most nests contained three eggs on the seaward side.

GENERAL COMMENTS

- Nests throughout the North Shore seemed to have fewer eggs than in past years.
- A large number of these eggs appeared to be smaller than in the past.
- Hatching on eastern island groups seemed much later than during 1981.
- Hatching on westerly islands seemed about the same as in 1981.

OTHER WILDLIFE SEEN

- Island #13: Four Black Bellied Plovers, and four Semipalmated Plovers.
- Island #23: Canadian goose, no nest found.
- Island #25 & #16: Each had a Mallard nest containing seven to ten eggs.

-- Island #31: A Spotted Sandpiper was seen.

-- Island #37: 19 Dunlin and one Semipalmated Sandpaper and one Short-Billed Dowitcher were seen.

### 1983 Survey

#### SUZIE ISLAND GROUP - Date visited: 5-24-83

- 50-70% of the nests had three eggs, the remainder had two eggs.
- No hatching taking place on May 24th.
- Nest numbers were about normal; down slightly but within 3% of last years count.
- The three small gulls seen on island #12 were either Bonaparte's gulls or Little gulls. All light in color with a conspicuous dark spot behind eye, dark bill.
- The falcon seen appeared to be a peregrine<sup>e</sup> from the size;  $1\frac{1}{2}$  the size of a Kestrel, with a very large head; could have been a Merlin. The bird was attempting to take swallows.

#### BLUEBERRY ISLAND GROUP - Date visited: 5-26-1983

- Island #25 - most nests had two eggs in them and the remainder had three eggs. There were no four egg nests, while #23 had three eggs in most nests and had one four egg nest, the only four egg nest found this year.
- No hatching occurring on May 26th.
- The number of nests were normal on the smaller island - 48 nests, however, nest~~s~~ numbers on the larger island were down from 270 to 174. There were many nests without eggs which were not counted. At this late date, it is doubtful they will have eggs.

#### MARR ISLAND GROUP - Date visited: 5-26-1983

- Nest numbers were the same as last year, however, the number of eggs in nests were lower. 50% had three eggs and 50% had two eggs. One nest was hatching.
- A group of 100+ Dunlin were on the large island in this group. This is the largest number seen during the years the survey has been conducted.

GRAND MARAIS ISLAND GROUP - Date visited: 5-26-1983

- This group was up approximately 15% over last years, number of nests and more nests had three eggs than had two eggs. Egg numbers are lower than normal.
- The eggs on #36, Five Mile Rock, appeared larger than those on other islands. No hatching was taking place.
- Guana Rock, #37, had between 300 & 400 Wimbaralls on it. This is by far the largest flock seen on the survey over the years.
- Island #36, Five Mile Rock, had 15-20 Wimberalls.

TACONITE HARBOR ISLAND GROUP - Date visited: 5-23-1983 & 5-27-1983

- On the first visit, May 23rd, two nests were hatching on the high central ridge. A number of two egg nests were seen as well as a large number of empty nests. The low count, (807) prompted a second visit on the 27th of May. On the second visit, 32 nests were hatching, over half of which were on the high central ridge. On the second visit, hatching was taking place in some nests with one and two eggs, indicating that one or two eggs were all to be laid. The total count of nests with eggs was 818, down nearly 200 from last year.
- Counts on the smaller island were also down, 344 this year as compared to 387 last year; again, there were a number of empty nests.
- Nests on island #48 were hatching even though they contained only one or two eggs indicating no further laying to be done.

SILVER BAY ISLAND GROUP - Date visited: 6-1-1983

- Island #70 had about the same number of active nests as last year and about 50% were hatching on June 1st. In addition, there were 11 empty nests which were not counted.

- The average number of eggs in active nests was 2.35 per nest. This appears lower than normal.
- Island #64 also had about the same number of active nests as the year before, and 20% showed signs of hatching. 20% showed signs of hatching June 1st and the average number of eggs per active nest was again lower than normal - 2.47 eggs per nest. The eggs appeared small.

SPLIT ROCK ISLAND GROUP - Date visited: 6-1-1983

- Nest numbers in this group were up slightly over past years, however, the average number of eggs per active nest was 2.24 per nest, considerably lower than normal.
- 32% of the active nests were hatching on June 1st, and a small number of nests were empty - five nests.

KNIFE ISLAND GROUP - Date visited: 6-1-1983

- Again the most advanced nesting was in the center of the island and along the landward side. Most of the nests with eggs were located on the seaward side and at lower elevations.
- The presence of several adults which had been decapitated has not been seen before. Most had not been eaten. One was being consumed presumably by gulls.
- Most nests had hatched, (80% est.) and there appeared to be about normal numbers of chicks at each nest site. (three chicks). More than 50 dead chicks were seen which is not abnormal and several were fresh kills from pecking of the eyes and head, presumably by other adult gulls.
- Egg<sup>s</sup> and chick<sup>s</sup> appeared normal size.

### GENERAL COMMENTS

- From the low number of eggs in active nests and the high number of empty nests late in May, it appears the hatch will be low this year.
- This may or may not have an effect on the number of chicks fledged as the mortality between hatching and fledging is normally very high.
- The total number of active nests on the survey was down - 4.15%, 127 nests, however, this may have been the result of the large number of inactive new nests found.
- The presence of large numbers of empty nests late in May, when incubation was almost at an end, suggests that birds made an attempt to nest but for some reason, did not lay eggs.
- This reason, I believe, was poor physical condition of the adult birds. This poor condition may have been caused by poor food conditions on the wintering area or may have been a direct result of the extremely poor smelt run this spring.
- The low number of eggs that were laid at most sites would also suggest the birds were in poor physical condition.
- Knife Island appeared to be normal and this may be explained by its nearness to the Duluth dump which provides a rather stable food supply. The nest sites at Split Rock appeared the hardest hit and these birds could be highly dependent upon smelt as there is no dump site of size within the immediate area.
- The cities of Silver Bay, Taconite Harbor and Grand Marais, have experienced extremely poor economic conditions and it is likely that material available to gulls, as food, would be down.
- Grand Portage is always depressed economically and the food supply available to gulls stable.

-- While on island #64 in the Silver Bay group, two areas were observed where the ground was covered with gull feathers. A limited amount of feathers is normal as birds fight to establish nesting territories. They appeared to be kill sites, however, no dead birds were found on the island. The nests nearby had neither chicks nor eggs. This island is within 200 yards of shore in an area with rather high cliffs. There could well be an avian predator taking gulls.

Complete Survey of 1984

SUZIE ISLAND GROUP- Date visited: 5-27-1984 & 5-28-1984

- 26% of the nests were hatching by May 28th.
- Only one dead chick was found.
- One dead adult on #16 had been killed by a predator. Both wings removed and large amounts of feathers. Some feathers had skin attached. I suspect an owl.
- Frogs were heard on two islands<sup>s</sup> (#6 & #16)

BLUEBERRY ISLAND GROUP -Date visited: 5-29-1984

- 27% of the nests were hatching.
- Eight dead chicks found. Seven of them on #26.
- On island #25 two nests had been destroyed by predators and on #26 one was found.

MARR ISLAND GROUP - Date visited: 5-29-1984

- 28% of the nests were hatching.
- One dead adult was found. No dead chicks.

GRAND MARAIS ISLAND GROUP - Date visited: 5-27-1984 & 5-30-1984

- On the first trip, islands #37-40 were visited and no hatching was taking place.
- Island #36 was visited on May 30th and hatching was taking place in 15% of the nests.
- Islands #36 and #37 had a high percentage of one egg nests. (22%)

LUTSEN ISLAND GROUP - Date visited: 5-30-1984

- 11% of the nests were hatching. 23% taking place on island #43.
  - On the visit to island #42 during the 1978 season, one gull was very aggressive and reluctant to leave her nest. On this year's visit there was a nest in the same location and the gull occupying that nest, again was reluctant to leave and very aggressive.
- This has to be the same bird and she has apparently selected the exact nest site and location for at least seven consecutive years.



-- One dead chick and one dead adult were found.

TACONITE HARBOR GROUP - Date visited: 5-23-1984 & 5-31-1984

-- Island #49 was visited first on May 23rd and 4% of the nests were hatching. In area "A", the large grass flat on the land side, less than 2% of the nests were hatching. On the second visit on May 31st, it was very evident that many more nests were now hatching. Island #48 had 25% of the nests hatching on May 31st.

-- A number of dead adults were found. (Nine birds) Six of these were in area "A" and only the wings were near empty nests with an abundance of feathers around them. The presence of gull wings is not uncommon, however, the presence of pairs of wings (one left and one right) is.

-- Three nests were found on island #49 which were very light blue in color.

-- A weathered hawk skull and breast bone were found in area "A". They had been there at least since last fall.

-- Several nests with very small eggs ( $1\frac{1}{2}$  x  $1\frac{1}{8}$ ").

LUTSEN ISLAND GROUP - Date visited: 6-3-1984

-- Hatching taking place in 47% of the nests.

-- Two dead chicks on site #55a; a shoreline site.

SILVER BAY ISLAND GROUP - Date visited: 5-18-1984 & 5-26-1984

-- This group was visited over a period of nine days, as poor weather made landing impossible; or wind and rain would not allow us to disturb the colony. This unusually long period allowed us to observe the progression of hatching.

-- On the 19th of May, one egg was hatching on island #71. On the 23rd 4% (14 nests) were hatching on islands #64 & #65. On the 26th

15% of the nests on island #66 were hatching.

- The boulder breakwater from island #70 is being used by 49 birds as a nesting area. There have always been a few birds nesting in this area (less than ten nests), however, they have never been included in the count. Access is difficult from the island and a very long walk over the rough breakwater when approached from land. These nests were not included in this years count, but perhaps should be.
- Island #68 showed abundant sign of pred<sup>o</sup>ator activity. Twenty-three dead birds were found on the tailing flat to seaward and along the upper portions of the rocky seaward side near the road. None of these birds were eaten, but several had been opened and unlayed eggs removed.

SPLIT ROCK ISLAND GROUP - Date visited: 5-17-1984

- No hatching taking place at this early date.
- Site #79a was formerly found in section #1 & #12, and is a shore-line site. It is now totally in section #1.

KNIFE RIVER ISLAND GROUP - Date visited: 5-15-1984

- No hatching taking place.
- Most two egg nests were found on the west end of the island.
- Four dead adults were found. (not abnormal)

GENERAL COMMENTS AND OTHER WILDLIFE

- Island #11 in the Suzie group presents a problem. This site has never been completely counted by walking the entire island. This site represents a major percentage of this group (60%), and a sizeable percentage of the North Shore nesting population (12%). An attempt should be made to count this island, even though it will be time consuming. I feel the estimate of 500 nests for this island in 1979 was accurate and the colony has increased to 900.

- Island #16 - Black Duck nesting near small landlocked pond and a beaver has been active recently, cutting small birch for food. A predator has killed an adult and is believed to be an owl.
- Island #25 - Red Breasted Merganser nesting.
- Island #31 - Three Ruddy Turnstone and five Dunlin were seen on this island May 29th.
- While on island #31 several immature gulls were seen. It is not known if they <sup>were</sup> attempting to nest. Several gulls were also seen carrying nesting material and tried unsuccessfully to construct a nest while most gulls were off the island awaiting our departure. As we left island, a nesting gull drove the new comer away.
- As we returned from island #36 and entered the breakwater, two Whimbrel were seen on the west breakwater on May 30th.
- Island #37 - The nests were in very poor condition and the nest and egg counts were very low. The high waves encountered at Silver Bay on May 25th could have destroyed nests on this site, as it is very low. The one nest in good condition was found on the highest point of rock in the center of the island.
- Island #39 - Three Oldsquaw~~a~~ were seen in open water not far from this site.
- Island # 48 - We flushed a hen (Red Breasted Merganser) from interior of island, nest was not located.
- Island #65 - Sighted a Double Crested Cormorant off island in open water on May 23rd.
- Island #74 - While here, three Cormorants were seen in flight. The nearest was identified as either a Red-faced or a Pelagic. Because of its small size, <sup>saw</sup>key neck, and small head, it was decided to be a Pelagic Cormorant.

- Island #70 - There was a Mallard nesting on this site.
- Island #79a - Sighted a large stick nest located 100 yards west of the nesting area on a cliff approximately 50 feet above the water. There was whitewash on the ledge and a Raven feather was found in a gull nest.

Table I: Nesting Pairs of Herring Gulls on Monitor Sites 1977 - 1984

Group	Island Number	1977	1978	1979	1980	1981	1982	1983	1984
Susie Island	12	37	35	31	42	40	36	34	29
	13	13	21	18	27	26	23	23	26
	16	<u>61</u>	<u>54</u>	<u>60</u>	<u>88</u>	<u>96</u>	<u>90</u>	<u>85</u>	<u>103</u>
Group Totals		111	110	109	157	162	149	142	158
Blueberry	23	38	41	44	49	51	47	48	65
	25	<u>174</u>	<u>188</u>	<u>216</u>	<u>(241)</u>	<u>206</u>	<u>270</u>	<u>174</u>	<u>194</u>
Group Totals		212	229	260	(290)	257	317	222	259
Marr Island	31	264	278	295	264	199	225	225	223
Grand Marais	36	69	78	80	89	70	66	74	62
	37	<u>27</u>	<u>40</u>	<u>49</u>	<u>36</u>	<u>40</u>	<u>32</u>	<u>38</u>	<u>20</u>
Group Totals		96	118	129	125	110	98	112	82
Taconite	48	--	406	400	341	401	387	344	393
Harbor	49	--	<u>909</u>	<u>939</u>	<u>(801)</u>	<u>1046</u>	<u>1015</u>	<u>818</u>	<u>910</u>
Group Totals			1315	1339	(1142)	1447	1402	1162	1303
Silver Bay	64	--	40	43	40	40	37	42	49
	70	--	<u>119</u>	<u>121</u>	<u>130</u>	<u>135</u>	<u>153</u>	<u>147</u>	<u>185</u>
Group Totals			159	164	170	175	190	189	234
Split Rock	77a	--	75	85	67	87	91	100	103
	77b	--	<u>25</u>	<u>33</u>	<u>26</u>	<u>30</u>	<u>32</u>	<u>31</u>	<u>33</u>
Group Totals			100	118	96	117	123	131	136
Knife Island	80	--	569	584	542	699	554	748	759
Monitor Totals			2878	2998	(2786)	3166	3058	2931	3154
North Shore Population Actual and (Est.)			6186	6491	(6696)	(7291)	(7130)	(7003)	7738

Table II: 1- Formula To Estimate The Total Group Nesting From The Monitoring Data.

2- Formula To Determine The Accuracy Of The Monitoring Sites In

Estimating Total Group Nesting

The 1979 nesting season was the last year a complete survey was conducted and will be used as the base year. Formula 1: To obtain the group nesting estimate is:

$$\left( \frac{B - A}{A} + 1 \right) C = D$$

$$\% + 1 = \text{factor (A over B + 1)}$$

A = 1979 Monitor Count Within A Specific Group  
B = 1984 Monitor Count Within The Same Group

C = 1979 Total Count Within (That Group) = Same

D = 1984 Total Estimate Within (That Group) = Same

Formula 2: To determine the accuracy of the monitoring site in estimating total group nesting is:

$$\frac{E - \left[ \left( \frac{B - A}{A} + 1 \right) C \right]}{E} = P$$

A, B, C, D = Same as above

E = 1984 Total Count Within That Group

P = Percent (+) or (-) Difference Between The 1984 Estimate and The 1984 Actual Count.

EXAMPLE : SILVER BAY GROUP

A	B			C	D	E	P
1979	1984			1979	1984	1984	percent
monitor	monitor			group	group	group	(+) or (-)
count	count	difference	factor	count	estimate	count	difference
164	234	70	1.427	1360	1941	1899	(+) 2.2%

Using formula 1:  $\left( \frac{B - A}{A} + 1 \right) C = D$

$$\left( \frac{234 - 164}{164} + 1 \right) 1360 = 1941$$

Using formula 2:  $\frac{E - \left[ \left( \frac{B - A}{A} + 1 \right) C \right]}{E} = P$

$$\frac{1899 - \left[ \left( \frac{234 - 164}{164} + 1 \right) 1360 \right]}{1899} = (+).022$$

## THE MONITORING SYSTEM

Table II displays the procedure to estimate the total North Shore nesting by using the monitoring data. The 1984 data offers the first opportunity, since 1979, to compare this estimate with complete North Shore counts conducted during the same nesting season.

The overall estimate for North Shore nesting is unbelievably close. <sup>Table III.</sup> (Within 1%) However, several groups show sizeable differences. The cause of these differences, and the ability of the monitoring system to accurately portray the group nesting population, will be discussed in the following narrative.

SUZIE ISLAND GROUP - Although the estimate for this group correlates perfectly with the actual count, there is one item which gives me concern. This group contains one large island (#11), which has never been completely counted. The ruggedness and difficulty encountered in reaching the nesting areas, resulted in only a partial count during the 1978 survey and the remainder of the colony was estimated. The total number of nests were established at 500, and this number was used in the 1979 survey. During the 1984 survey, it was obvious that many more birds were present and by comparing this site with other large colonies, the number of nests was estimated at 900. This estimate could easily be in error by 200 nests. I feel if there is an error, it is likely to be an over estimate. Assuming such an error, the difference between the actual and estimated nest numbers for this group will produce an error of 15%. To validate the accuracy of the monitoring, this island should be counted at least once.

GRAND MARAIS ISLAND GROUP - One monitor site within this group, (#37) decreased nearly 60% from peak nest numbers during the 1979 nesting season, while the remaining members of this small group experienced an 18% decline during the same period. During the survey of the Silver Bay group on May 25th, 1984, waves of up to eight feet were encountered. Waves of this size could have easily removed nests from island #37 and may be the cause of the low count on the 27th. Normally, less than 10% of the nests on a site are without eggs; while on island #37, 26% of the nests were empty. This suggests birds may still be attempting to establish territories or attempting to rebuild nests removed during high wave action on the 25th of May.

LUTSEN ISLAND GROUP - No monitoring sites were assigned this group, and estimates of nest numbers are arrived at by using the Grand Marais Group data. The wave action described previously may be the reason for the great difference between actual, and estimated nest numbers for this group. Site #42 is a shore site and a number of the nests are found very near the waters edge. During the 1984 survey, 30% of the nests were empty and may indicate attempts to renest following removal of nests by high wave action on the 25th of May.

ILLEGEN CITY ISLAND GROUP - As in the case of the Lutsen group, no monitoring sites were assigned this group and estimates of nest numbers are arrived at by using the data obtained on the Silver Bay monitoring sites. The two groups are not at all similar. While the Silver Bay group is composed of a number of large colonies found on islands, the Illegem City group has a shore site, which accounts for 90% of the nests. The changes taking place within the island monitoring sites are just not the same as those taking place within



shoreline sites. The effect of this small group on the data for the North Shore is minimal.

SPLIT ROCK ISLAND GROUP - This group consists of seven sites, of which three are shoreline sites. Two islands serve as monitoring sites and the changes occurring on these islands may not represent what is taking place within the shoreline colonies. There also appears to be some shifting between colonies within this group. One shoreline colony has been all but abandoned, while a new shoreline colony has been established five miles away. It is difficult to say when these shifts took place, or what caused them, but some of the movement may be from these shoreline colonies to monitor sites and thus the difference between the estimate and the count.

ENCAMPMENT ISLAND GROUP - This is another group which was not assigned monitor sites and data obtained at Knife River is used to estimate nest numbers. When the two groups are treated as one, the difference between the estimate and the actual is 3%. It is well within the limits of a good sample.

Table III: Individual Group Changes During The Period 1977 - 1984 (east half)

<u>Suzie Island Group</u>	<u>SURVEY YEAR</u>								<u>est. 1984</u>
	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>	
Monitor Count	111	110	109	157	162	149	142	158	
Group Count or (Est)		1029	1045	(1505)	(1553)	(1428)	(1361)	1515	(1514)
<u>Blueberry Group</u>									
Monitor Count	212	229	260	*	257	317	222	259	
Group Count or (Est)		553	629	(702)	(622)	(767)	(537)	614	(627)
<u>Marr Island Group</u>									
Monitor Count	264	278	295	264	199	225	225	223	
Group Count or (Est)		329	343	(307)	(231)	(261)	(261)	259	(259)
<u>Grand Marais Group</u>									
Monitor Count	96	118	129	125	110	98	112	82	
Group Count or (Est)		160	188	(182)	(160)	(143)	(163)	133	(120)
<u>Lutson Group</u>									
Monitor Count	**	**	**	**	**	**	**	**	
Group Count or (Est)		60	65	(63)	(70)	(68)	(56)	56	(41)
<u>Taconite Harbor Group</u>									
Monitor Count	*	1315	1339	(1142)	1447	1402	1162	1303	
Group Count or (Est)		1318	1346	(1148)	(1455)	(1410)	(1169)	1311	(1311)
East Half Totals		<u>3449</u>	<u>3616</u>	<u>(3907)</u>	<u>(4091)</u>	<u>(4077)</u>	<u>(3547)</u>	<u>3888</u>	<u>(3872)</u>

Table III: Individule Group Changes During The Period 1977 - 1984 (west half)

	SURVEY YEAR								est.
<u>Illgen City Group</u>	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1984</u>
Monitor Count	**	**	**	**	**	**	**	**	
Group Count or (Est)		64	53	(55)	(57)	(62)	(62)	66	(77)
<u>Silver Bay Group</u>									
Monitor Count	*	159	164	170	175	190	189	234	
Group Count or (Est)		1408	1360	(1410)	(1452)	(1577)	(1569)	1899	(1941)
<u>Split Rock Group</u>									
Monitor Count	*	100	118	96	117	123	131	136	
Group Count or (Est)		239	286	( 233)	(284)	(299)	(319)	303	(330)
<u>Encampment Island Group</u>									
Monitor Count	**	**	**	**	**	**	**	**	
Group Count or (Est)		457	592	(549)	(708)	(561)	(758)	823	(769)
<u>Knife Island Group</u>									
Monitor Count	*	569	584	542	699	554	748	759	(759)
Group Count or (Est)		( same as above )							
West Half Totals		<u>2737</u>	<u>2875</u>	<u>(2789)</u>	<u>(3200)</u>	<u>(3053)</u>	<u>(3456)</u>	<u>3850</u>	<u>(3876)</u>
North Shore Totals		6186	6491	(6696)	(7291)	(7130)	(7003)	7738	(7748)

Notes: \* Incomplete Data

\*\* Groups without Monitoring Sites. Monitoring Date From Adjacent Group used.

Table IV: A Comparison Of The Actual North Shore Nesting Population And  
The Estimated North Shore Nesting Population For The Year 1984

<u>Group</u>	<u>1979 Monitor Count</u>	<u>1984 Monitor Count</u>	<u>Difference</u>	<u>Factor</u>	<u>1979 group Count</u>	<u>1984 group Estimate</u>	<u>1984 group Count</u>	<u>percent + or - Difference</u>
Suzie	109	158	49	1.450	1045	1515	1515	0
Blueberry	260	259	1	.996	629	627	614	-2%
Marr	295	223	72	.756	343	259	259	0
Grand Marais Lutson	129	82	47	.636	188 65	120 41	133 56	-10% -27%
Taconite Harbor	1339	1303	36	.973	1346	1310	1311	0
Illgen City					53	76	66	+15%
Silver Bay	164	234	70	1.427	1360	1941	1899	+ 2%
Split Rock	118	136	18	1.153	286	330	303	+ 8%
Encampment Knife					592	770	823	+ 7%
	584	759	175	1.300	584	759	759	0
TOTALS						7748	7738	+ 0.13%

## POPULATION TRENDS DURING THE SURVEY PERIOD 1978-1984

For the analysis of population trends, the North Shore colonies have been divided into two areas; the western and the eastern halves. The western half contains the Knife, Encampment, Split Rock, Silver Bay, and Illgen City nesting groups. While the eastern half contains the Taconite Harbor, Lutsān, Grand Marais, Marr Island, Blueberry, and Suzie Island groups. The graph on page 55 may be used as a reference.

WESTERN HALF - Nest numbers in the western half are now 41% above their 1978 level. However, this increase has not been constant. A rather small decrease occurred in 1980, and is thought to be the result of the severe storm on June 1st of that year. A number of nests were lost at Knife Island and Split Rock because of high wave action. A rather sharp decline occurred in 1982 and is thought to be a reaction to the large increase experienced the previous year. The nesting sites were stocked to capacity and could not satisfy the space requirements of the breeding birds. The last two years have been years of large increases, due largely to Knife and Encampment Islands in 1983, and to large increases within the Silver Bay group during 1984.

Of the 21 nesting sites containing breeding birds in 1978, 16 have increased in numbers, while five have experienced a decline in nest numbers. Three new sites have been established, while three sites were vacated; bringing the total number of occupied sites in 1984 to 21. Three of the five sites experiencing a decrease, occurred on sites having only one nest and they are now unoccupied. The two remaining sites, which decreased, are within the Split Rock group. These losses may be the result of shifting of birds within this group and may not represent a true loss of breeding gulls.

EASTERN HALF - The eastern half has not been as prosperous as the western area, and has experienced a 13% increase above the 1973 level. Between 1973 and 1981, there was a steady and substantial increase in breeding birds. This steady increase may not be the case because of an absence of data on two sites for the 1980 nesting year. It is assumed that populations on these two islands experienced the same increase as did islands adjacent to them and within the same group. This may or may not be the case.

A sizeable drop in the number of nesting birds in 1983 is thought to be the result of the 1980 storm which created a shortage of three year old replacements. Four colonies are now below their 1973 nesting levels and if it were not for a huge increase on island #11, the eastern half would not have increased and would now be very close to the 1973 level. It should be noted that the increase on island #11 is an estimate and may or may not be the actual breeding population.

Of the 35 nesting sites occupied by breeding birds in 1973, 20 have decreased in nest numbers, while 13 have increased, two have remained static, and six sites have been vacated. It should be noted that both static sites and all of the sites which were vacated, were sites containing one nest and have little effect on the data. There are now 29 occupied sites within this group. The Suzie Island and Blueberry Island groups have shown healthy increases, while the remaining groups have declined. This decline is most pronounced within 20 miles of Grand Marais.

When graphically portraying the changes taking place each year within a nesting colony, it becomes evident that the use of numbers of nests to show these changes leaves much to be desired. Small colonies have a flat appearance when nest numbers are used, even though the loss in nests may represent a large percentage of the nesting population. In contrast, the graphs of larger colonies climb and plunge sharply in response to changing numbers of nests; even though these changes represent only a small percentage of the total breeding population for that site. The comparison between small and large colonies and the analysis of the effects resulting from these changes is difficult if not impossible.

To remedy this situation, all sites, small and large, must be on a similar scale and the changes shown in such a way that they may be easily compared and analyzed. To achieve this equalization, all year to year changes have been converted to percentages.

The following graphs illustrate the year to year changes in nest numbers, on the 15 island nesting sites monitored throughout the 1973-1984 survey period. The 1978 nesting year has been used as the base because several sites were omitted during the 1977 survey. The percentage figures for a given year indicate the departure from the base year 1978. The difference in the position of the point from one year to the next indicates the magnitude of the change in nest numbers during that year.

To obtain the percent gain or loss of nests, the 1978 count is subtracted from the count of each succeeding year and the difference is then divided by the 1978 count. Table V reflects these percentages, and graphs 1-16 displays the data by individual monitoring site, groups, east, and west halves of the North Shore and for total North Shore.

Table V : Changes in nest numbers on individule monitor sites from 1978 - 1984  
in percent.

MONITOR SITE NUMBER	BASE YEAR 1978	NESTING YEAR					
		1979	1980	1981	1982	1983	1984
12	0	-13	+20	+14	+3	-3	-17
13	0	-14	+29	+24	+10	+10	+24
<u>16</u>	<u>0</u>	<u>+11</u>	<u>+63</u>	<u>+78</u>	<u>+67</u>	<u>+57</u>	<u>+91</u>
Group	0	-1	+43	+47	+36	+29	+44
23	0	+7	+20	+24	+15	+17	+59
<u>25</u>	<u>0</u>	<u>+15</u>	<u>(+28)*</u>	<u>+10</u>	<u>+44</u>	<u>-8</u>	<u>+3</u>
Group	0	+14	+27	+12	+38	-3	+13
<u>31</u>	<u>0</u>	<u>+6</u>	<u>-5</u>	<u>-28</u>	<u>-19</u>	<u>-19</u>	<u>-20</u>
Group	0	+6	-5	-28	-19	-19	-20
36	0	+3	+14	-10	-15	-5	-21
<u>37</u>	<u>0</u>	<u>+23</u>	<u>-10</u>	<u>0</u>	<u>-20</u>	<u>-5</u>	<u>-50</u>
Group	0	+9	+6	-7	-17	+5	-31
48	0	-2	-16	-1	-5	-15	-3
<u>49</u>	<u>0</u>	<u>+3</u>	<u>(-12)*</u>	<u>+15</u>	<u>+12</u>	<u>-10</u>	<u>0</u>
Group	0	+2	-13	+10	+7	-12	-1
64	0	+8	0	0	-8	+5	+23
<u>70</u>	<u>0</u>	<u>+2</u>	<u>+9</u>	<u>+14</u>	<u>+29</u>	<u>+24</u>	<u>+56</u>
Group	0	+3	+7	+10	+20	+19	+47
77a	0	+13	-11	+16	+21	+33	+37
<u>77b</u>	<u>0</u>	<u>+32</u>	<u>+4</u>	<u>+20</u>	<u>+28</u>	<u>+24</u>	<u>+32</u>
Group	0	+18	-4	+17	+23	+31	+36
<u>80</u>	<u>0</u>	<u>+3</u>	<u>-5</u>	<u>+23</u>	<u>-3</u>	<u>+32</u>	<u>+33</u>
Group	0	+3	-5	+23	-3	+32	+33

NOTE: \* denotes sites where no count was conducted during that year and nest numbers are estimates.



Graph #1 ; Changes in nest numbers from 1978 - 1984 in percent.

SUZIE ISLAND GROUP

PLUS  
PERCENT

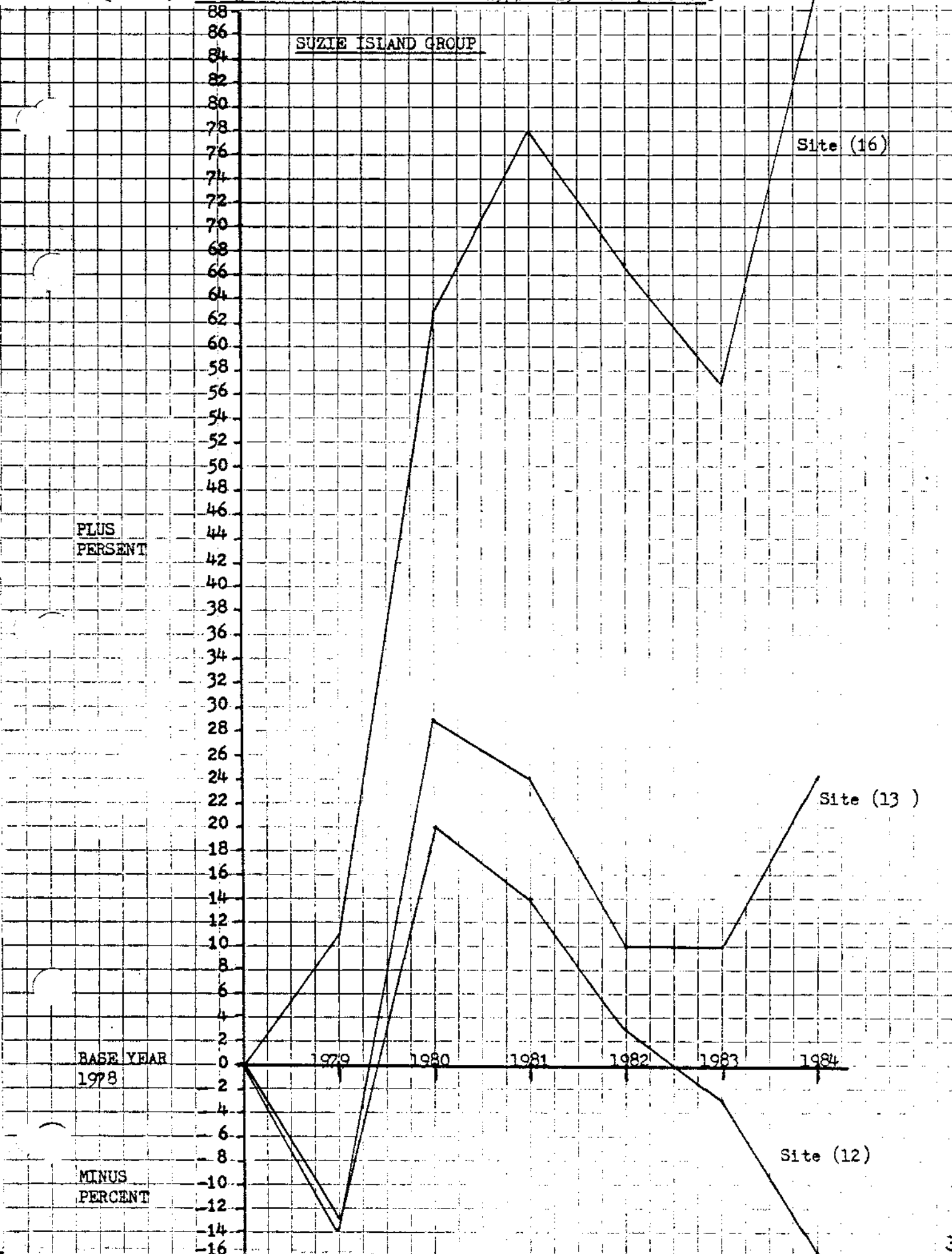
BASE YEAR  
1978

MINUS  
PERCENT

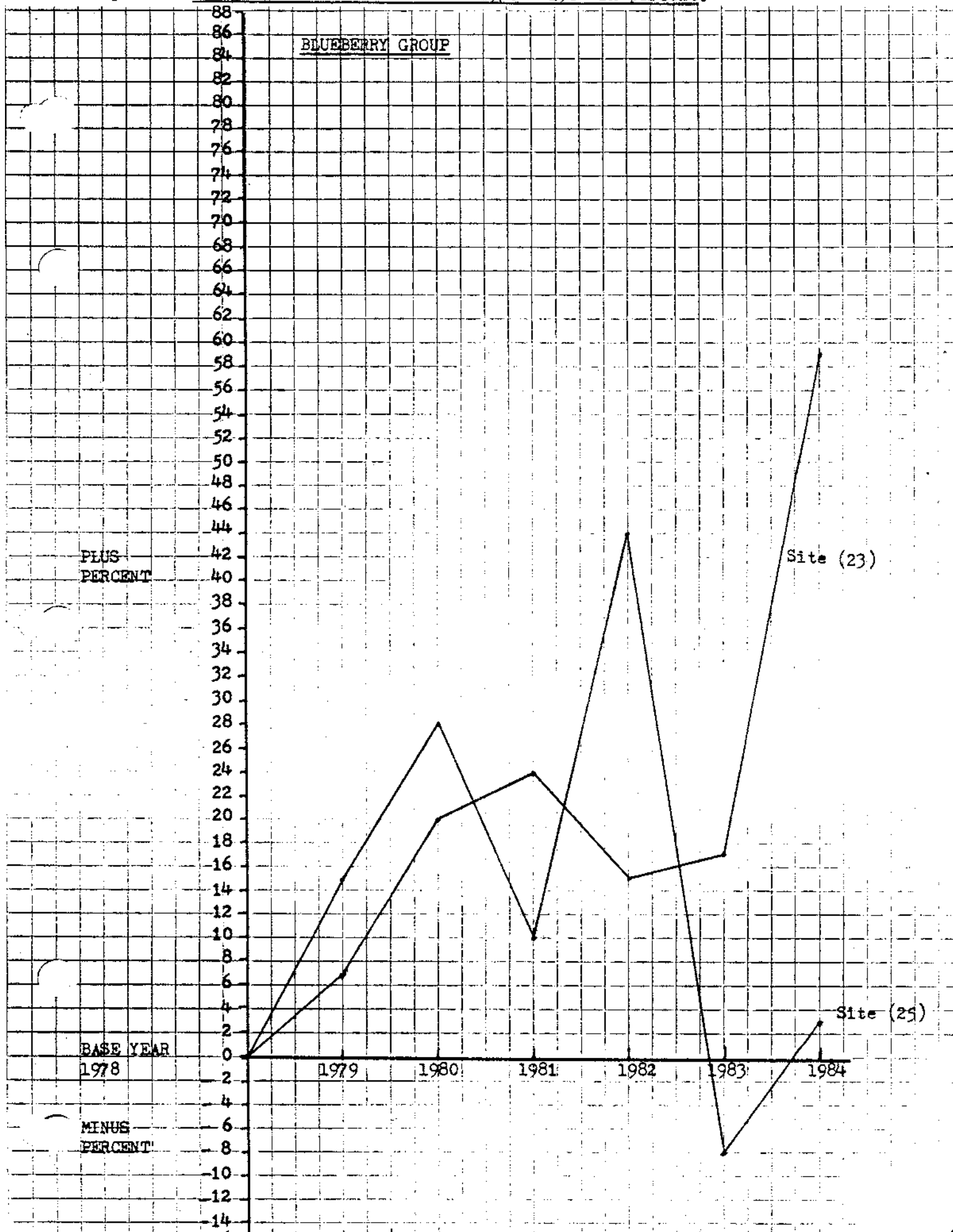
Site (16)

Site (13 )

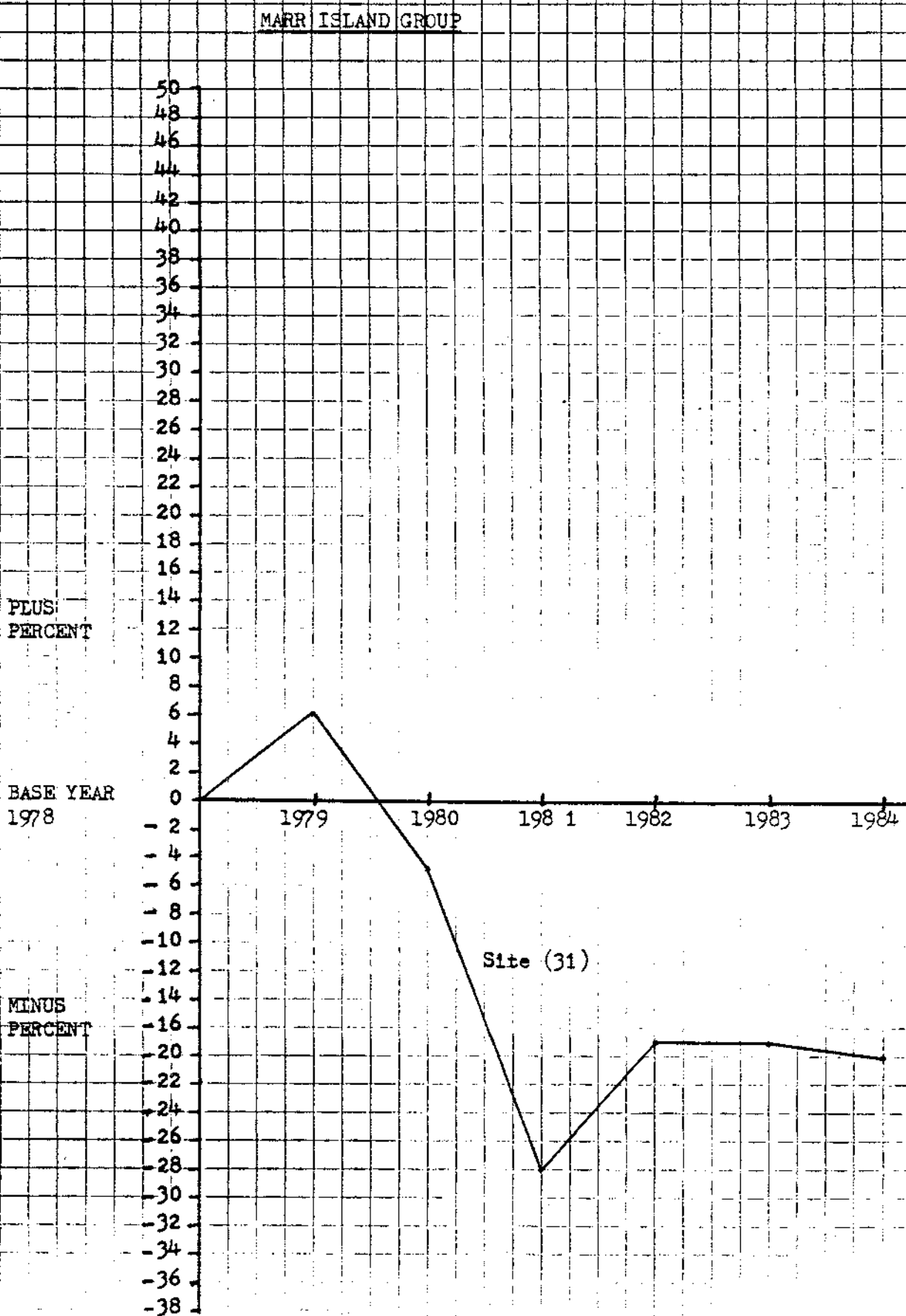
Site (12)



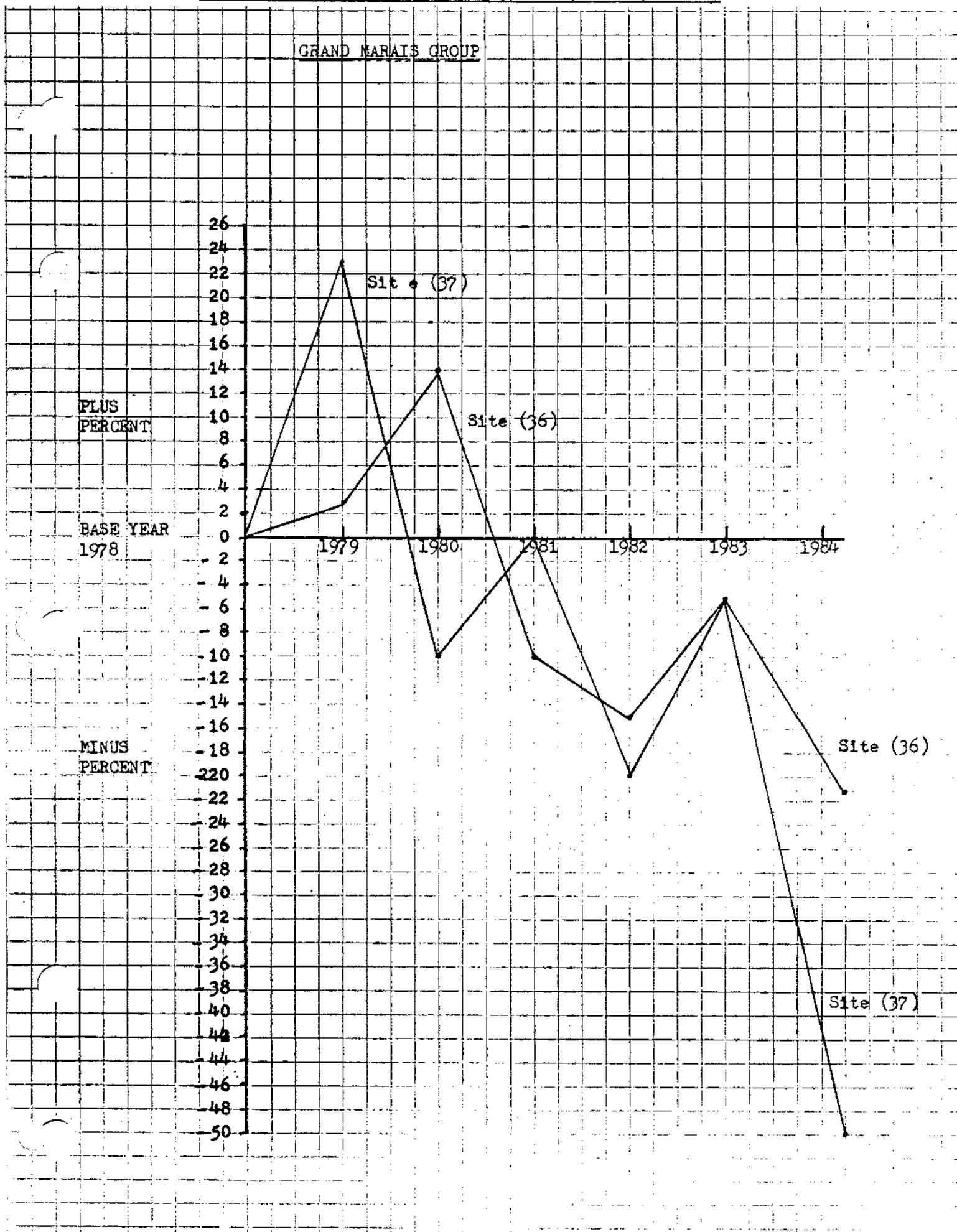
Graph #2: Changes in nest numbers from 1978 - 1984 in percent.



Graph #3: Changes in nest numbers from 1978 - 1984 in percent.

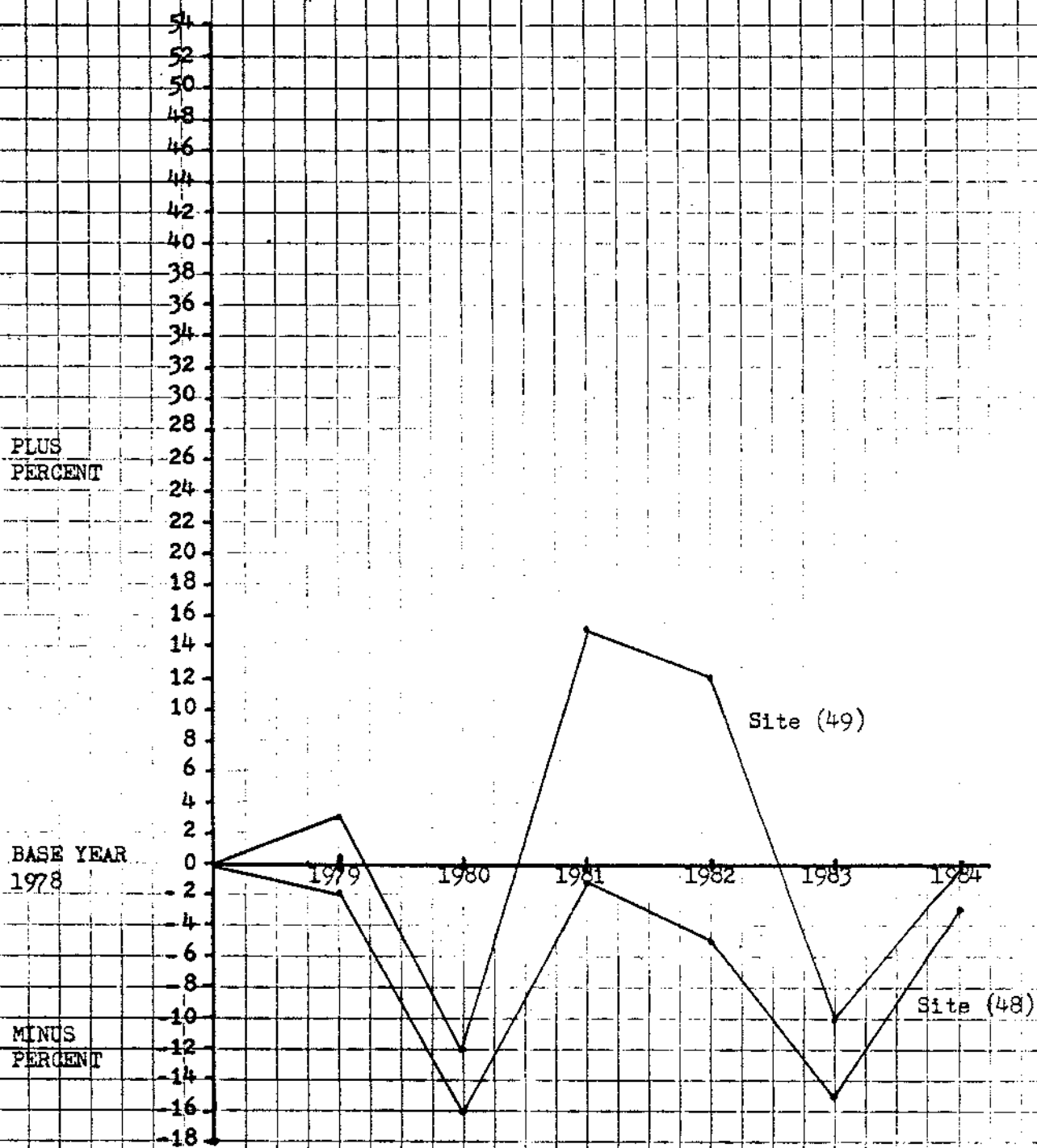


Graph # 4: Changes in nest numbers from 1978 - 1984 in percent.

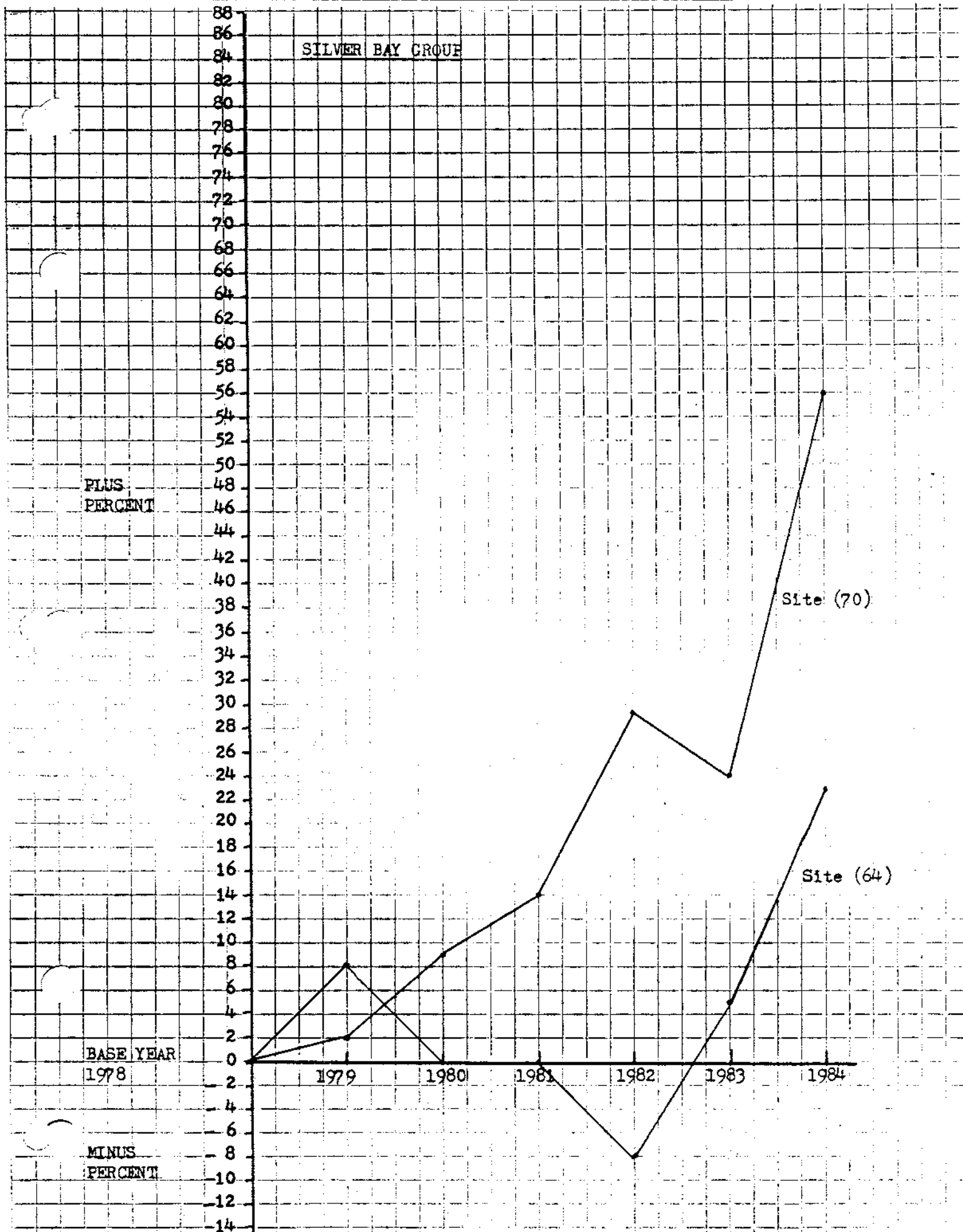


Graph #5: Changes in nest numbers from 1978 - 1984 in percent.

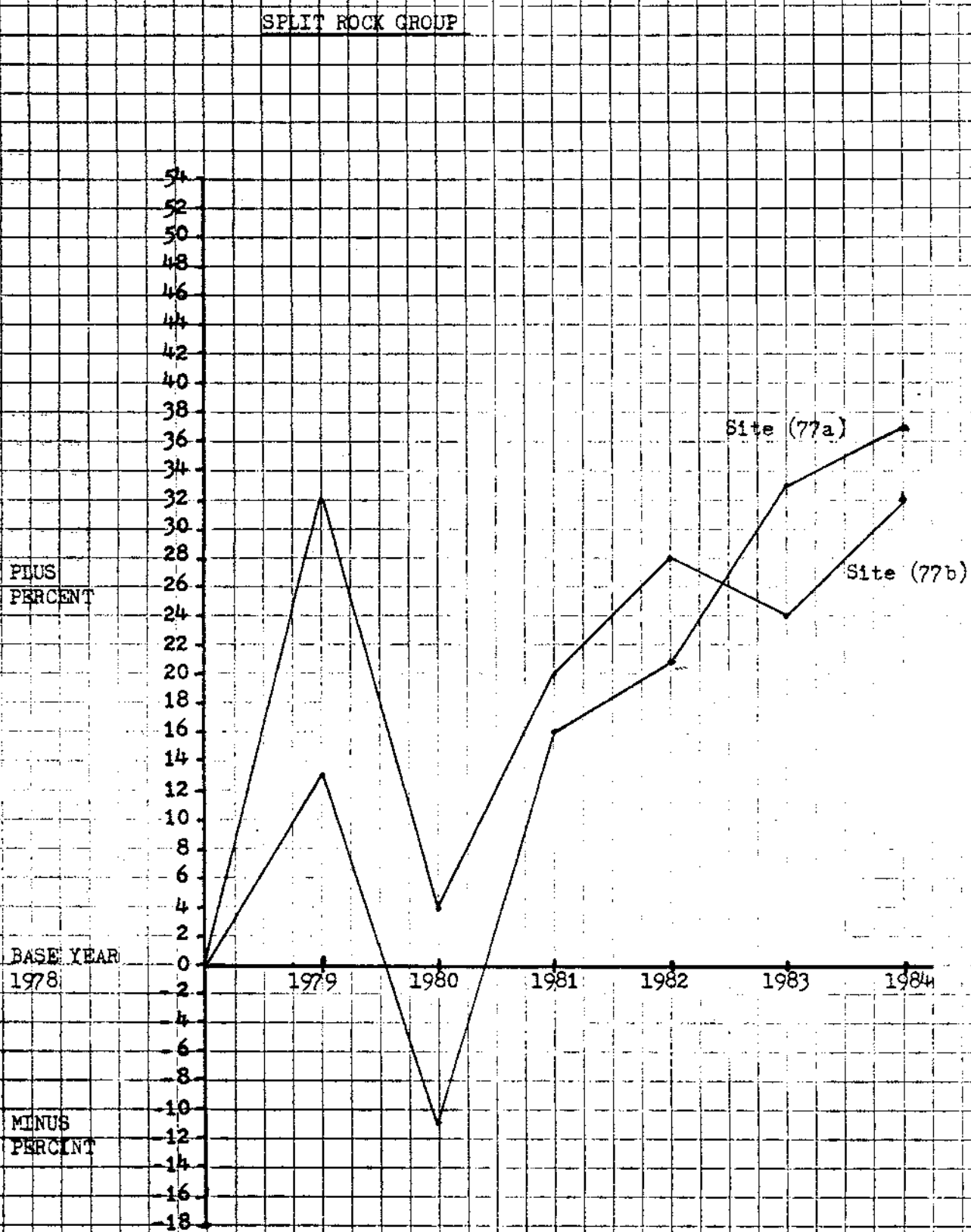
TACONITE HARBOR GROUP



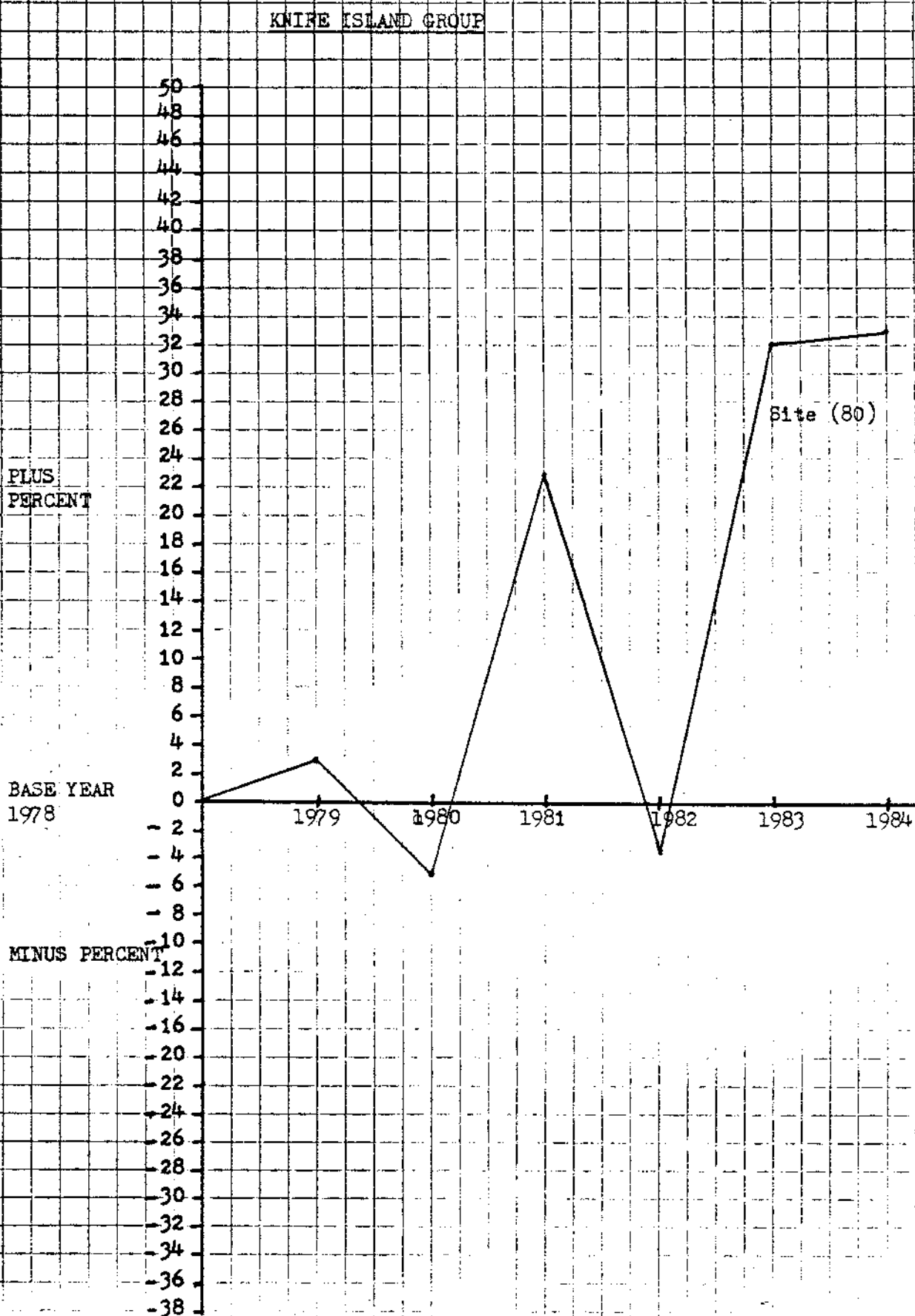
Graph # 6 : Changes in nest numbers from 1978 - 1984 in percent.



Graph #7: Changes in nest numbers from 1978 - 1984 in percent.

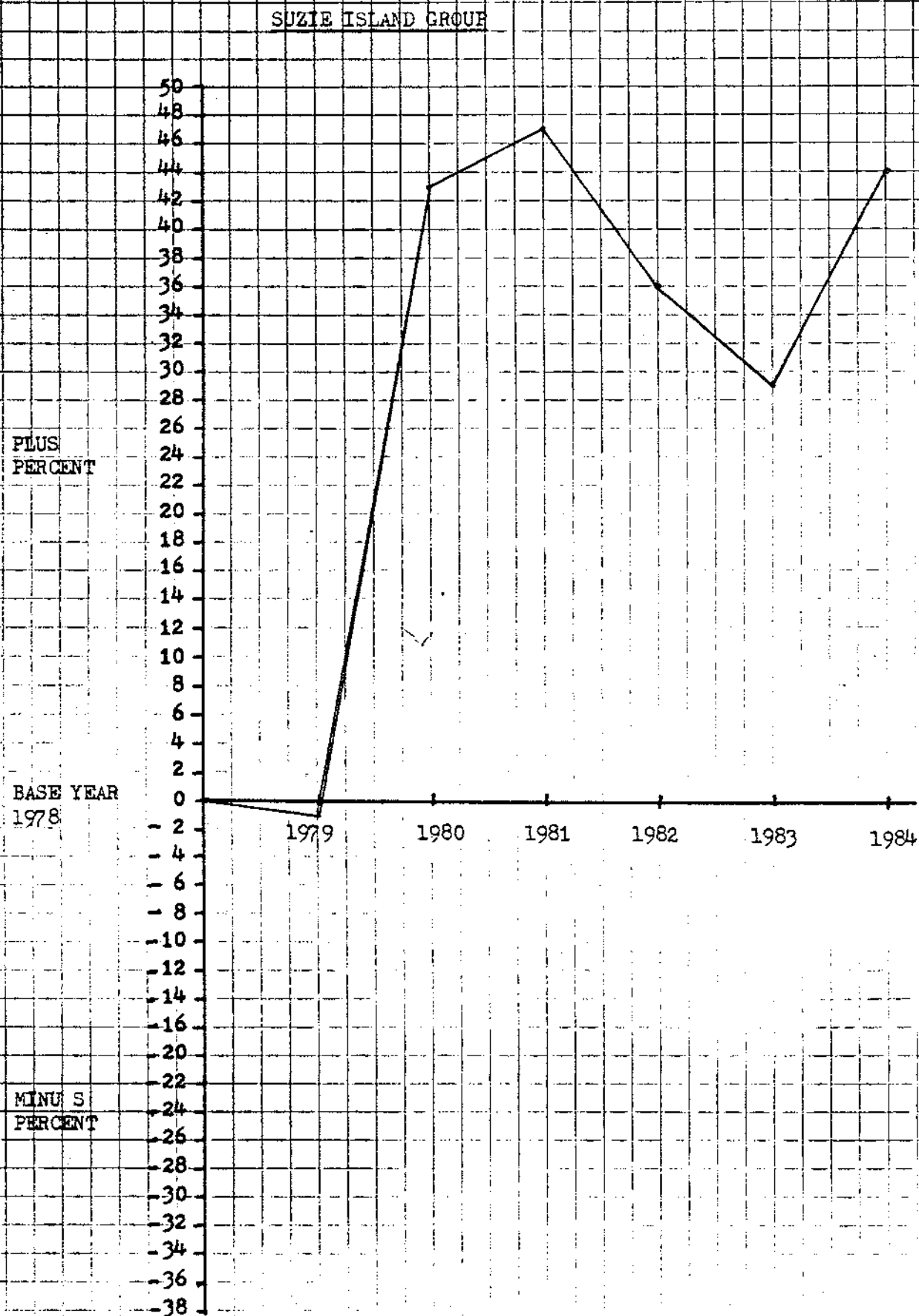


Graph #8 : Changes in nest numbers from 1978 - 1984 in percent.

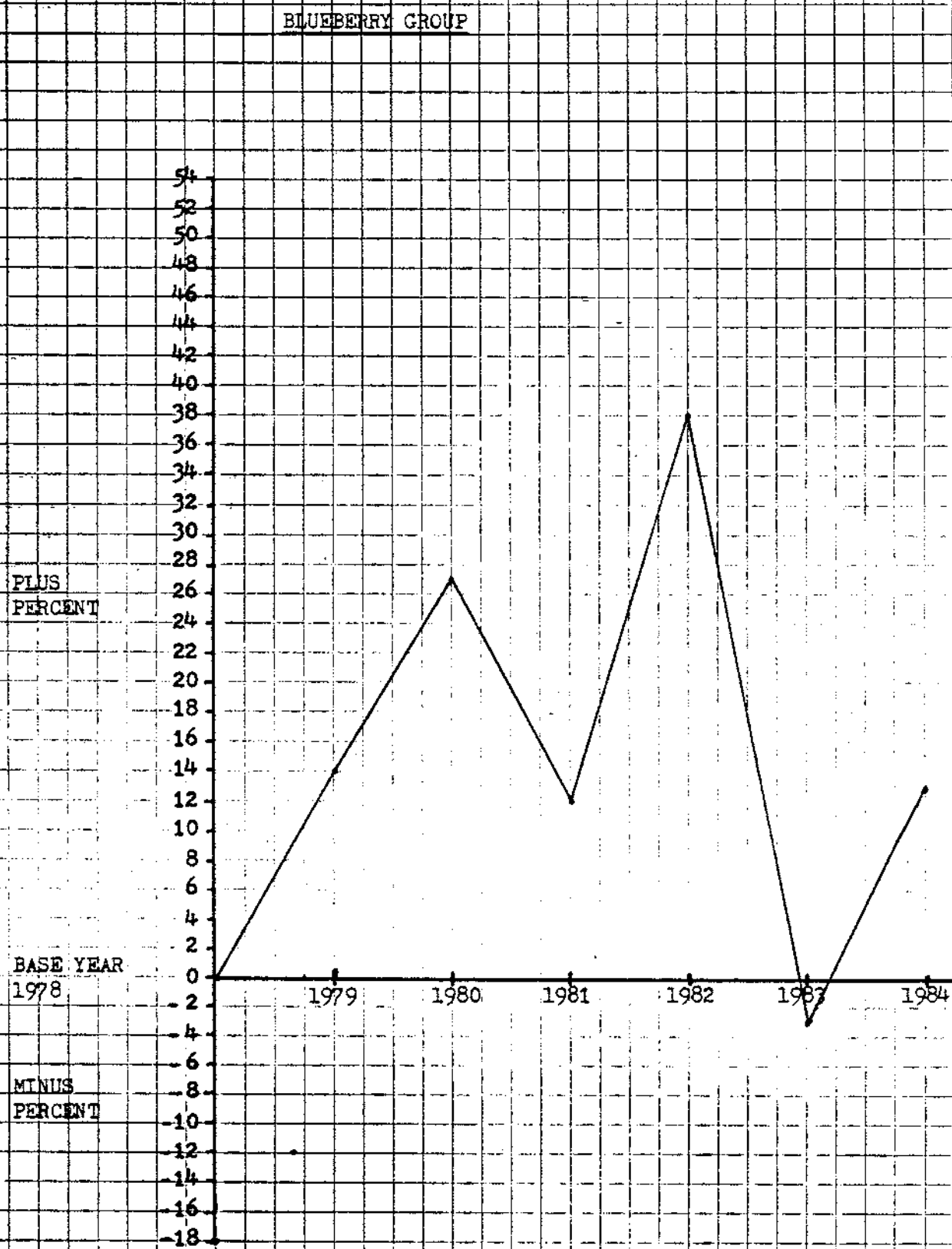




Graph # 9: Changes in nest numbers, within Groups, from 1978 - 1984 in percent.

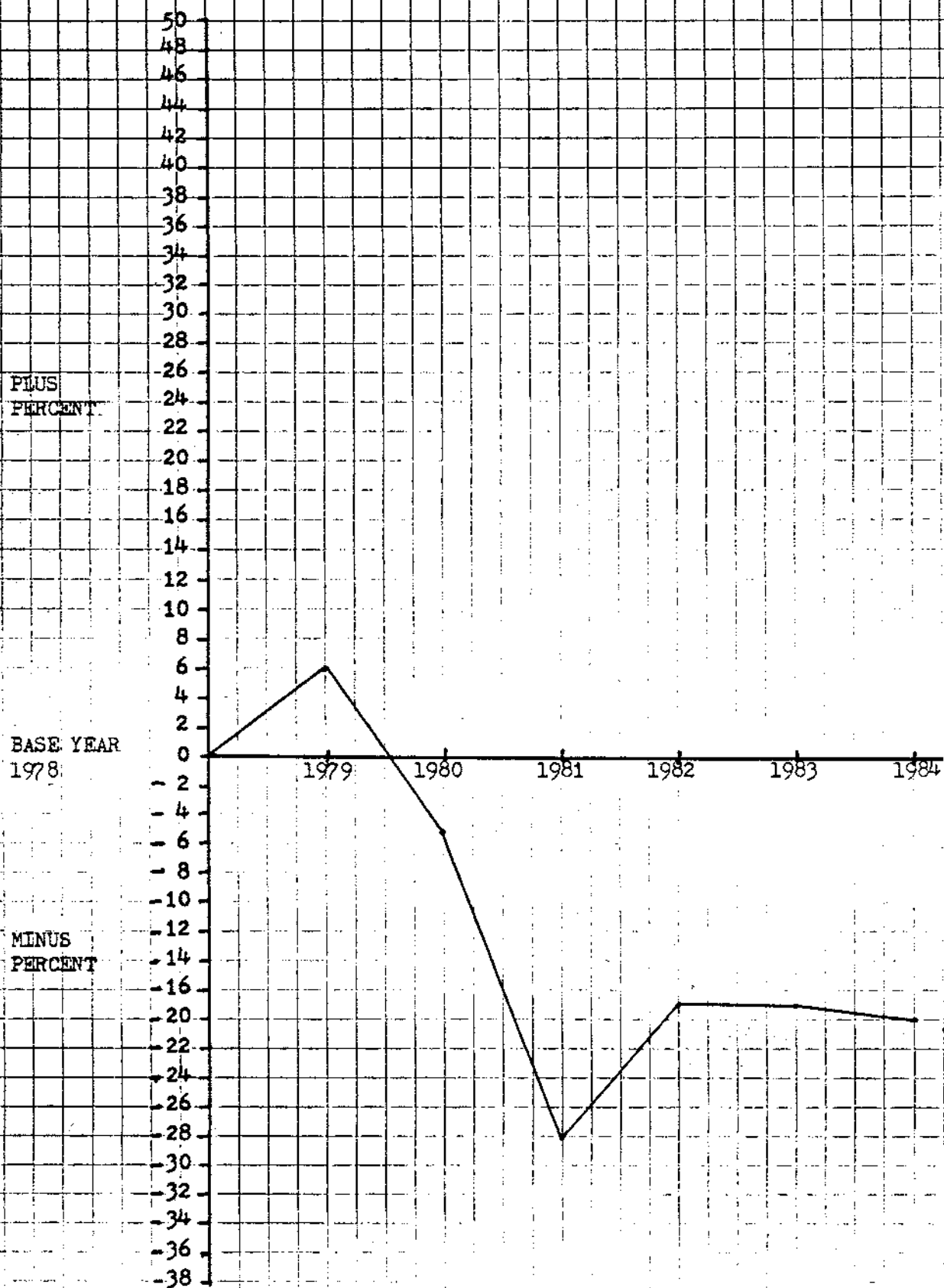


Graph #10: Changes in nest numbers, within Groups, from 1978 - 1984 in percent.

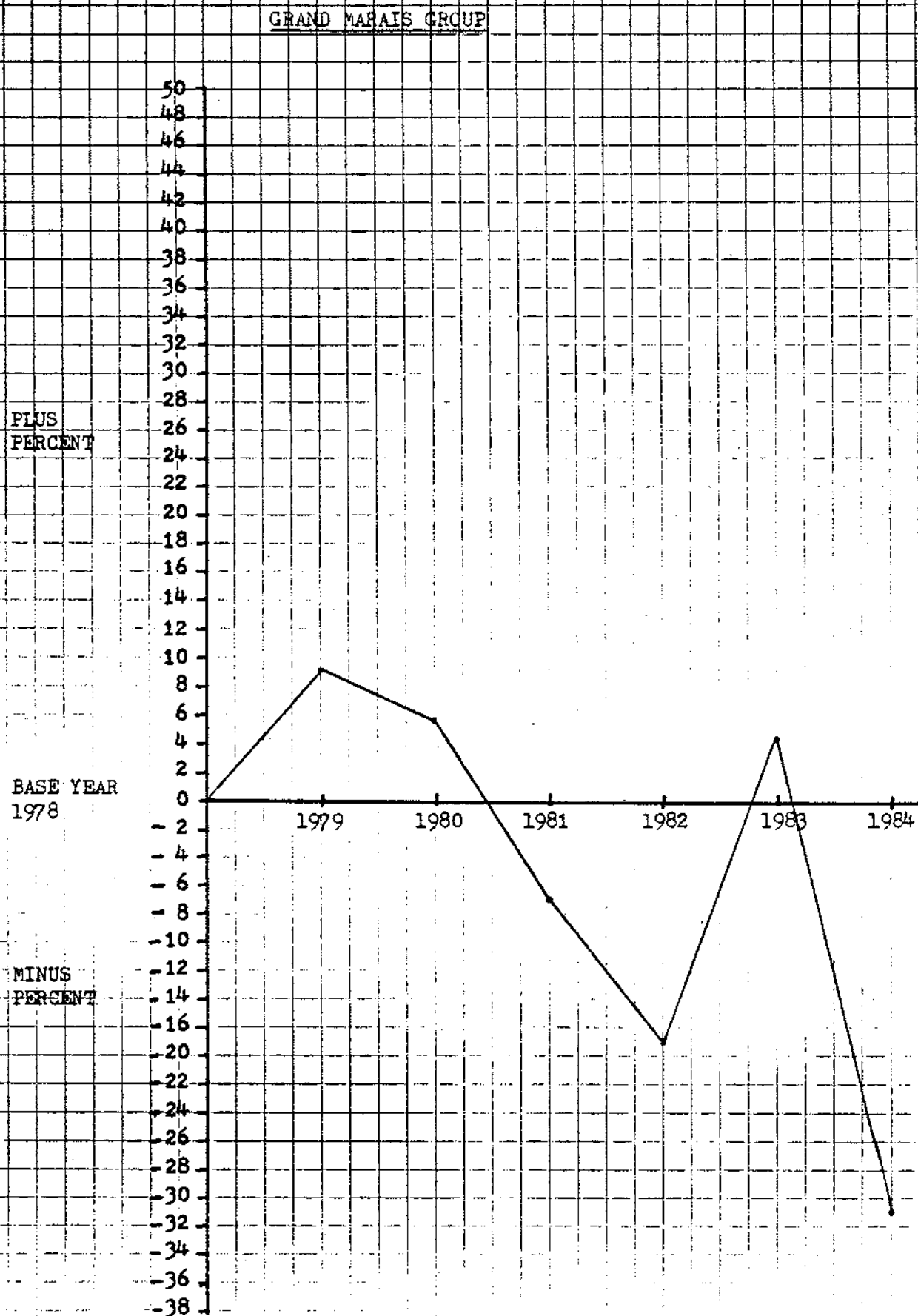


Graph #11: Changes in nest numbers, within Groups, from 1978 - 1984 in percent.

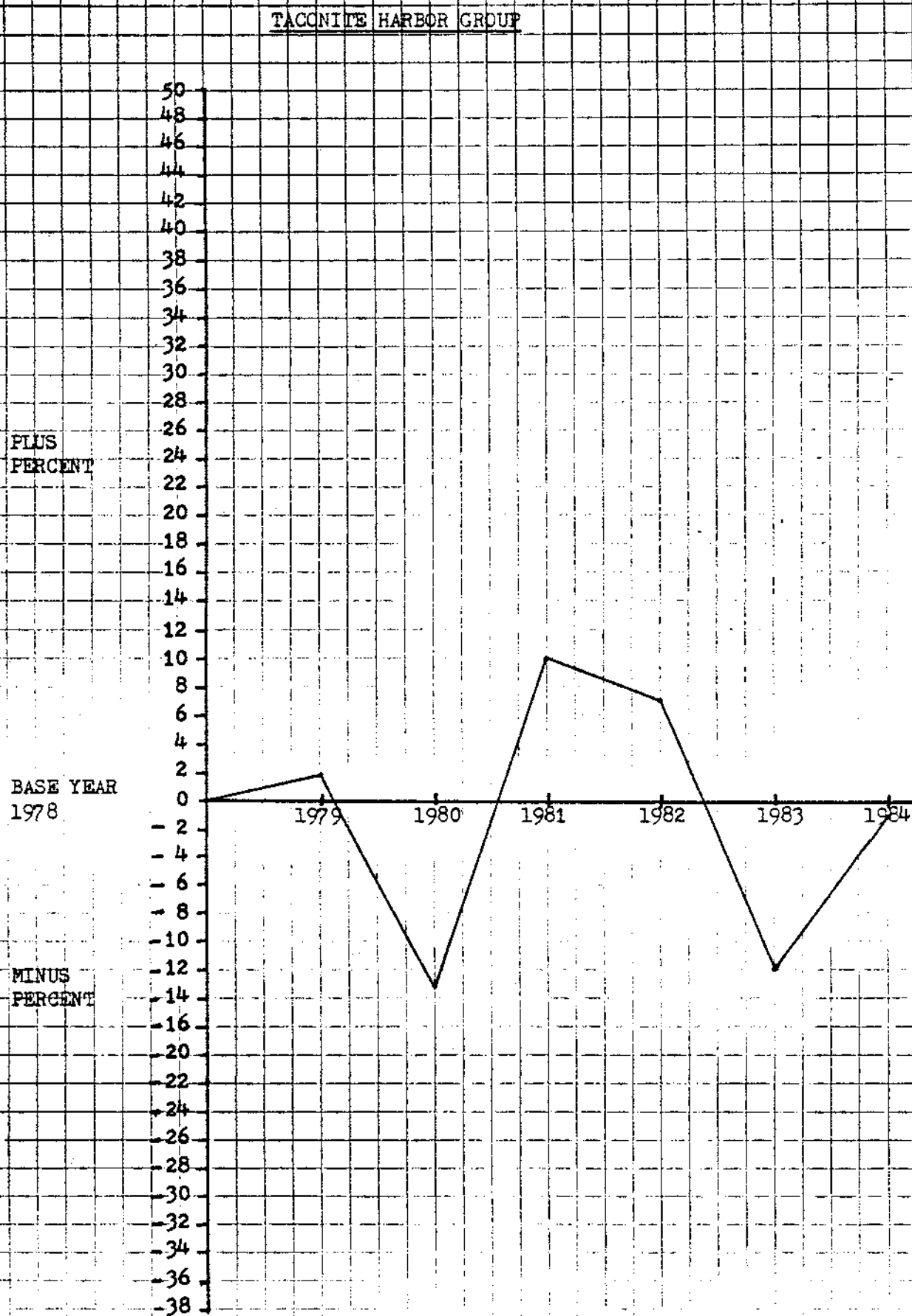
MARR ISLAND GROUP



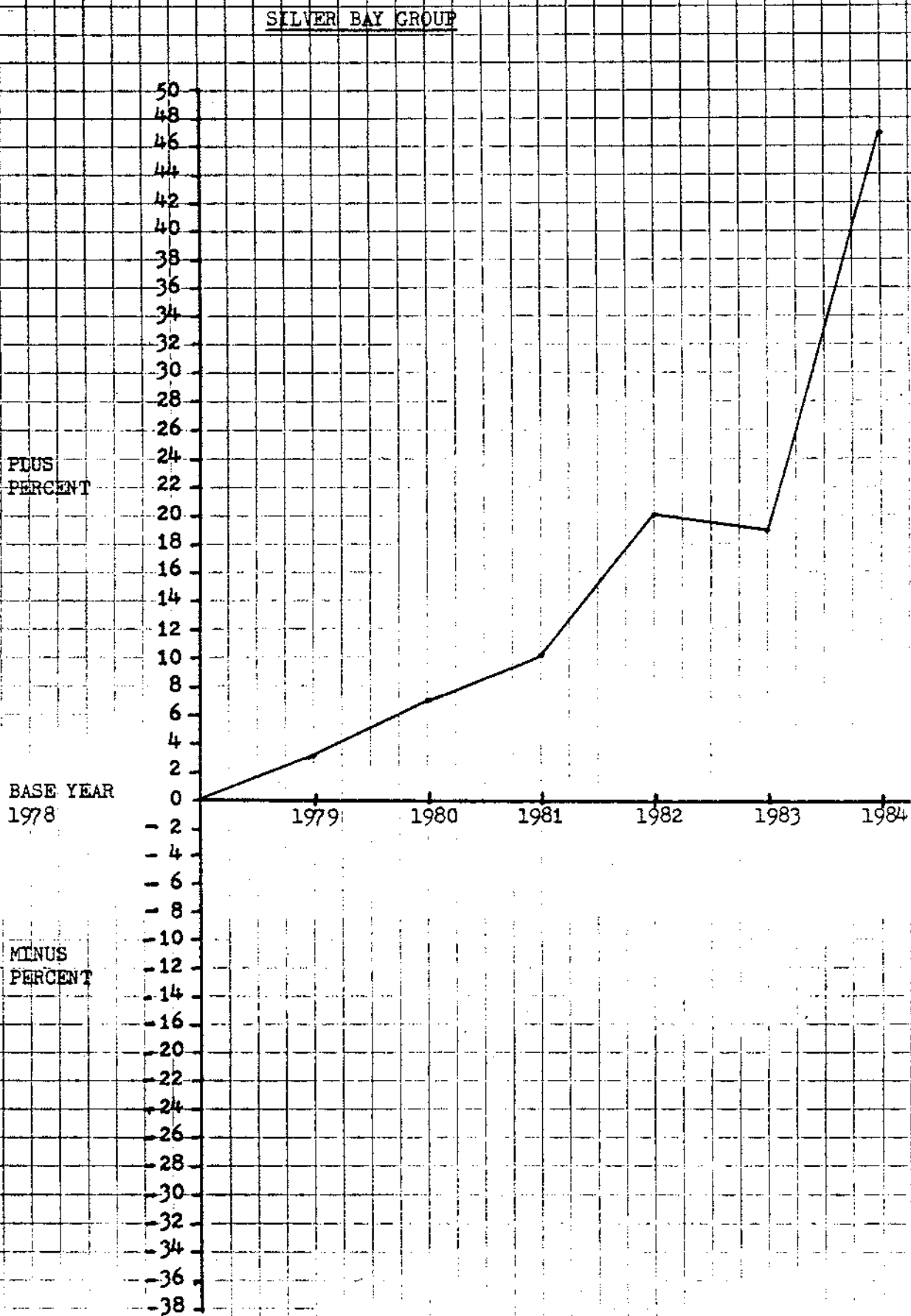
Graph #12: Changes in nest numbers, within Groups, from 1978 - 1984 in percent.



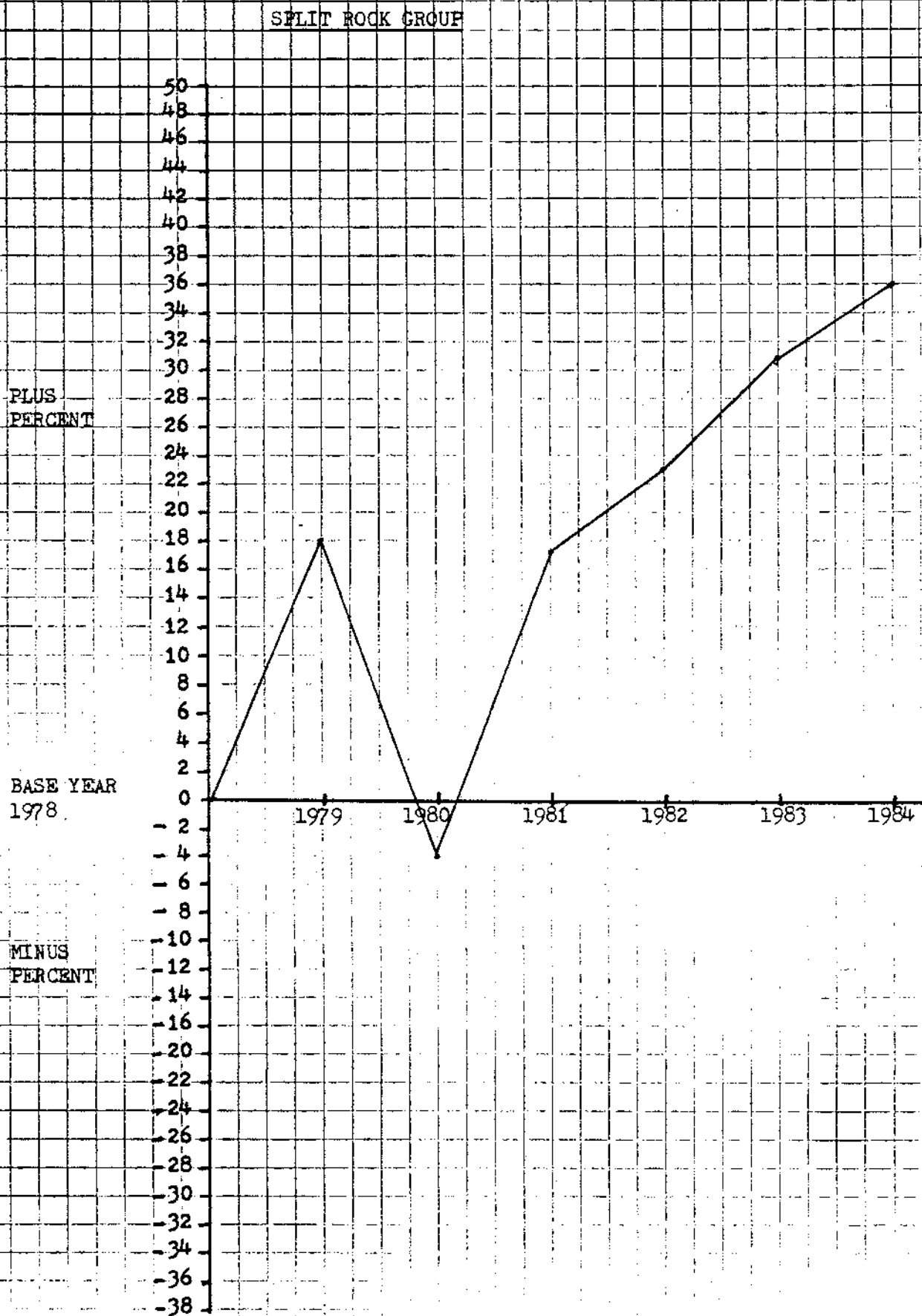
Graph #13: Changes in nest numbers, within Groups, from 1978 - 1984 in percent.



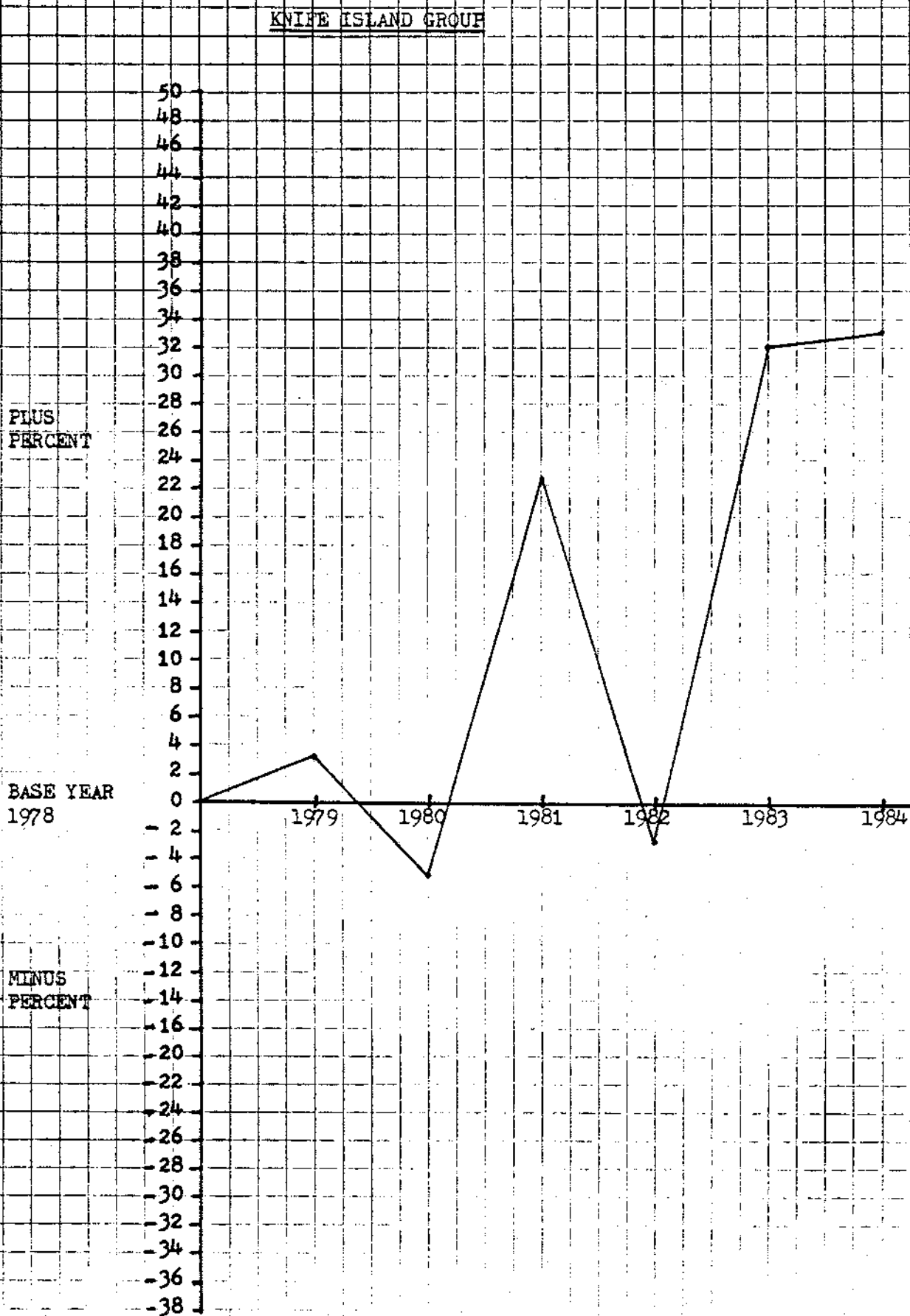
Graph #14: Changes in nest numbers, within Groups, from 1978 - 1984 in percent.



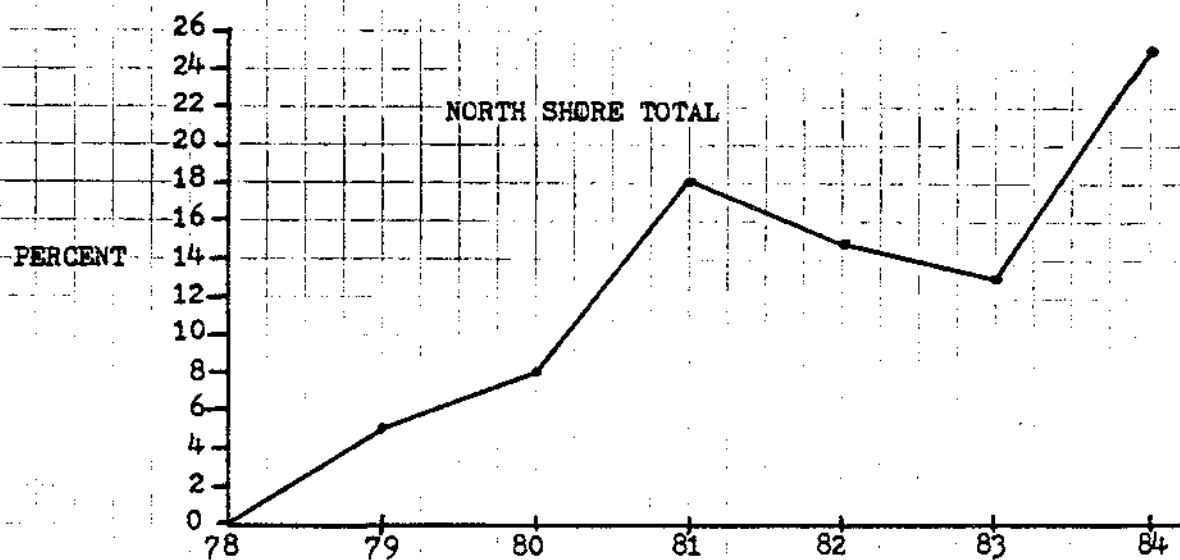
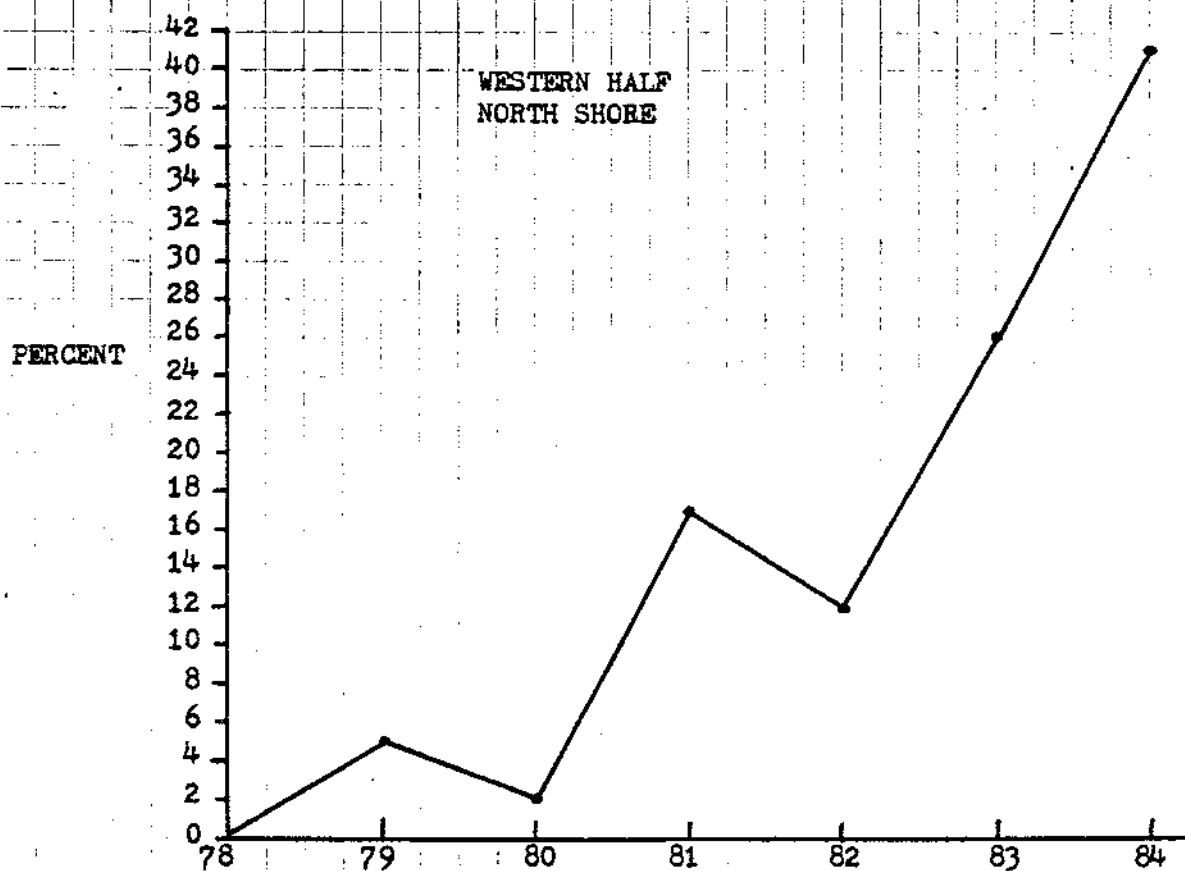
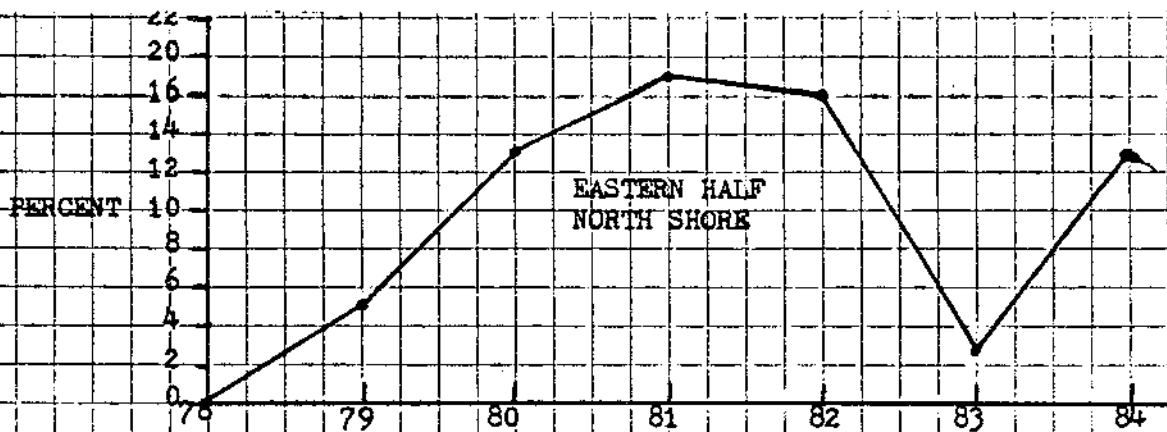
Graph #15: Changes in nest numbers, within Groups, from 1978 - 1984 in percent.



Graph #16: Changes in nest numbers, within Groups, from 1978 - 1984 in percent.







## PRODUCTIVITY

Table VI displays the number of one, two, and three egg nests; the percentage these numbers represent, and the average number of eggs in a nest for 34 sites. This data was collected on islands #64, #70, #77a, and #77b during the 1983 survey; but represents the first years effort on the remaining sites. In past years the number of one, two, and three egg nests were estimated as each site was completed and recorded as a percentage.

During 1984, there was a rather marked difference in the productivity level of the eastern and western halves of the North Shore breeding colonies. The western sites, from the Silver Bay group through Knife Island group, averaged 2.6 eggs per nest, while groups east of Silver Bay averaged 2.3 eggs per nest. The significance of this difference is not known. However, were the eastern colonies at the same productivity level as western colonies, 724 more eggs would have been produced. Another unknown is the ranking of these productivity levels among long term averages. I feel that 2.3 and 2.6 eggs per nest is somewhat low. Observations during the first four years indicate the average number of eggs per nest to be near 3.0 and possibly higher.

All sites within a given group exhibit a rather close correlation of the number of eggs per nest, except islands #36 and #37 in the Grand Marais group. These two sites have a very low productivity level compared to the one remaining member within this group. The average for island #36 and #37 is 2.0, while the figure for island #39 is 2.6.

Herring Gulls along the North Shore depend upon several sources of food. From a totally natural source, Lake Superior, they have become heavily dependent on mans leftovers, and for some time have

depended heavily upon dumps to serve their nutritional needs. Another source are the remaining commercial fishing camps still in operation.

The availability of food from any source will have a great influence on productivity. Not only in the number of eggs produced, but perhaps to a greater degree on chick survival through the first three months. Dumps along the North Shore have undergone changes during the last ten years. Dumping and periodic burning was the general practice before the advent of land fills. Of perhaps greater importance than the type of treatment was the distribution of these dump sites. It was common for each community to operate a small dumping area, and many individuals had small dumps. These areas have since been consolidated, and the effect has been to increase the distance gulls must travel to obtain food. For non breeding birds this is not a problem, as they loaf in flat open areas near the food source between feedings. For breeding birds who must feed growing young, it creates long, round trip flights, and I imagine, reduces the amount of food available for these growing chicks. The distance from a breeding colony to the nearest dump may have a great deal to do with that colonies' productivity level.

Dump locations, method of treatment, and changes that have taken place, have not been documented. Nor have the location and volume of remaining commercial fishing operations. I feel additional information on these two food sources will allow further analysis of the population trends along the North Shore, and may answer some nagging questions concerning individual nesting sites.

The timing and volume of spring smelt runs has been partially reviewed. There appears to be little correlation with peak smelt years and peak gull populations along the North Shore. However, such a potentially important food source should be fully investigated. The timing of smelt runs, (April) could have a great impact on a birds condition just prior to egg laying, and thus have a great influence on productivity.

Table VI: Number of Eggs / Active Nest During The 1984 Survey (west half)Suzie Island Group

Nesting Site	Total Active nests	Number of eggs in a nest				% of total active nests				Ave. eggs per. nest
		1	2	3	+	1	2	3	+	
5	77	7	31	39	0	9	40	51	0	2.4
6	152	14	51	87	0	9	34	57	0	2.5
9	38	0	12	26	0	0	32	68	0	2.7
12	29	3	10	16	0	10	35	55	0	2.5
13	26	4	8	14	0	15	31	54	0	2.4
14	129	9	54	65	1 (5)	7	42	51	0	2.5
15	14	0	5	9	0	0	36	64	0	2.6
16	103	14	44	44	1 (4)	14	43	43	0	2.3
20	38	7	10	21	0	18	26	55	0	2.4
	606	58	225	321	2	10%	37%	53%	0	2.4

Blueberry Group

23	65	8	25	32	0	12	39	49	0	2.4
24	84	8	36	40	0	10	43	47	0	2.4
25	194	21	96	77	0	11	50	39	0	2.3
26	271	54	106	111	0	20	39	41	0	2.2
	614	91	263	260	0	15%	43%	42%	0	2.3

Marr Island Group

28	34	1	11	22	0	3	32	65	0	2.6
31	223	25	80	118	0	11	36	53	0	2.4
	257	26	91	140	0	10%	35%	55%	0	2.4

Grand Marais Group

36	62	17	24	21	0	27	39	34	0	2.1
37	20	9	6	5	0	45	30	25	0	1.7
39	29	2	8	19	0	7	28	65	0	2.6
	111	28	38	45	0	25%	34%	41%	0	2.2

Lutson Group

42	30	4	12	14	0	13	40	47	0	2.3
43	26	5	12	9	0	19	46	35	0	2.2
	56	9	24	23	0	16%	43%	41%	0	2.3

Taconite Harbor

48	393	44	218	131	0	11	56	33	0	2.2
49	910	82	441	387	0	9	49	42	0	2.3
	1303	126	659	518	0	10%	50%	40%	0	2.3

Table VZ: Number of Eggs / Active Nest During The 1984 Survey (west half)Silver Bay Group

<u>Nesting Site</u>	<u>Total Active nests</u>	<u>Number of eggs in a nest</u>				<u>% of total active nests</u>				<u>Ave. eggs per. nest</u>
		<u>1</u>	<u>2</u>	<u>3</u>	<u>+</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>+</u>	
64	49	3	24	22	0	6	49	45	0	2.4
65	278	21	111	146	0	8	40	52	0	2.5
66	397	41	149	207	0	10	38	52	0	2.4
68	811	53	243	515	0	7	30	63	0	2.6
69	13	2	3	8	0	15	23	62	0	2.5
70	185	20	45	120	0	11	24	65	0	2.5
71	<u>117</u>	<u>4</u>	<u>39</u>	<u>74</u>	<u>0</u>	<u>3</u>	<u>33</u>	<u>63</u>	<u>0</u>	<u>2.6</u>
	1850	144	614	1092	0	8%	33%	59%	0	2.5

Split Rock Group

74	133	8	56	69	0	6	42	52	0	2.5
77a	103	9	32	62	0	9	31	60	0	2.6
77b	<u>33</u>	<u>4</u>	<u>12</u>	<u>17</u>	<u>0</u>	<u>12</u>	<u>36</u>	<u>52</u>	<u>0</u>	<u>2.4</u>
	269	21	100	148	0	8%	37%	55%	0	2.5

Encampment Island

79	754	48	200	504	2(4)	6%	27%	67%	0	2.6
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Knife Island

80	759	35	132	591	1(4)	5%	17%	78%	0	2.7
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North Shore Totals

	6579	586	2346	3642	5	9%	36%	55%	0	2.47
East Half:	<u>2947</u>	<u>338</u>	<u>1300</u>	<u>1307</u>	<u>2</u>	<u>12%</u>	<u>44%</u>	<u>44%</u>	<u>0</u>	<u>2.33</u>
West Half:	<u>3632</u>	<u>248</u>	<u>1046</u>	<u>2335</u>	<u>3</u>	<u>7%</u>	<u>29%</u>	<u>64%</u>	<u>0</u>	<u>2.58</u>

## TIME OF HATCHING

Hatching along the North Shore appears to take place in the western colonies first, Knife Island being the earliest; followed closely by the Encampment and Split Rock groups. The date of peak hatching occurs some six days later on the Suzie Island group than on Knife Island, with the remaining groups showing some progression between these two dates. Average dates for peak hatching would be near May 27th for Knife Island, and June 2nd for the Suzie Islands.

On Knife Island the earliest noted hatching occurred on May 19th in 1978, and the latest estimated peak was June 7th in 1982. These two years represent extremes in the date of peak hatching during the survey period. However, the majority of the peak hatching dates will fall within a seven day period for a given group. Herring Gulls appear to have some measure of flexibility as to when they begin laying, but there is a limit. During the 1979 survey, island #36 in the Grand Marais group was covered by four to six feet of ice on May 24th. Nests had been constructed, eggs had been laid, and incubation was taking place on ice piles, which would soon melt and destroy nests and eggs. These birds apparently had reached the limit of their flexibility.

Table

Estimated average date of peak hatching:

<u>GROUP</u>	<u>DATE</u>	<u>GROUP</u>	<u>DATE</u>
Knife-----	May 27th	Grand Marais-----	June 1st
Encampment----	May 28th	Marr-----	June 2nd
Split Rock----	May 28th	Blueberry-----	June 2nd
Silver Bay----	May 30th	Suzie-----	June 2nd
Taconite-----	June 1st		

The difference in the number of eggs in a nest, (and in particular, the one egg nests) has been a puzzle the last few years. Throughout the survey there have always been a number of nests with one egg, while the majority of nests contained a greater number; between two and five. The occurrence of one egg nests has increased the past four years and it was first thought these nests were not full and that egg laying was not completed. I now feel that egg laying is complete and these nests represent one of two things: 1) One egg nests are the result of poor physical condition of the hen, or 2) They represent the efforts of first year breeding birds.

In an attempt to answer this question, additional data was gathered during the 1984 survey. The number of eggs in each nest was recorded, as well as the number of nests hatching in each class (one, two, or three egg nest). Should the one egg nests be the efforts of first year breeding gulls, then there should be a difference in the date these nests hatched. Assuming first year breeders arrive at the nesting colonies at a later date and spend more time establishing nesting territories than birds who have nested previously.

Hatching was occurring on 24 sites during the 1984 survey and all showed a difference in the percent of one egg nests hatched as to the percent of two and three egg nests hatched. Twenty-two sites had a higher percentage of the two and three egg nests hatching than that for one egg nests. Two sites had a higher percentage of one egg nest hatching than two and three egg nests. The average difference for the 22 sites was 10.4%. This suggests there may be a difference in the date of hatching between one egg nests and nests containing a higher number of eggs. The difference between two and three egg nests on the same sites is 5.7%. A good deal more data is needed before any meaningful analysis can be made.



## PREDATOR ACTIVITY

Predation was noted 21 times during the survey, however, the majority of the occurrences were during 1983 and 1984. During the 1982 survey it was thought that avian predators were active within the Silver Bay group, and during the next two years a greater attempt was made to record the occurrence of predation.

Crows appear to account for most of the destructive activity, as they rob unguarded nests of their eggs. Other culprits include fox, coyote, bear, gulls, and avian predators of some sort. The combined total losses attributed to predators does not appear excessive or great enough to have an impact on gull population. One shoreline site has been devastated at least once by a fox and a black bear. However, these devastating visits are rare, and the colony has been quick to recover.

Predation of adults and eggs on the large site at Silver Bay occurs each year. This site has been connected to the mainland by tailings for some time and allows access by fox and coyote, who regularly take adults, eggs, and undoubtedly chicks. The remaining sites receive only occasional losses.

## CONCLUSIONS

The number of nesting birds within a Herring Gull colony appears to fluctuate regularly. When looking at a graph of nest numbers, this loss and gain may not be apparent on smaller colonies. However, when percent of increase or decrease is used, all colonies (regardless of size), exhibit this roller coaster appearance. There are periods of static or slightly changing numbers, or perhaps even periods of sustained gain or loss over two or three years. At some point all colonies will show a sharp increase or decrease in nest numbers.

At first glance these peaks and lows in nest numbers would appear to be a result of changes in the birds environment. As conditions for survival improve there is a corresponding peak in the nesting population. As these conditions become poor, the colony responds with a reduced number of breeding birds. Herring Gulls require a number of years to reach breeding age, and it was therefore thought these peaks and lows occurred in response to a change in the survival of young birds in prior years.

Drastic increases or decreases in the survival rate of Herring Gull chicks will certainly have an effect on breeding numbers in the future. However, these effects should take place on a number of sites during the same year, or at least on all sites within a group. The occurrence of uniform peaks or dips in nest numbers, on the North Shore, over the past seven years, is evident in only two years. During the 1979 nesting seasons, twelve of fifteen sites increased, while in 1984, eleven of fifteen sites increased. The intervening years show no such correlation.

Though the survival of the chicks is an important factor in long term gull populations, the explanation of the roller coaster appearance of nesting population<sup>3</sup> is likely to be found elsewhere.

I believe the year to year fluctuations in numbers of nest-Herring Gulls is a response<sup>2</sup> to changing requirements taking place within the colony and except for rare occasions, has very little to do with changes in the environment.

Herring Gull colonies have a breeding population composed of a succession of distinct age classes. Within larger colonies all age classes may be represented, although these classes will not necessarily contain the same number of breeding birds. The smaller colonies are likely to have gaps in age classes and these gaps may occur in consecutive years.

As young gulls are fledged, they leave the breeding sites and filter towards the wintering areas. They do not return to the breeding sites until they have reached breeding maturity, and may not return to the North Shore where they were hatched. In any event, these first year breeders have little or no attraction for the nesting site from which they were fledged, and the process of selecting a suitable site becomes one of first opportunity. Once a gull has established a nesting territory and nested successfully, they return to that site for the rest of their breeding life.

Duluth seems to serve as a staging area for returning Herring Gulls and the dump is the focal point. Repeat breeders are probably the first to leave and procede up the North Shore to the breeding colony they have used in the past. At some later date first year breeders began the search for a place to establish a breeding territory. They work their way up the North Shore until

a site is found where they are successful at establishing a territory. For the remainder of the gulls breeding life it will return to this site.

Opportunities for first year breeders to establish nesting territories depends upon the number of individuals lost from the breeding population during the preceeding winter and upon the changing needs of the remaining breeding population. In years of high over winter losses, a high percentage (and possibly all first year breeders), may find sites to establish territories while in years where over winter losses are low, There may be a huge surplus of first year breeding birds and they will not be able to establish territories.

The breeding<sup>LIFE</sup> of Herring Gulls appears to be between ten and fifteen years and it is highly likely that a birds requirement for territorial space will change during that period of time. New breeders are willing to accept a much smaller area in which to conduct their nesting activities, than those birds who have nested previously. The second year there is a demand for a larger area. This demand for a larger territory may occur more than once in the breeding life of a Herring Gull, but I feel certain it occurs at least once,<sup>and</sup> during the second nesting year.

The effect of this changing space requirement on the size of a breeding colony, results in year to year changes in the number of nesting gulls the site will accomodate. The loss of a specific number of individuls with a high space requirement will allow a much higher number of birds, with a reduced space requirement, to enter the colony and establish territories, causing the population to increase. When these birds return the second year, they will occupy a much greater space. Unless over winter losses are large enough to compensate for this additional space requirement,

the nesting population will decline. Thus the roller coaster effect seen in many of the colonies.

The effect of a colony being occupied by returning breeders, and denying entry to first year breeding birds, is to create gaps in the age class distribution. When these gaps reach a point where they would normally increase the space required, their absence will create room for an increased number of first year nesters with a lower space requirement and the breeding population may increase. Conversely, when these gaps in age classes reach a point when they would normally be lost to the colony as breeders, an over abundance of birds will occur and the colony population may drop off sharply. By denying new birds entry into the colony the roller coaster effect is perpetuated.

The preceeding is based on the assumption that there is always an abundance of first year breeding birds. At least enough to satisfy the systems need for replacements. This is not always the case, for there are years when very few chicks are produced and even fewer survive. The 1980 nesting season was just such a year. A June 1st storm resulted in large losses of chicks in the colonies southwest of Grand Marais to the Knife River group. This storm ~~caused~~ high waves and was accompanied by a wind driven rain, and cold, damp weather.

The excepted age at which Herring Gulls reach breeding maturity appears to be four or five years and the breeding longevity appears to be between 10 and 15 years. Using this four or five year figure to reach breeding age, a drastic reduction in the number of replacement birds should be experienced during the 1984 or 1985 nesting season. I feel this shortage of first year breeders

took place during the 1983 nesting season and suggests North Shore Herring Gulls are reaching breeding age at three years; not four or five.

With this in mind, an analysis of the 1983 nesting populations in various groups, reveals a strange occurrence. The four western colonies, which were hit by the storm, showed an 11% increase over the 1982 breeding population. \* The four eastern colonies, which were not affected by storm showed a 13% decrease from the 1982 breeding population.

If three year olds return to the site where they were fledged, this situation should be reversed and those groups not affected by the storm should show an increase. If new breeding birds show no attraction for the site where they fledged, and simply work their way up the North Shore, taking the first available nesting site, then three year old birds were in short supply.

In fact they may have been all but depleted by the time they reached Silver Bay. All groups east of Silver Bay, with the exception of Grand Marais, either reduced nesting populations or remained stable. (the Grand Marais groups increase was 14 nests).

The North Shore Herring Gull population appears to be healthy and doing well with a few exceptions. All groups are at, or above their 1978 breeding populations with the exception of the Grand Marais and Marr Island groups; and nest site #12 in the Suzie Islands. Each of these sites will be discussed separately.

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\* Silver Bay had a 1% decrease, while the remaining groups had healthy increases of 7% at Split Rock group and 35% at Knife River.

## FUTURE NEED TO MONITOR AND SURVEY

A continuation of some form of monitoring appears desirable if long term changes in the North Shore Herring Gull nesting population are to be detected. The present selection of monitoring sites has shown close correlation to the actual group counts, except for three groups: Grand Marais, Luts<sup>en</sup>, and Illgen City.

Correlation between the total estimated, and actual North Shore nesting population, was unbelievably close in 1984. However, this may have been due, in part, to compensating errors. The estimation that 900 nests were present on island #11 in the Suzie group, could easily be in error by 200 nests. An error of this magnitude would leave the North Shore correlation at 2%, well within acceptable limits.

If changes in the monitoring system were to be made, I would suggest these changes be made in the following areas:

- Island #11, in the Suzie group, should be counted at least once to verify the estimate. Should a practical way be found to inventory this site, it should be added to the Suzie group as a monitor site and completed each year.
- Island #68 in the Silver Bay group, should be added as a monitor site. This island accounts for nearly 44% of the nesting within this group and would have been included previously were it not for the fact that a pipeline was under construction. It was felt that the constant turmoil during two nesting seasons would distort the data. This site has now returned to normal and could provide a wealth of reliable data.

GRAND MARAIS GROUP - Of the three nesting sites in this group, two have been monitored since the last full survey in 1979. The two sites are located five to six miles either side of Grand Marais. Both have fluctuated wildly with large increases followed by even larger reductions the following year. The seven years of fluctuation have resulted in an 18% reduction on site #36, and a 50% reduction on site #37. Some of the reduction on #37 may have been caused by high waves on the 25th of June, 1984. Six to eight foot waves were encountered at Silver Bay on that date while checking that group. Waves of this height would certainly have washed nests off the island. If this is the case, this site should rebound in a few years.

MARR ISLAND GROUP - This site has shown only one increase during the last six years and is presently nearly 20% below the 1978 level. The 24% decrease in 1981 is not uncommon for sites of this size. However, most sites respond the following year with a sizeable increase in nest numbers while this island did not. This may be a result of a very mature breeding population and the presence of gaps in the age classes.

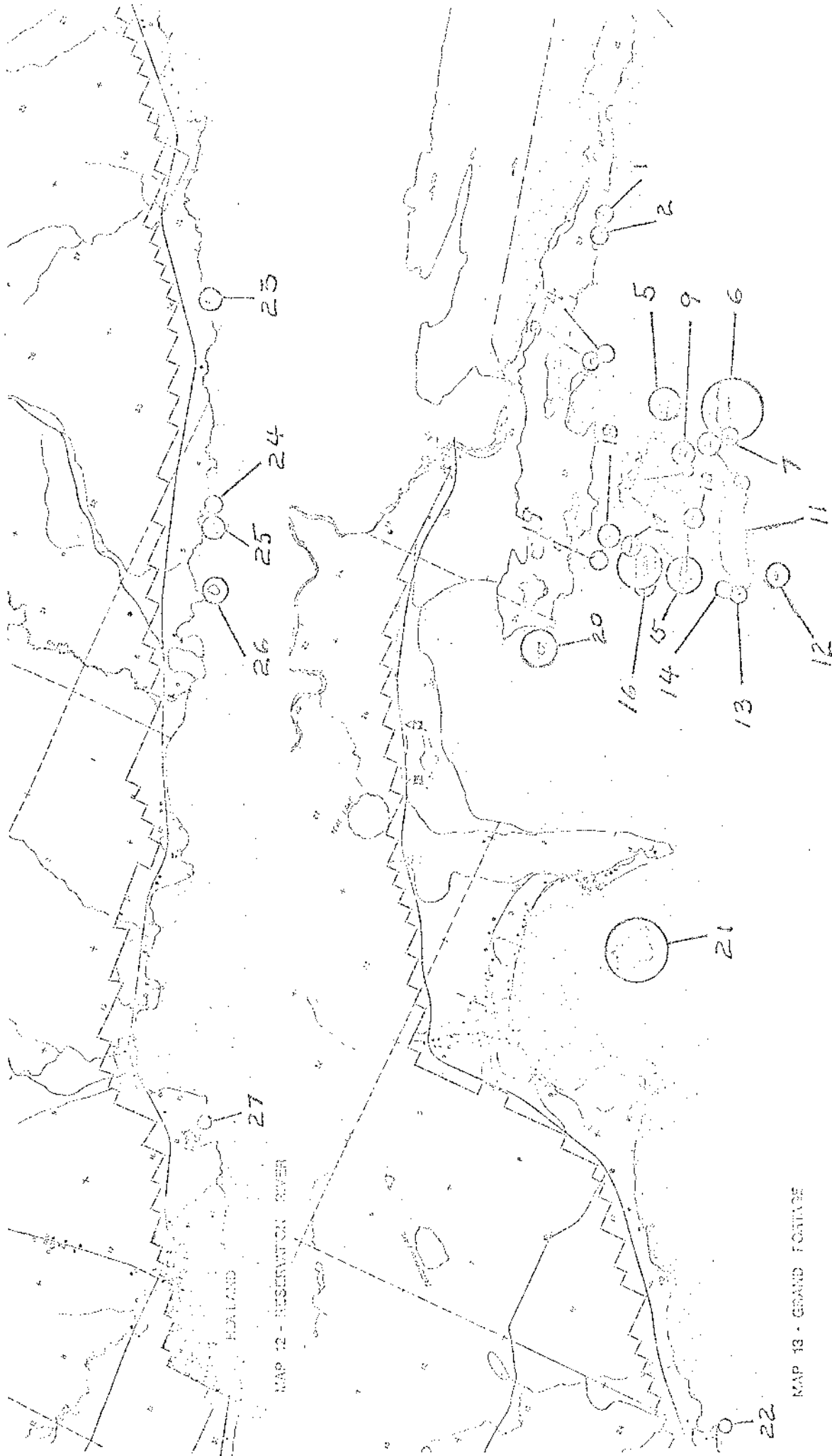
SUZIE ISLAND GROUP - Island #12 has shown decreases in the nesting population four consecutive years, and has shown only one large increase during the survey period. That increase occurred in 1980 and followed a modest decline. The chances of having four consecutive years of decline are one in twenty over the survey period, so this site may be in trouble and should be watched.



The procedure of following four years of monitoring by a full survey, is insurance that the data will not get too far out of hand without being detected. Should a change take place within the colonies which renders a monitor site useless, it is important to detect this change as soon as possible. If not detected, a loss of meaningful data over a long period is possible.

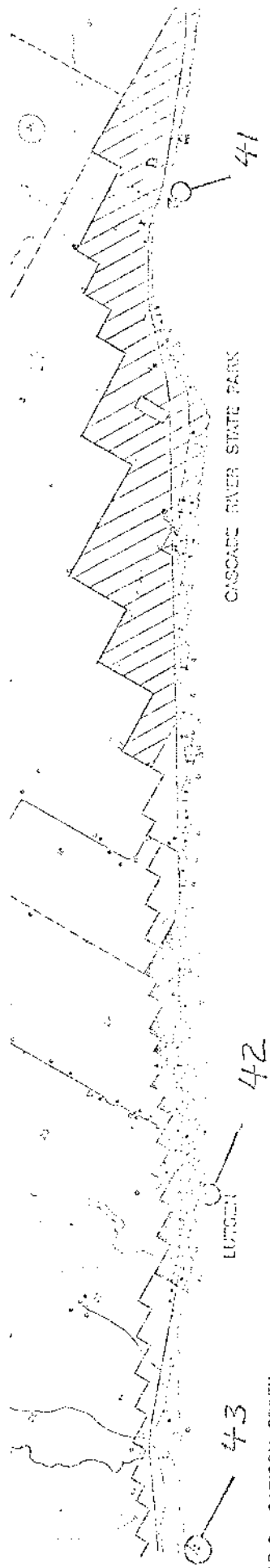
The sequence of a full survey every fifth year may not be the desired time frame, and could be shortened or lengthened without difficulty. But the longer the period of time between full counts, the greater the risk of losing meaningful data. A procedure could be established to survey all monitor sites each year, in addition to a full survey on one group. This group could be rotated and achieve the full count on each group every five years. This procedure would reduce the likelihood of not completing the field work because of inclement weather. It would have the disadvantage of not permitting a comparison of nesting numbers, throughout the North Shore, in one year from actual counts. Comparisons between groups would be a comparison of actual counts with estimates. It seems that eventually a full count would be necessary to eliminate the risk of a shift between groups going undetected. Such a shift between groups does not appear to have occurred during this project, but may be taking place between nesting sites within the Split Rock group, and possibly within the Encampment group.

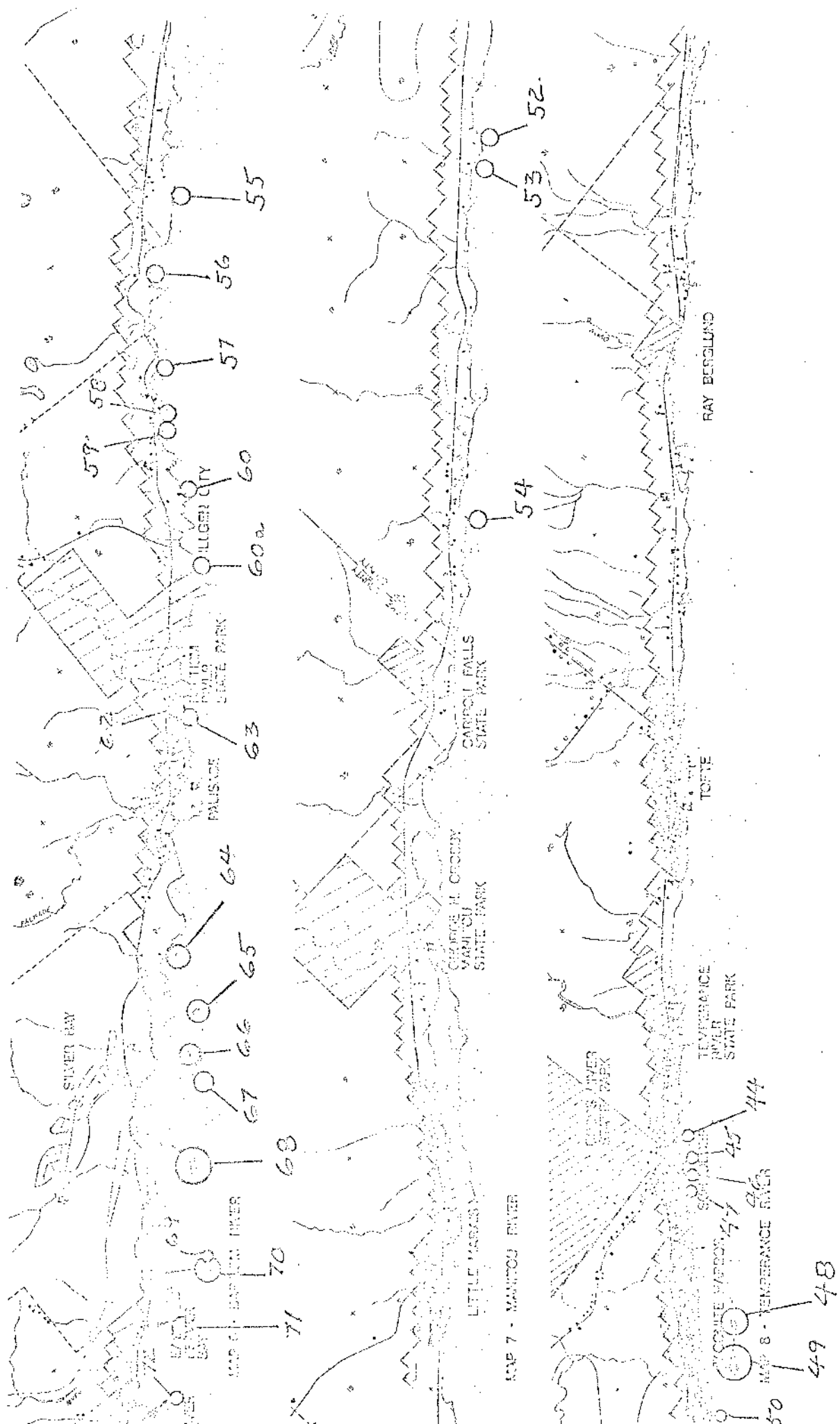
Whatever sequence is utilized, it seems mandatory to have a full survey; if for nothing else than to lend credibility to the monitor site selection.

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2023-2024

## COASTAL ZONE PLAYING AREA



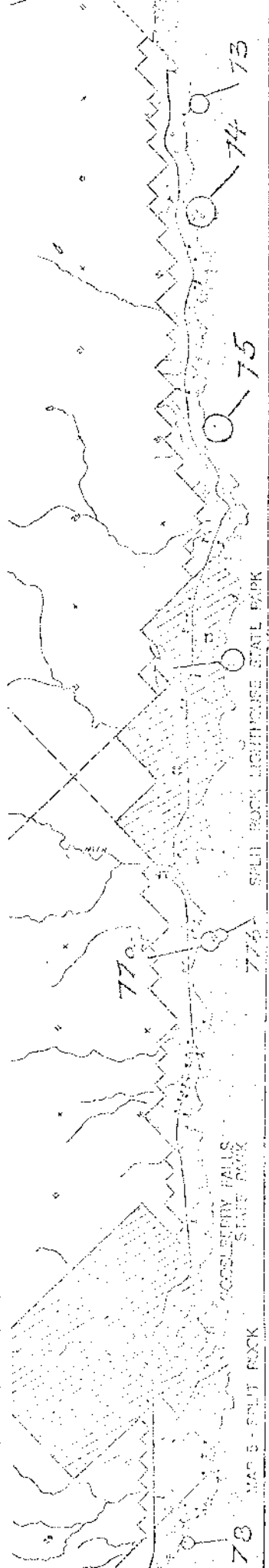
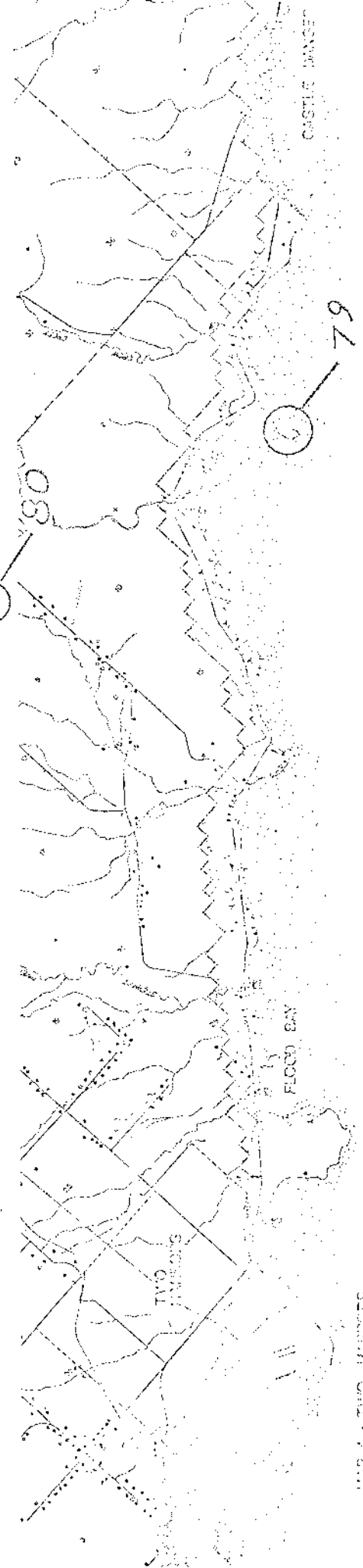
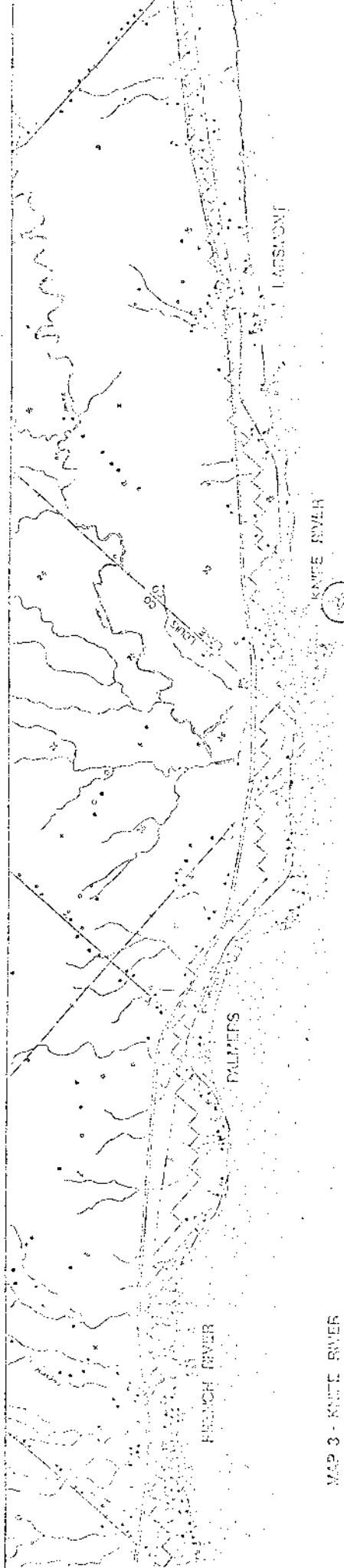


## COASTAL ZONE PLANNING AREA

**Map 7 - Manitow River**

**Legend:**

- Water
- Land
- State Parks
- Other



COASTAL ZONE PLANNING AREA	
78	MAP 5 - SPLIT ROCK
79	MAP 4 - TWO RIVERS
74	MAP 3 - KNIFE RIVER
75	MAP 2 - FLOOD BAY
76	MAP 1 - FRENCH RIVER