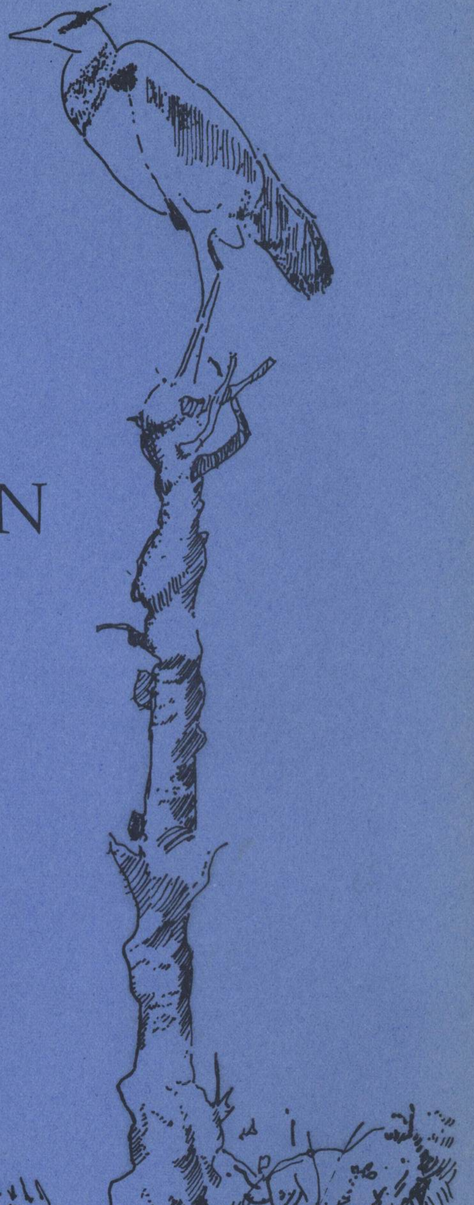
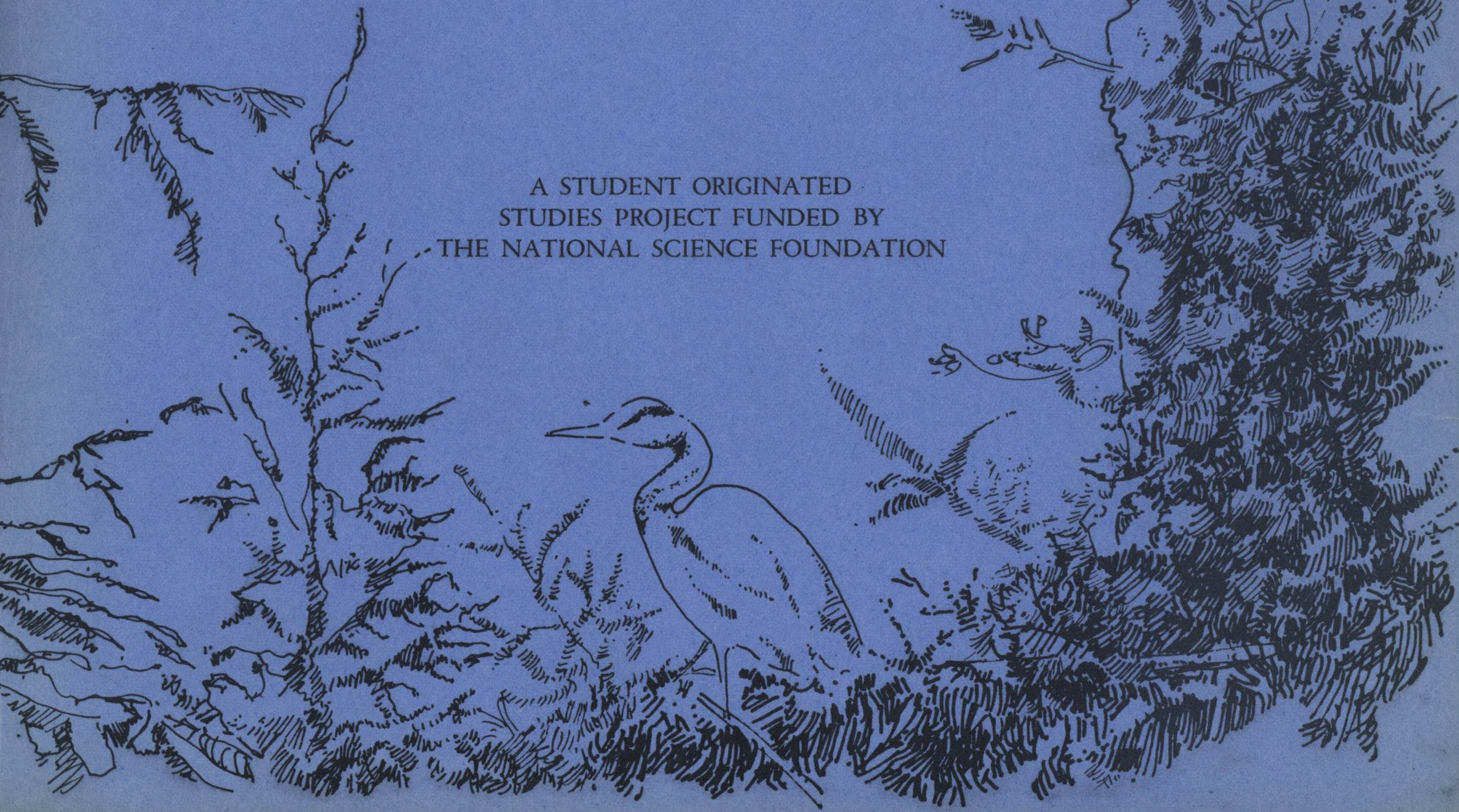


A SURVEY OF GREAT BLUE HERON ROOKERIES ON THE OREGON COAST

A STUDENT ORIGINATED
STUDIES PROJECT FUNDED BY
THE NATIONAL SCIENCE FOUNDATION



A SURVEY OF

GREAT BLUE HERON ROOKERIES

ON THE OREGON COAST

A STUDENT ORIGINATED STUDIES PROJECT

FUNDED BY

THE NATIONAL SCIENCE FOUNDATION

BASED AT THE OREGON INSTITUTE OF MARINE BIOLOGY

CHARLESTON, OREGON

UNDER THE DIRECTION OF

UNIVERSITY OF OREGON BIOLOGY DEPARTMENT

STUDENT DIRECTOR - ELLEN McMAHON

ABSTRACT

Data was collected concerning 13 heronries in the coastal region of Oregon. A total of 885 active nests were found; an average of 68 nests (range 15-175) per heronry. Eight of the 13 heronries were in canyons. Red alder, sitka spruce, and hemlock were the major nesting trees at 12 sites. The average height of nesting trees was 82' (range 40'-125') in the 7 spruce/hemlock heronries and 68' (range 55'-100') in the 5 red alder heronries. Diameters of trees were 26.5" (range 7"-44") in spruce/hemlock and 18" (range 8"-30") in the red alders. One heronry was in live oak trees with an average height of 49' (range 30'-100') and average diamter of 13" (range 5"-27"). An average of 84.5 per cent of the constructed nests were active this season.

The average arrival time was the first week in March the peak hatching period was the first two weeks in May and the peak fledging occured in the first two weeks of July.

The average number of young which fledged succesfully was 2.3 per active nest. The average per cent of young which did not survive to the fledging stage was 43 per cent. The most common age at death was 3 to 4 weeks. Individual write ups of each heronry were done including details of physical features, biological observations, and land use plans.

Topographical maps were drawn at each heronry showing the locations and species of every tree containing nests. Cross sections were drawn to demonstrate the density of vegetation and location of the nests. Land owners were contacted to determine their plans for the land containing the heronries. Maps of feeding areas near the heronry are included at the end of each individual section.

PROJECT PARTICIPANTS

Student Director
Ellen McMahon

Biological Observations	Ellen McMahon Mary Leitschuh David Werschkul
Surveying and Vegetation Analysis	Charlotte Skibinski George Williamson Scott English
Cartography Illustration, and Land Ownership Research	Gretchen Vadnais Elizabeth Gassel
Location and Observation of Feeding Areas	Randy Eisendorf Debbie Henry

Faculty Advisors
University of Oregon

Dr. Paul Rudy
Dr. Robert Terwilliger
Dr. Jack Barclay

Southwestern Oregon Community College

Mr. Robert Cooper
Dr. Benjamin Fauver
Mr. William Lemoin

ACKNOWLEDGEMENTS

This project would not have been possible without the tremendous amount of support and cooperation we received from individuals, agencies, and corporations.

Special Thanks to:

Portland Audubon Society
Harry Nehls
Harry Irons

Bureau of Land Management
Gary Gebhardt

Oregon Wildlife Commission
Chuck Bruce
Jim Hutchison
Wesley Batterson

United States Forest Service
Gene Silovsky
Carlos Pinto
John Czemerys
Bob Towers
Ed Gory
Lloyd Collett

Southwestern Oregon Community College
Audio Visiual Department

Oregon Coastal Conservation and Development Commission
Glen Akins
Neil Conan

Crown Zellerbach

Seneca Sawmill Co.

U.S. Plywood

Davidson Industries Inc.

Georgia Pacific
Ray Ayers

Menasha Corporation

Charleston Elementary School

George and Crystal Barton

The Laffertys

Range Bayer

Bob (Kewpie) Ziek

Vance Lawry

Neil Maine

David Sibley

Hilda Riehr

Mary Siebel

Steve Johnson

Amy Stewart

Mike Russell

Wayne Larson

And very special thanks to the Oregon Institute of Marine Biology for their unending patience and understanding.

Dr. Paul Rudy

Dr. Bob Terwilliger

Shirley Leegard

Jean Hanna

Norma Smith

Bud McCall

TABLE OF CONTENTS

PAGE

WHEELER

BALL MOUNTAIN

MILL CREEK

YAQUINA BAY

BEAVER CREEK

REYNOLD'S CREEK

PAGE

FLORENCE

ELBOW LAKE

NORTH SPIT

SOUTH SLOUGH

BANDON

LIST OF FIGURES

LIST OF TABLES

LIFE HISTORY

A good deal of information is available concerning the breeding biology of the Great Blue Heron. In recent years, work has been done in California by Wilburn (1971), Page (1971, 1972) and Ives (1971) dealing with clutch sizes, hatching success, mortality of the young, and factors which may have had a disturbing effect on the productivity of the population. Work by Helen Pratt (1970, 1972) concerning nesting season duration and the intervals between major events in the breeding cycle has provided us with valuable comparative data.

Articles concerning behavior which we used as reference material were done by Cottrile and Cottrile (1958), Bent (1926), Mock (1972), Meyerriecks (1960), Owen (1959), and Kirkpatric (1940). Personal communications with Range Bayer were particularly helpful in our study of feeding behavior.

The 1972 survey conducted by the Portland branch of the National Audubon Society directed by Harry Nehls, provided us with a tremendous amount of valuable information concerning the exact locations and histories of the heronries. The only other attempt to survey and research the histories of Great Blue Heron nesting colonies over a large region which we could find was done by Miller (1943) in the Philadelphia region.

Great Blue Herons (Ardea herodius) and their close relatives have a world-wide distribution. In North America the Great Blue Heron's range extends from Nova Scotia and southeastern Alaska to southern Mexico and the Galapagos Islands (Wetmore, 1965). In the coastal region of Oregon and Washington they are present throughout the year. East of the Cascades where the large bodies of water freeze, populations decrease in the winter months (Jewett et al, 1953; Gabrielson and Jewett, 1940).

Great Blue Herons are one of Oregons' largest and most known wading birds. They stand 4 feet tall, with a wing span of 70 inches (Robbins, Brown, and Zim, 1966). Their long legs, long flexible neck, and sharp bill make them easily recognized. They acquire full adult plumage at 2 years of age, with a bluish grey body, light colored head, neck, and underside streaked with brown black cap, shoulder patch, and occipital plumes. The juvenile birds (in the first year) have slate grey caps and lack the occipital plumes and black shoulder patches. The young between 1 and 2 years of age have the beginnings of shoulder patches, black crowns, and occipital plumes (Palmer, 1962).

The heron fishes standing motionless or walking slowly through the shallow water of tideland marshes, mud flats, river banks, or lakes. The Great Blue Heron's diet consists of fish and small aquatic animals (Martin, Zim, and Nelson, 1951), Their diet varies considerably depending on the availability of different prey. Great Blue Herons have been found to eat insects, crayfish, crustaceans, rodents, amphibians and reptiles (Martin, Zim, and Nelson, 1951), aquatic plants, aquatic beetles, (Palmer, 1961), and young greebes (E. McMahon). They generally feed individually. Small groups occur in areas where food is concentrated; but the birds remain separated by individual distances (Palmer, 1969). The breeding season of the Great Blue Herons in Western Oregon extends from mid-February to late July. The adults gather in colonial nesting areas called heronries or rookeries. These areas are occupied by breeding pairs for a number of years if they are not disturbed. In 1972,70 heronries were reported in Oregon, containing approximately 2000 nests. The large-

st known rookery in Oregon is located in Klamath County and consists of 300 nests (Audubon Society survey, 1972). In Western Oregon there have been no reported instances of other species nesting in the heronries. In California, Washington, and eastern Oregon great egrets (Casmerodius albus), cattle egrets (Bubulcus ibis), double-crested cormorants (Phalacrocorax auritus), and black crowned night herons (Nycticorax nycticorax) nest in the same rookeries with Great Blue Herons.

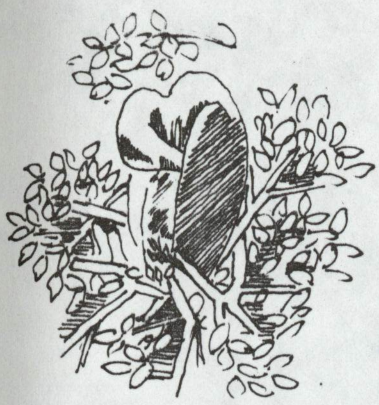
The nests are constructed by both the male and female. They are made of dry twigs and sticks which are gathered from the ground or broken from trees. They are loosely woven together to form shallow nests 18 to 48 inches across (Mike Scott, 1974) and 6 to 8 inches thick. A large percentage of the nests remain intact from the previous year. These are repaired and reused, perhaps by the same pair.

Great Blue Herons have a relatively early breeding season. In western Oregon birds begin to roost in the heronries in mid-February (Henny and Bethers, 1971). Studies done by a number of people in different parts of North America indicate that breeding times vary up to two months, depending on local climactic conditions. Intervals of time between major events in the heronry generally agree. Courting displays and copulation go on for 2 to 3 weeks.

From 3 to 5 bluish-green eggs are laid 2 days apart. Incubation does not start immediately with the first eggs; as a result eggs hatch in a period of 5 to 8 days (Pratt, 1970). This ansychronous hatching causes a considerable size disparity, which plays an important role in competition for food in the nest. The nestlings are attended constantly until they are from 3 to 4 weeks old. After 4 weeks both adults spend the day away from the heronries and return only to feed the young. Adults feed the nestlings of all ages regurgitating food, usually fish, into the bottom of the nest (Pratt, 1970).

From 40 to 50 per cent of the original clutch do not survive to leave the nest. Some factors involved in the mortality of the young in the heronry are hatching failures, starvation, wind (causing young to fall from nests) avian predation, parasites, and disease. Shooting and other man-made disturbance is a factor in some less isolated areas. Pratt (1970) found the largest number of dead young to be 3 to 4 weeks of age. The nestlings begin flapping their wings at 6 weeks of age, by the ninth week they can make sustained flights. The young return to the nest to be fed by the adults until they are 11 or 12 weeks old. The average age at departure from the nest is 81 days (Pratt, 1970; Palmer, 1961). When the adults return to an empty nest it is their signal to return to a solitary life through the winter. The nests remain empty until the next breeding season. The young of the year spend their first 2 years feeding and nesting alone until they reach reproductive maturity (Bent, 1963).

OBJECTIVES



In 1972 the Portland branch of the National Audubon Society conducted a statewide survey of Great Blue Heron nesting colonies. Location, number of nests, and ownerships were reported and compiled. In the winter of 1974 funds were given by Portland Audubon to update information concerning coastal heronries. This was necessary preliminary work for this study which was financed by the National Science Foundation from April to September of 1974 under the Student Originated Studies Program.

The main goals of this project were to locate the major heronries on the Oregon Coast and collect data concerning breeding success and habitat requirements so that recommendations could be made concerning future land management.

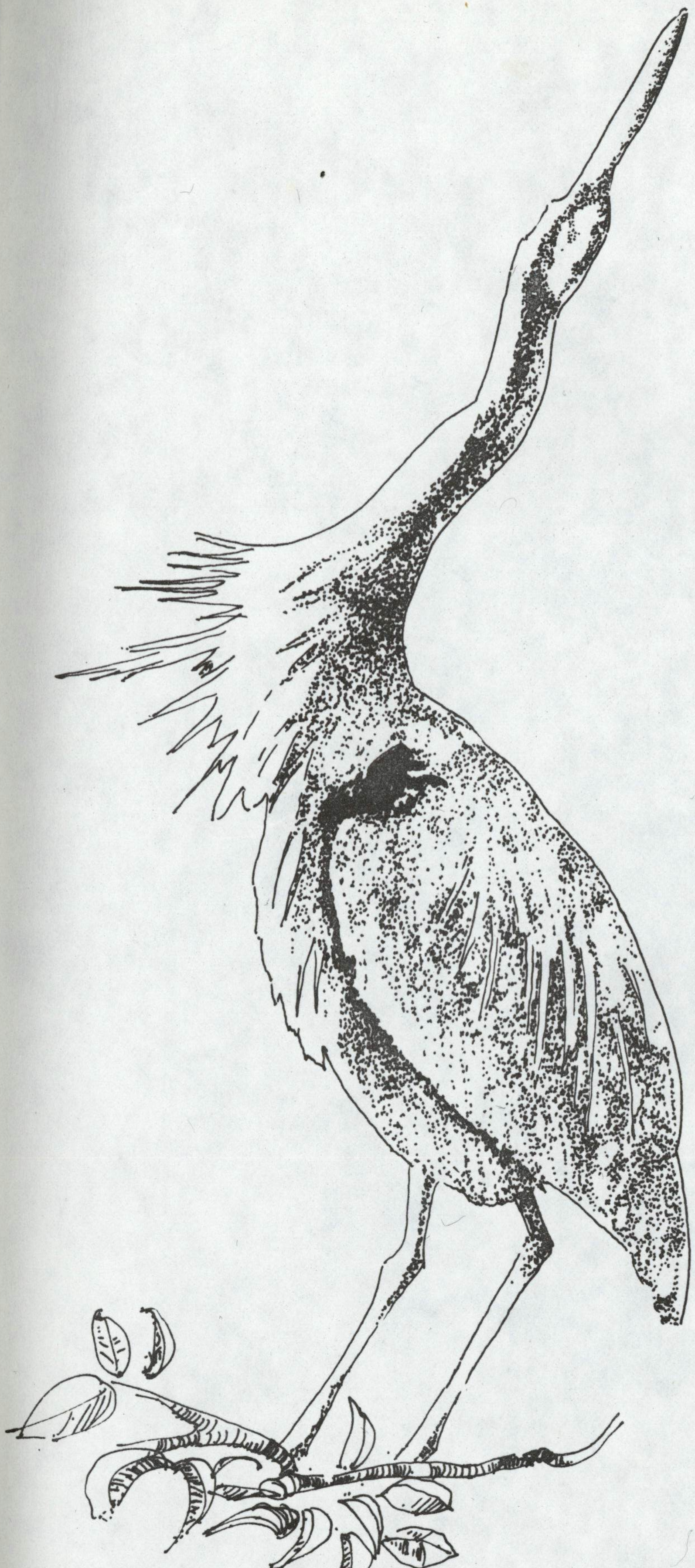
The study was broken down into four stages: biological observation, analysis of the physical features of the nesting area, research of the history and ownership of the land, and location and observation of feeding areas.

The objective of the biologists was to determine the relative breeding status of the Great Blue Heron nesting population along the coast.

The goals of the foresters were to determine the locations of each nesting tree, the distances to existing landmarks such as roads, streams, and clearcuts, and the topography and vegetation of the immediate area.

To determine future land use plans, two members of the project contacted land owners. Maps and illustrations were drawn to aid in the interpretation of data concerning habitat.

The portion of the project dealing with feeding areas was not included in the original proposal, but was found to be a necessary addition to studying Great Blue Heron habitat. The purpose of this section of the study was to locate and record some of the areas used by the Great Blue Heron to feed.



METHODS

METHODS

METHODS OF LOCATION

During February and March, heronry sites were located with the assistance of the 1972 Audubon survey, the U.S. Forest Service, the Oregon State Wildlife Commission, various timber companies, and local residents responding to requests for information in coastal newspapers. The nests remaining from previous breeding seasons were counted and the trees containing nests were marked in 7 of the 13 heronries.

BIOLOGICAL METHODS

The biologists were primarily concerned with the dates of significant breeding events throughout all of the coastal heronries, and an approximation of the populations and general productivity. Because of the varied environments and locations of each heronry as well as the time of year that each was located, a variety of methods was used.

The coastal zone was divided into three sections and one biologist worked on the heronries in each area. In most cases, visits were made at least once a week during April, May and June (Appendix 2). Observations were made from the ground and from blinds built in trees in the periphery of the heronry. No attempts were made to climb the trees containing nests. To our knowledge, breeding activities were not hampered because of our presence.

In some cases, establishing the exact arrival time of the birds into the heronry was not possible; as they came between visits. In these cases, the estimated time of the first hatch was used for backdating. Two to 3 weeks were allowed for nest building and courtship, 4 weeks for incubation (Pratt, 1970), establishing the arrival time at 6 to 7 weeks before the first hatch. In cases where the first hatch was not observed, backdating was done from the peak hatch by subtracting an average of 3 weeks.

Activity of each nest was determined by the observation of egg shells which had clearly fallen from one particular nest, whitewash on the edges of the nest, presence of young birds, and arrival of adults to the nest. In some cases where visibility was completely obstructed, sound from the nest was the determining factor.

The first hatch dates were only positively set when young birds were heard in the nests. Broken egg shells found below the nests could not be used as evidence of the first live young because they may be the remains of unsuccessful hatches. To estimate first hatching dates, egg shells were examined on the first visit and if counts were low, and young were heard, it was estimated that the season had recently begun. Egg shells were judged as recent if they contained a white mucus or blood vessels. If young were visible on the first visit, an approximate date of hatching was estimated by their age compared to young of a known age in other areas.

The relative number of egg shells counted was used to determine the peak hatching activity and the length of the hatching period. Peak hatching time was established to be the time when most egg shells were collected.

The average number of young per nest was determined from a sample of as many nests as could be seen from any vantage point in the heronry. Counts were taken from May 16 to June 26.

The per cent of the initial clutch which did not survive to fledge was determined at 5 heronries. This mortality rate was determined by dividing the average number of young per nest at each heronry by 4.19 (clutch size reported by Henny and Bethers in 1971, Albany, Oregon). The quotient was the average number of young which had survived to that stage. This number was subtracted from 100 to get the per cent of young which had died since the eggs were laid.

Peak fledging was designated as the time when approximately one half of the young were taking extended flights from the nests. At some heronries observed, views were sufficient to account for more specific information concerning population trends. This included accounting for adult herons unsuccessful in hatching young, instances of pairs moving to another location within the heronry to renest, the death of a young bird before or after the counts of young per nests were made, and deaths of the young in a nest before fledging.

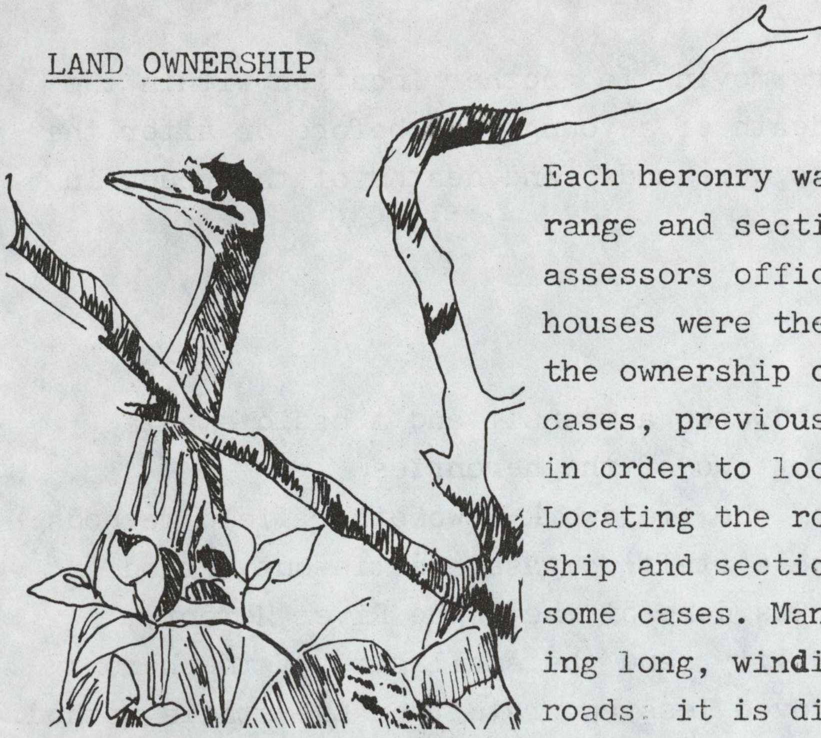
SURVEYOR'S METHODS

For the surveying fieldwork, a transit and a basic stadia method was used in all but two of the heronries.

In the early stages of the fieldwork, two other field methods were tried. At Elbow Lake a staff compass and tie-out method was used. A hand survey was done at the Rogue River Heronry, because of poor accessability, and the small size of the heronry. Both of these methods proved less accurate than the stadia method. Mapping was done to create an accurate representation of each heronry from the data collected in the field. In addition, the positions of natural and man-made landmarks such as ridgetops, bodies of water, and roads were established in relation to the heronry. These landmarks aided in locating the heronries on existing contour maps, and play an important part in determining buffer zone boundaries. Nesting sites were also located on fire maps in quarter section plots.

A vegetation inventory was compiled concurrently with the surveying, and was divided into floor, understory and upperstory vegetation. Identification of vegetation was determined in the field with the exception of unfamiliar plants which were brought out of the area and keyed out using one of several source books (See Bibliography). The species of each nesting tree was noted along with the tree number, diameter and height. Sketches were drawn for the cartographers, who drew cross sections of each nesting area. Trees with nests were tagged and numbered with aluminum plates when land owners' permission was granted. These tags will facilitate future observations of the heronries.

LAND OWNERSHIP



Each heronry was located by township, range and section. Records in the tax assessors office of the county courthouses were then utilized to determine the ownership of the land. In some cases, previous owners had to be found in order to locate present owners. Locating the rookeries by range, township and section presented problems in some cases. Many are reached by traveling long, winding, and unused logging roads; it is difficult to relocate such areas on a map. Fortunately, these heronries are on Forest Service land and the locations were finally pinpointed by rangers from the area.

Once the ownership was established, the owners were approached to find out what plans, if any, they had for the land on which the heronry was located. This was first done with letters. They stated our purpose, which was to discover the status of land, and were sent to lumber companies, the Forest Service and private owners. We received only two replies.

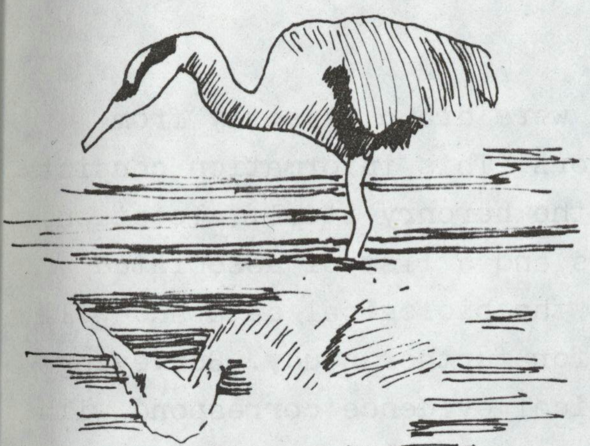
Though the letters were unsuccessful, they did serve to make the next step of personally contacting each owner easier. In most cases people remembered the letters and our purpose was more easily explained and understood.

In all cases people were receptive and willing to discuss what would happen to the different heronries. However, it was not always possible to obtain a specific answer. The logging companies that own the land on which two of the heronries occur were not aware that the nesting areas were on their land and the representatives could not immediately commit themselves to a statement. One of these companies did lend us a color air photo, on which we pinpointed the location of the heronry. The Forest Service could not give us specific answers for the future of the heronries on

Forest Service land because a plan for the overall management of the Siuslaw National Forest is just now being drawn up.

The only heronries for which the future land use is specifically known are on the Rogue, and Columbia rivers. These will not be cut. For the others there has been no commitment on the part of the owners.

FEEDING STUDY METHODS



Two observers located feeding areas by traveling along the banks of rivers, estuaries, sloughs, inlets and marshes, and recording instances of feeding herons. The feeding areas were designated on various maps and short descriptions of areas used by the herons were recorded for further mapping. Observations were made with 7x35 binoculars and a spotting scope with a 60 power zoom lens. Areas were observed between June 25 and August 23. During the first few weeks of observation only adults were observed because the young had not left the nest. As the summer progressed, both adults and young were observed feeding on the mudflats. All of the 17 major estuaries (larger than 100 acres) were observed with the exception of the 204 acre Salmon River area. Seven of the 9 minor estuaries were checked. The 2 unchecked areas were Elk Creek and Neskowin Creek Each estuary was observed for two low tides, usually on separate days, unless two low tides occured during daylight hours on a single day. Observations were made within 3 hours before and after low tide. This time period was chosen because herons commonly feed in areas where waters are shallow enough for wading and food is more fully exposed.

At each estuary, several view points were chosen around the periphery of the water. The observers traveled to each place and watched a section of the estuary for approximately 10 minutes, at which time feeding herons were counted in that section. Approximately 100 minutes of actual observation time was logged for each low tide Counts for each section seen from one view-point were averaged for the two low tide visits and represent approximately 200 viewing minutes. Each dot on the feeding maps represents one feeding heron, and the total number of dots in a particular section is the average number of herons sighted in the section during the two observations.

CARTOGRAPHY METHODS

The maps included in this survey were drawn directly from information collected by the surveyors. This information consists of immediate topographical data of the heronry itself, location, height, and species of nesting trees and a list of associated vegetation. The maps correlate with the biological data and will also be of use in relocating trees for further study. Surveying stakes left at each heronry as physical evidence correspond with baseline set-up points drawn on the maps. Distances between trees are measured from center to center of the species symbols. These symbols are not drawn to scale.

The description of a heronry includes a cross section taken from the map. These cross sections are intended to augment the maps in further illustrating the relationship among nesting trees, the nests, associated vegetation and topography. The surveyors' information and the biologists' data (number of nests per tree) were used in drawing the sections. Nests drawn in the trees serve as a representation of nest distribution. They are not placed in the exact position in which they occur in the actual heronry.

RESULTS

SUMMARY OF RESULTS

Thirteen active heronries were located in the coastal region of Oregon in the 1974 breeding season. The total number of active nests was 885. The average number of nests per heronry was 68 (range 15-175). Six of the heronries had nests constructed predominantly in sitka spruce, 5 in red alder, 1 in hemlock, and 1 in live oak. The tree heights averaged 82' (range 40'-125') in the sitka spruce/hemlock heronries, 68' (range 55'-100') in the alder heronries, and 49' in the heronry built in live oak. (See figure 1, and table 1, pages 20 and 21).

Eight of the 13 nesting areas were in canyons or stream beds, 3 were in relatively flat areas, and 2 were on islands. The average area containing nests was .9 acres (range .2-2). (See figure 2, and table 1, pages 21 and 22).

The percentage of active nests compared to the total number of nests was determined at 8 locations. The percentage of constructed nests which were active directly related to the amount of disturbance that the area was subjected to. (See table 2, page 23).

In 5 areas which showed no signs of past or recent disturbance 92 to 97.8 per cent of the nests contained a breeding pair. Three areas with nest activity of 61 per cent, 64 per cent, and 78 per cent show evidence of obvious disturbance. The heronry with 61 per cent activity had a logging road constructed within 80 feet of the nests, logging nearby during the breeding season, and 3 adults shot at the nests. The heronries with 64 per cent and 78 per cent activity had clearcutting within 100 yards in the last 10 years which made the surrounding trees susceptable to blow down, and exposed the trees with nests.

The average arrival time was the first week in March (varying from early Ferbruary to mid-March). The average first hatch was the second week in April (range March 20-April 25), the average peak hatch was the first week in May (range April 17-May 14) and average peak fledging period was the first week in July (range June 20-July 15). (See table 3, page 25).

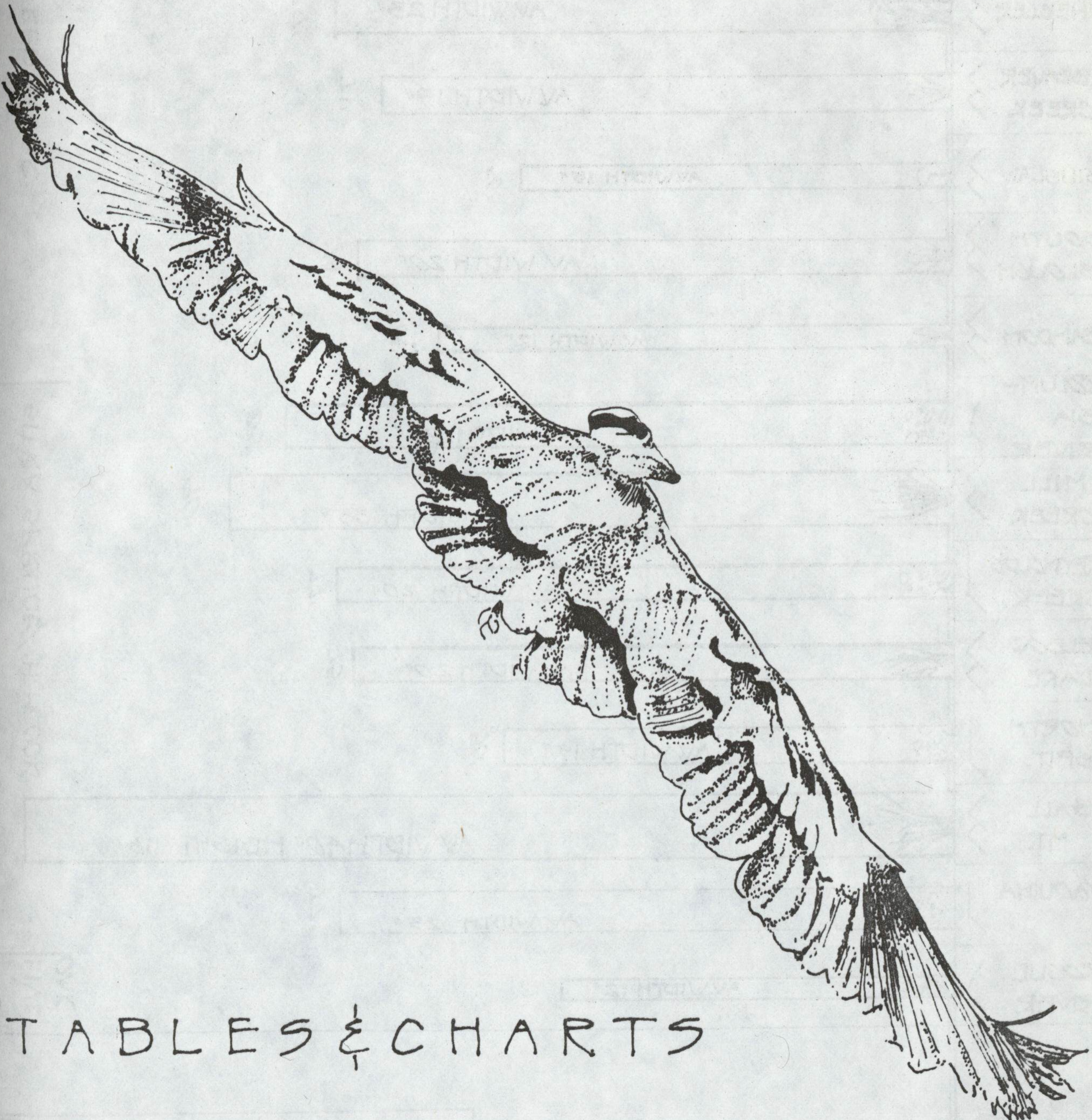
The intervals between events suggest that there is a 2 to 3 week period of roosting, courtship displays and copulation, and a 4 week period of incubation. These intervals also suggest that the young are 8 to 9 weeks old before short flights are made from the nest. We considered this period of short flights to be the fledging date, although the young were seen to return to the nest until they were 11 or 12 weeks of age.

The pairs which began nesting earliest fed their young for longer than the pairs which nested later. The intervals between major events are fairly consistent with those obtained by Pratt (1970), at Audubon canyon ranch, in central California, and Henny and Bethers (1971) in Albany, Oregon, in the Willamette Valley. The arrival times of the birds on the coast appears to be later than these other two locations.

The average number of young fledged successfully per nest at heronries was 2.3. This compares with the 2.0 found by Ives in California (1972), 2.6 found by Henny and Bethers in Albany (1971) and 2.5 found by Vermeer in Alberta (1967). Pratt (1970) found 1.5 to 1.7 young per nest because of the smaller clutch size found in the more southern locations.

Since egg counts were not obtained this season, we calculated nesting mortality rates by using the clutch size obtained by Henny and Bethers in Albany (1971) of 4.19. Assuming this to be the average clutch count at the 5 heronries, an average 43 per cent (range 36.7-51 per cent) of the young died between egg laying and fledging. This compares with figures obtained by Ives (1972) of 49 per cent, Pratt (1967) 45 per cent, and Miller (1943) of 40 per cent. The most common ages at death were from 3 to 5 weeks old. Whole broods of young were found dead in the nest (perhaps from disease) or below a nest (perhaps from high winds). Birds in 2 heronries were shot, 13 young and 3 adults were killed.

Of the 13 heronries observed, 6 are located less than a mile from shoreline areas suitable for feeding. Five are located less than 5 miles from identified feeding spots. Two are between 5 and 10 miles from any large body of water. (See table 1, page 21).



TABLES & CHARTS

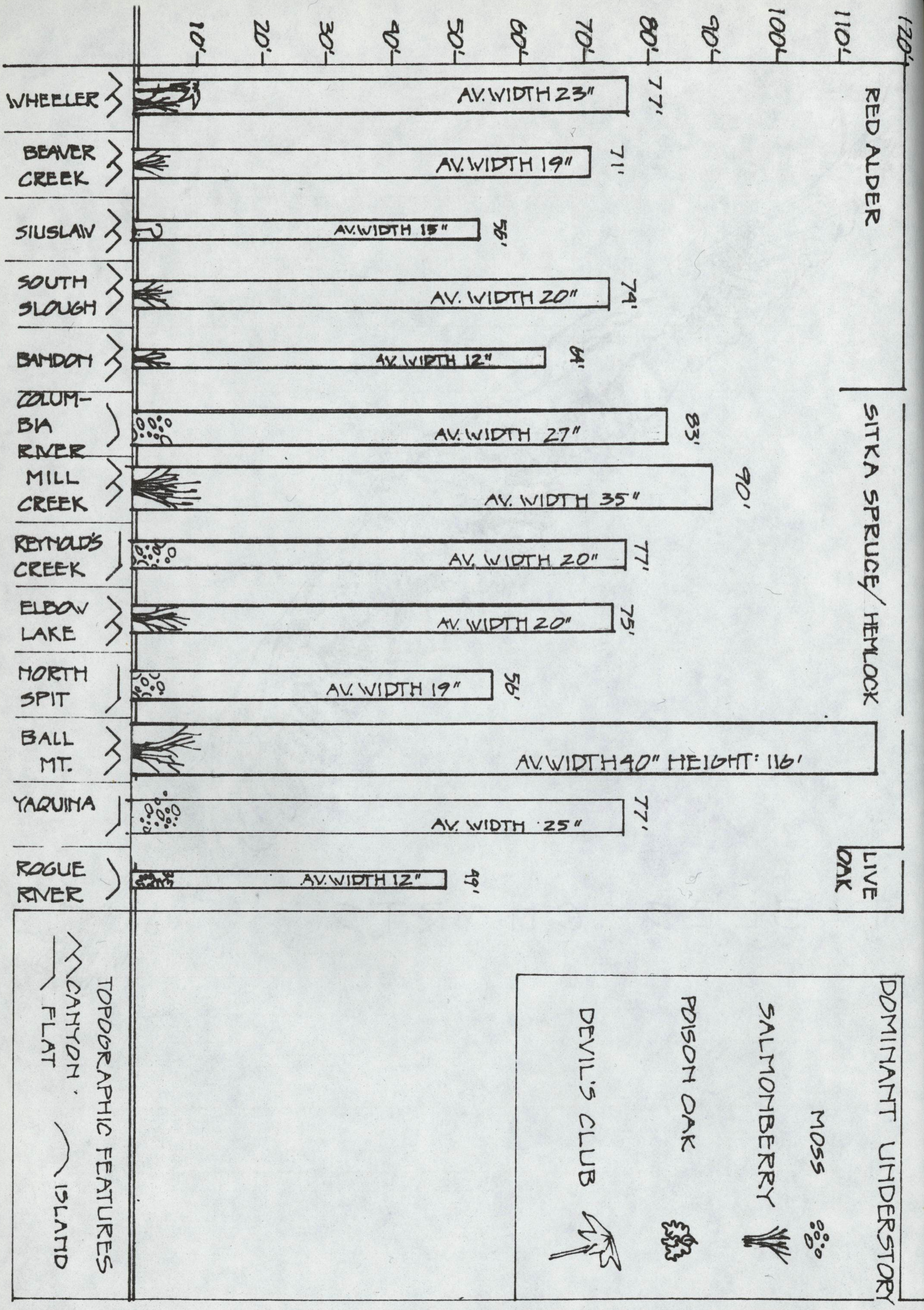

10'
20'
30'
40'
50'
60'
70'
80'
90'
100'
110'
120'
WHEELER
AV. WIDTH 23"
77'
BEAVER CREEK
AV. WIDTH 19"
71'
SIUSLAW
AV. WIDTH 15"
56'
SOUTH SLOUGH
AV. WIDTH 20"
74'
BANDON
AV. WIDTH 12"
64'
COLUMBIA RIVER
AV. WIDTH 27"
83'
MILL CREEK
AV. WIDTH 35"
90'
REYNOLD'S CREEK
AV. WIDTH 20"
77'
ELBOW LAKE
AV. WIDTH 20"
75'
NORTH SPIT
AV. WIDTH 19"
56'
BALL MT.
AV. WIDTH 40" HEIGHT: 116'
YAQUINA
AV. WIDTH 25"
77'
ROGUE RIVER
AV. WIDTH 12"
49'
RED ALDER
SITKA SPRUCE/HEMLOCK
LIVE OAK
TOPOGRAPHIC FEATURES
CANYON
FLAT
ISLAND
DOMINANT UNDERSTORY
MOSS
SALMONBERRY
POISON OAK
DEVIL'S CLUB

FIGURE No 1

PHYSICAL FEATURES OF HERONRIES

	GENERAL TOPOGRAPHY			PREDOMINANT TREE & HEIGHT			UNDERSTORY					
	CANYON	ISLAND	FLAT	HEMLOCK/ SPRUCE	ALDER	LIVE OAK	SALMON-BERRY	MOSS	POISON OAK	DEVIL'S CLUB	ACREAGE	MILES TO FEEDING AREA
OLUMBIA R.		X		83' (45'-110')				X			.9	<1 MILE
HEELER	X				77' (65'-85')					X	.6	<5
BALL MT	X			116' (100'-125')			X				.3	<10
ILL CR	X			90' (85'-100')			X				.3	<10
AQUINA			X	77'				X			2.0	<5
BEAVER CR	X				71' (55'-85')		X				1.0	<5
EYNOLDS CR			X	77' (60-120')				X			1.6	<5
SIUSLAW	X				56' (50'-80')						.9	<1
LEBOW LAKE	X			75' (60-120')			X				.7	<1
ORTH SPIT			X	56' (40-90')				X			.9	<1
UTH SLOUGH	X				75' (55-125')		X				.6	<1
BANDON	X				64' (50'-80')		X				1.3	<5
ROGUE R.		X				49' (30-100')			X		.2	<1

TABLE #1

HERONRY ACREAGE
AND
NUMBER OF ACTIVE NESTS

FIGURE Nº 2

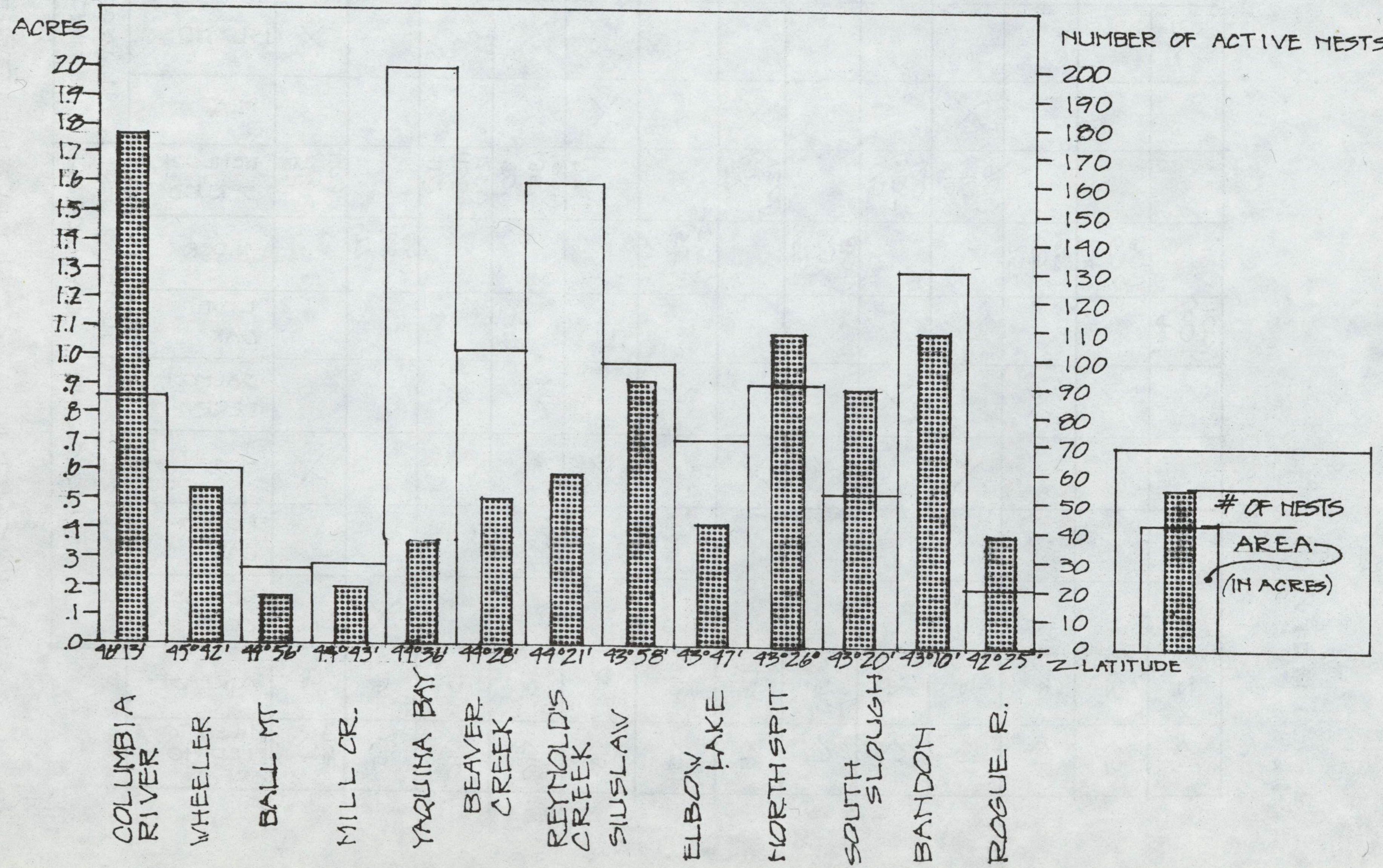


TABLE No 2

NEST DISTRIBUTION, % OF ACTIVE NESTS, & INFANT MORTALITY RATES

HERONRY	# OF NESTS	# OF TREES	% OF ACTIVE NESTS	YOUNG PER NEST	% OF YOUNG DEAD BEFORE FLEDGE	NEAREST DISTURBANCE
COLUMBIA RIVER	175	48	95	2.7	37	———
WHEELER	54	19	61	2.1	51	ROAD CONSTRUCTION & SHOOTING
BEAVER CREEK	50	35	69	—	—	PAST LOGGING & BLOWDOWN
REYNOLD'S CREEK	58	47	78	—	—	SHOOTING PAST LOGGING BLOWDOWN
SIUSLAW	92	44	98	2.5	40	———
NORTH SPIT	108	67	93	—	—	AIR TRAFFIC
SOUTH SLOUGH	89	39	97	2.6	39	———
BANDON	109	78	92	2.2	50	———

CHRONOLOGY OF MAJOR BREEDING EVENTS

TABLE Nº 3

HERONRY	ARRIVAL TIME	1ST HATCH	PEAK HATCH	PEAK FLEDGE
COLUMBIA RIVER	MID-FEB	MARCH 20	APRIL 17-20*	JULY 1-7*
WHEELER	MID-MARCH	APRIL 22*	MAY 1-7*	JULY 10
BEAVER CREEK	MID-MARCH	APRIL 19-25*	MAY 10	JULY 1-12*
REYNOLD'S CREEK	MARCH 1-7	APRIL 11*	MAY 2*	JUNE 29-30*
SIUSLAW	MARCH 1-7*	APRIL 7-14*	MAY 1-7	JUNE 20-30*
NORTH SPIT	MARCH 1	APRIL 12*	MAY 5	JULY 10
SOUTH SPIT	MARCH 7*	APRIL 19*	MAY 1-14*	JULY 10-15*
BANDON	MID-FEB*	APRIL 3*	END APRIL	EARLY JULY

*INDICATES EVENTS DIRECTLY OBSERVED! OTHER DATES WERE OBTAINED BY BACKDATING & EXTRAPOLATION

CONCLUSIONS

CONCLUSIONS

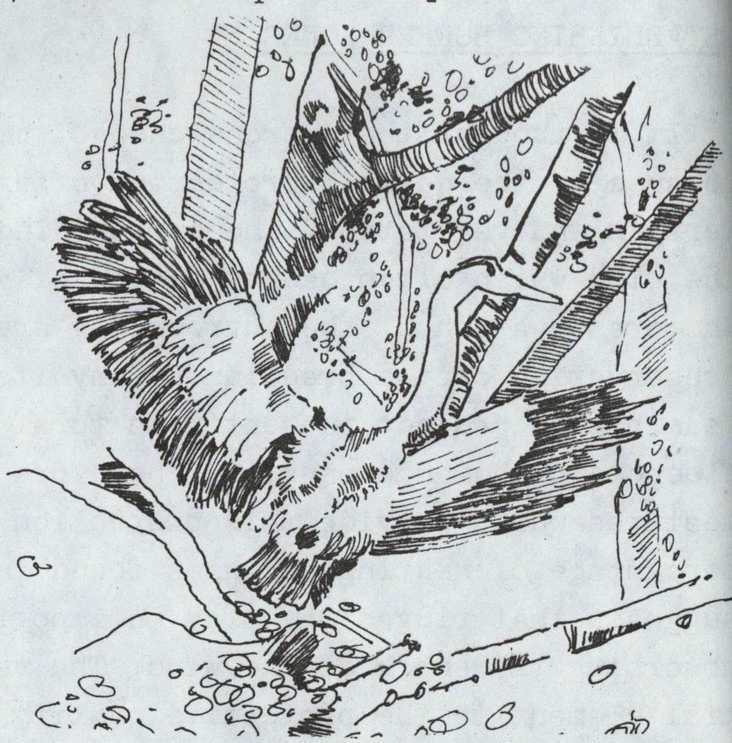
PROTECTION OF HERONRIES

There are at least two possible approaches to studying and assuring the continuation of heronries. One is to establish buffer zones around existing heronries to protect them from the spread of mans' influence. The second is to define as accurately as possible the conditions herons require in their nesting sites. This would make it possible to determine if suitable alternate nesting sites were available nearby in cases where sufficient disturbances to cause abandonment were imminent.

ESTABLISHING BUFFER ZONES

It is thought that Herons choose the site in which they nest because of the natural protection offered by the surrounding terrain and vegetation. The surroundings provide (a buffer) from the wind which often causes deaths of young and damage to nests. The preservation of the surrounding area would seem to insure the preservation of the breeding colony itself. It is not always feasible to protect the entire natural surroundings from the influences of human expansion. Therefore the essential natural features which provide this protection must be identified. The percentage of nesting colonies found in canyons in this study suggests that ridges may play an important role in deflecting or absorbing the shock of the wind. The vegetation may be an essential element to the protective quality of the ridges. In some cases the sheltering effect of the ridge is destroyed by removal of its timber. The old Ball Mountain heronry on Bureau of Land Management land is an example of this. A clearcut was made up to the edge of the nesting area. Eight acres of timber were left to buffer nesting trees from the high velocity wind blowing over the newly exposed hills. Unfortunately, this was not sufficient to protect the trees. All the trees with nests blew down and the birds were forced to relocate. The heronries at Reynolds Creek and Beaver Creek contain a relatively large percentage of inacti nests in the 1974 season. These may have been inactive for severa years. Both have clearcuts near the abandoned sections. Disruptio of the birds and/or wind damage may have contributed to making th locations unsuitable for nesting. In the Beaver Creek area, there appears to be a shift of the nesting site toward the more shelter canyon. At the Reynolds Creek heronry, there are many blown down trees between the abandoned section and the clearcut.

The choice of remote nesting sites would seem to indicate that another criterion for the nesting place is the absence of human disturbance. The shift in nest locations at the Wheeler heronry is an example of this preference. (See page 50). Here the herons returned to nest in the 1974 season dispite the presence of a newly constructed road. However, all of the new nests were built in the section of the heronry farthest away from the road and nests nearest the road were not used. This shift in nesting sites may have been caused by disturbances immediately associated with the new road; heavy traffic from logging trucks or the shooting near the road of three adult herons. The shootings here as well as 14 young birds shot at Reynolds Creek, were perhaps caused by increased accessability and visibility of the nests from the road. It is evident that these factors must also be considered in establishing a buffer with man in mind. The herons large size, concentrated nesting colonies, and the inability of the young to leave the nes make them easy targets. Shooting deaths are not uncommon when nesting sites are discovered, and law enforcement concerning



misuse of firearms is difficult in remote forested areas.

The Rogue River heronry is highly visible, however it is surrounded by a river with a rapid channel and is also protected by luxuriant poison oak. North Spit would also seem accessible if not for a dense, often impassable marsh. Protection of this marsh would most likely establish protection of the heronry, although more study of the surrounding forest would also be needed.

More must be understood about the reactions of herons to noise such as chain saws, road traffic and foot traffic. Through the course of this study something has been learned about fairly quiet approaches to heronries by foot or canoe. When observers approached, the adults often flew from the immediate nesting area to roost in nearby trees. They returned after varying lengths of time depending on the stage of the breeding season. Adult birds stayed away for longer periods of time before eggs were hatched and after young were older than 3 weeks. Birds under 3 or 4 weeks of age did not seem to respond to activity under the nests and continued what appeared to be normal behavior. Young birds of approximately 7 weeks of age regergitated when observers were moving below the nests. The herons took no apparent notice of movie camera noises and in the case of the North Spit heronry have adjusted to frequent and low flying air traffic.

HABITAT SPECIFICATIONS

Herons have been reported to use the same nesting area for over 100 years (Audubon Survey, 1972) if favorable conditions prevail. Further and more intensive study must be made of the heronry habitat itself in order to understand what constitutes these favorable conditions. In the course of this study, similarities in location and physical features of the heronries have become evident. Vegetation lists and cross sections point out some of these similarities. At this point a number of generalizations can be made concerning specific habitat requirements of Great Blue Heron populations along the Oregon Coast. Further studies concerning the elements of each individual heronry are necessary to more fully understand habitat requirements. This would require more detailed study of tree type, age, height, density, and associated vegetation in the heronry and surrounding areas. Additional study would also involve soils, drainage patterns, local winds, and microclimatic conditions, slope, distances to feeding areas, proximity to existing disturbances, and distribution and density of the nests in the trees. A study such as this may lead to a more specific definition of habitat requirements of the Great Blue Heron and would aid in the understanding of their choice of nesting sites.

Assurance of a stable Great Blue Heron population depends upon the availability of alternate nesting areas in the event that the birds must relocate. This would involve setting aside areas in the immediate vicinity which meet most of the habitat requirements of the existing heronry.

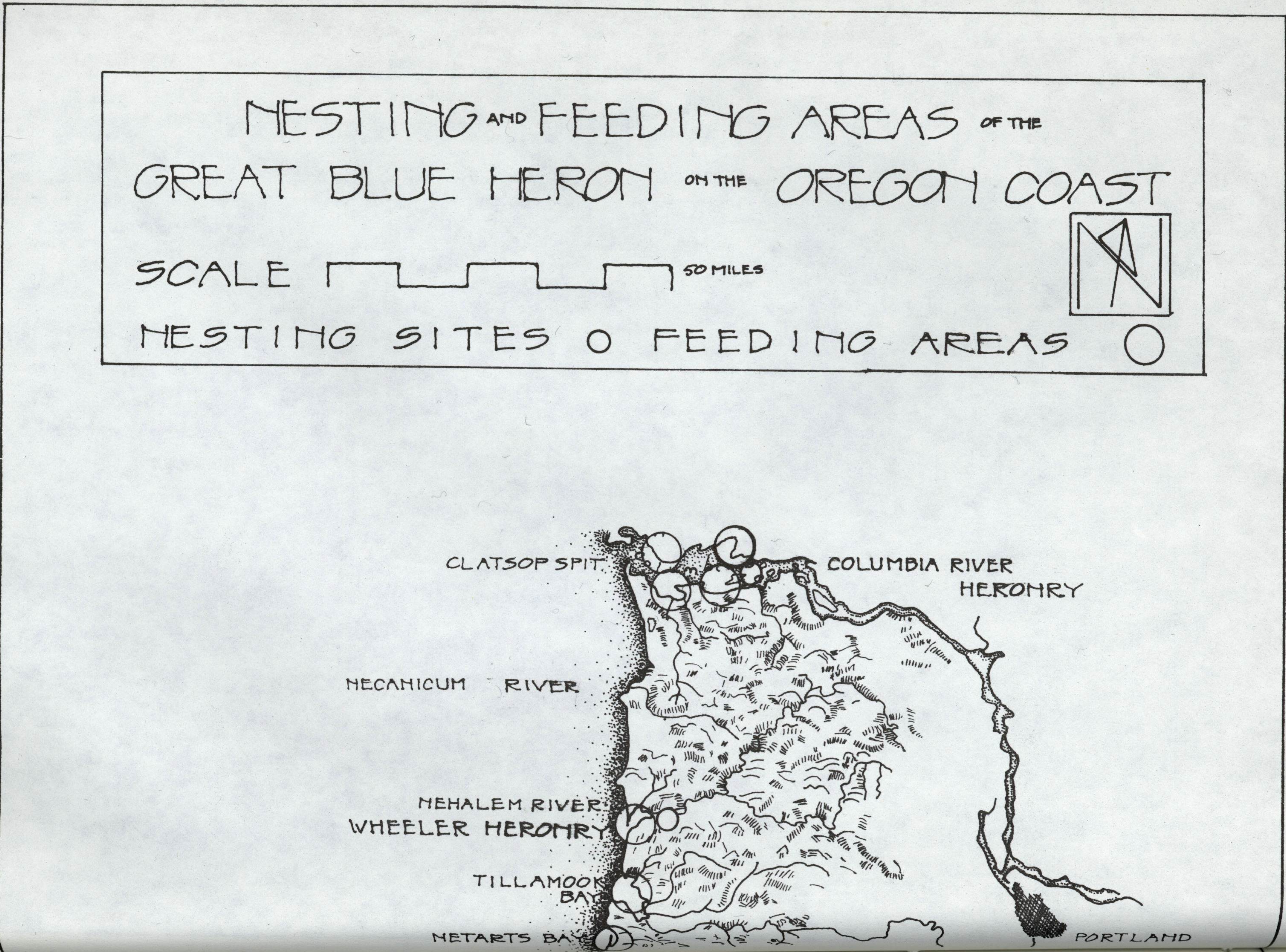
OBSERVATION OF FEEDING AREAS

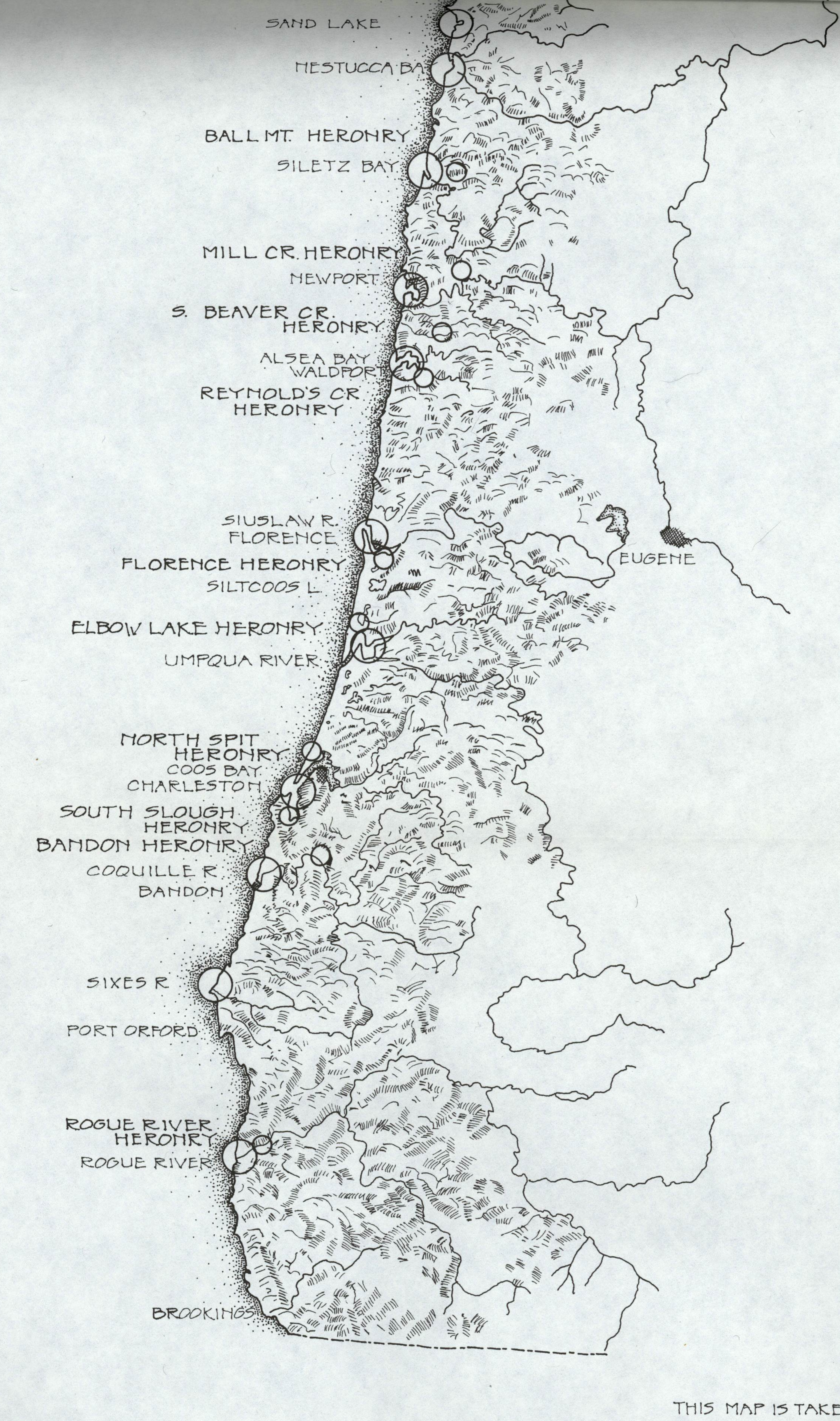
The observation of heronry sites increases the ability to predict what disturbances will most affect herons and what alternate nesting sites may be available, should a present site be destroyed. Another aspect of the habitat of the Great Blue Heron is the area in which it feeds. The following section presents a discussion and maps of some of the feeding areas which have been located on the Oregon Coast.

The maps show major roads and urban development near the feeding areas. Each dot on the maps represents one heron - the total number of dots being the average number of herons feeding at that place during two low tide observations. More work is needed, however, to know the actual amount of feeding done in an area as well as the total number of herons using that area. The few dots present on the maps do not accurately demonstrate the importance of the estuaries as Great Blue Heron feeding habitat. The numbers of herons feeding at a particular place can vary according to the height of the tide, the time of day, weather, availability of food, and perhaps other factors. Much more observation is needed to accurately account for and discover all the possible factors which affect the numbers of herons seen. The work done by this project is just a start at locating the important feeding areas.

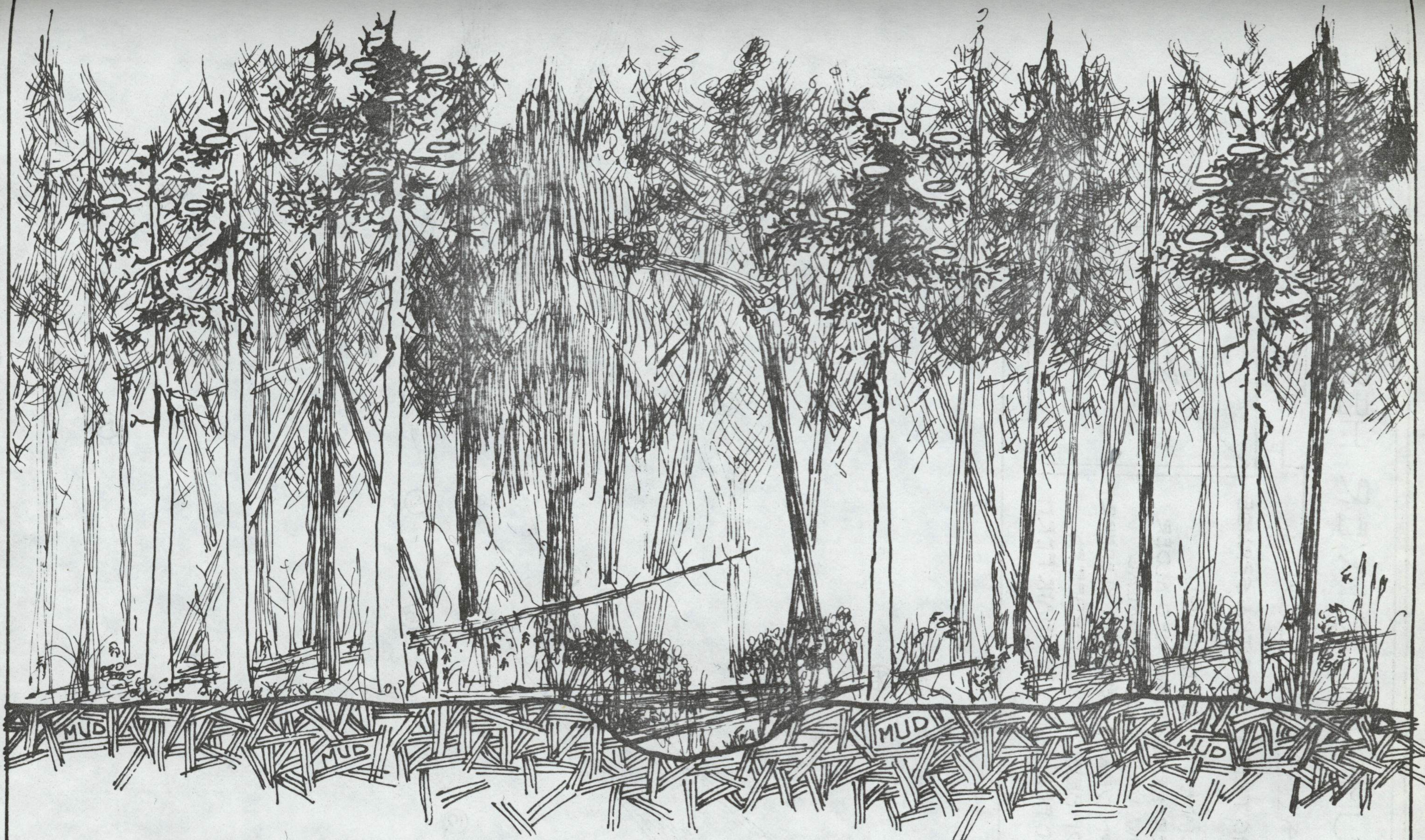
Information of this sort could be used to make correlations with facts already known about nesting sites. Some of the correlations and observations that need to be investegated are the number of herons in an area with the size of an estuary, the major plant and animal associations of a heavily used or unused estuary, the distance a heron will nest from a feeding area and the relationship between the heron population's productivity and fledging success.

In light of the fact that herons were observed feeding in all but 5 of Oregon's 26 estuaries, it is evident that herons can adapt to various types of feeding habitats. Our observations indicate that herons seem to prefer mudflats characteristic of estuaries on the central Oregon coast. We have also noted that the birds can adapt to man's development and use of estuaries, including logging and fishing operations. It must also be recognized that land fills and degradation of water quality affect estuaries adversely, and that such effects would also reduce feeding heron populations, an important link in the estuarine ecosystem. One other assumption based upon our observations is that Great Blue Heron nesting sites are selected partly in respon to suitable feeding sites; herons were not found nesting more thar 10 miles from suitable feeding areas.


NESTING AND FEEDING AREAS OF THE
GREAT BLUE HERON ON THE OREGON COAST
SCALE
50 MILES
NESTING SITES O FEEDING AREAS
CLATSOP SPIT
COLUMBIA RIVER
HERONRY
NECANICUM RIVER
NEHALEM RIVER
WHEELER HERONRY
TILLAMOOK BAY
NETARTS BAY
PORTLAND



THIS MAP IS TAKEN FROM THE "LANDFORM MAP OF OREGON" DRAWN BY: ERWIN RAISZ FOR: THE STATE DEPT. OF GEOLOGY AND MINERAL INDUSTRIES

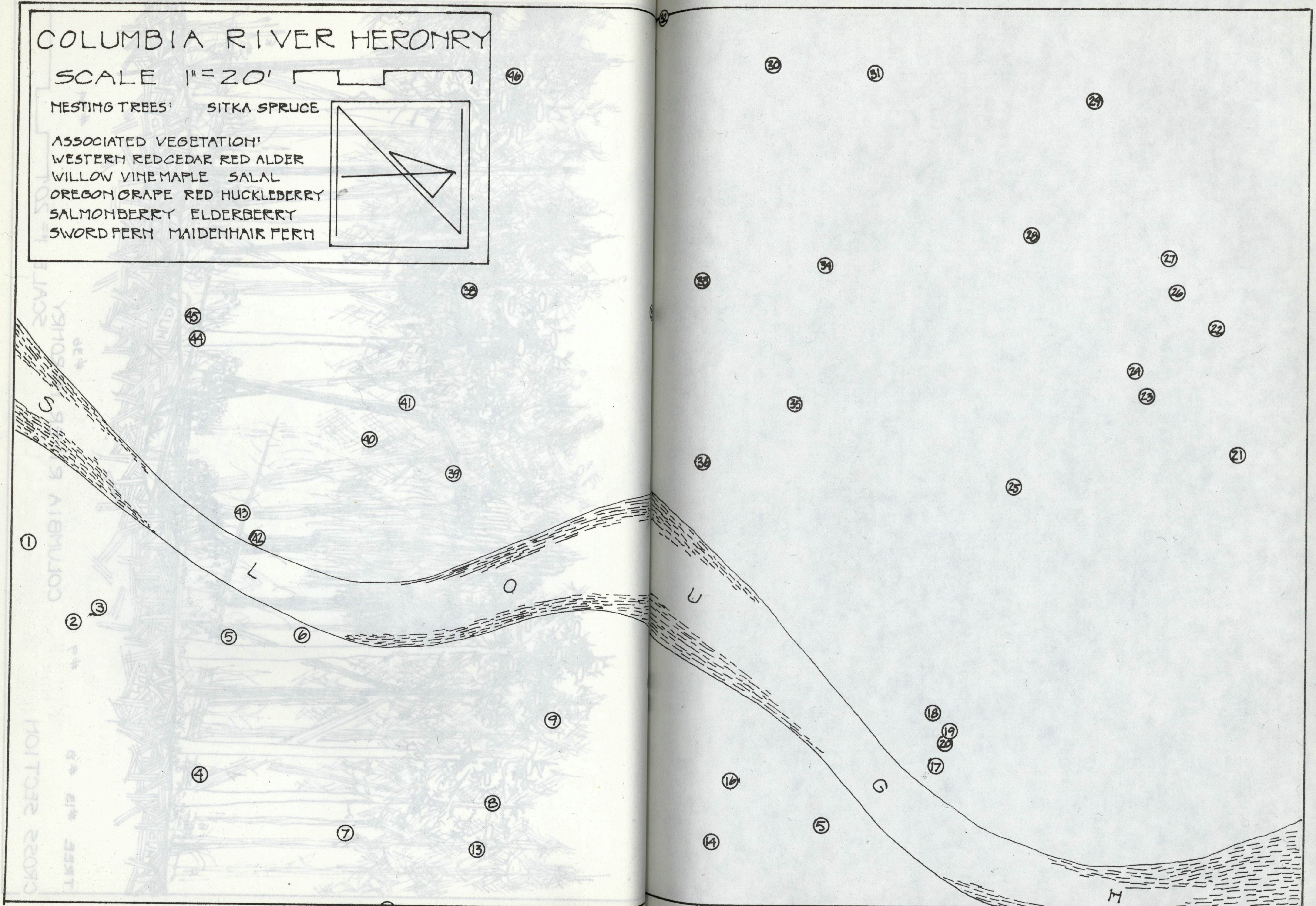


TREE #13 #8 #9 #36 #34

COLUMBIA RIVER HERONRY

CROSS SECTION

SCALE 1"= 20'


COLUMBIA RIVER HERONRY
SCALE 1" = 20'
NESTING TREES: SITKA SPRUCE
ASSOCIATED VEGETATION:
WESTERN REDCEDAR RED ALDER
WILLOW VINE MAPLE SALAL
OREGON GRAPE RED HUCKLEBERRY
SALMONBERRY ELDERBERRY
SWORD FERN MAIDENHAIR FERN
S L O U G H
1 2 3 4 5 6 7 8 9 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 38 39 40 41 42 43 44 45 46 48

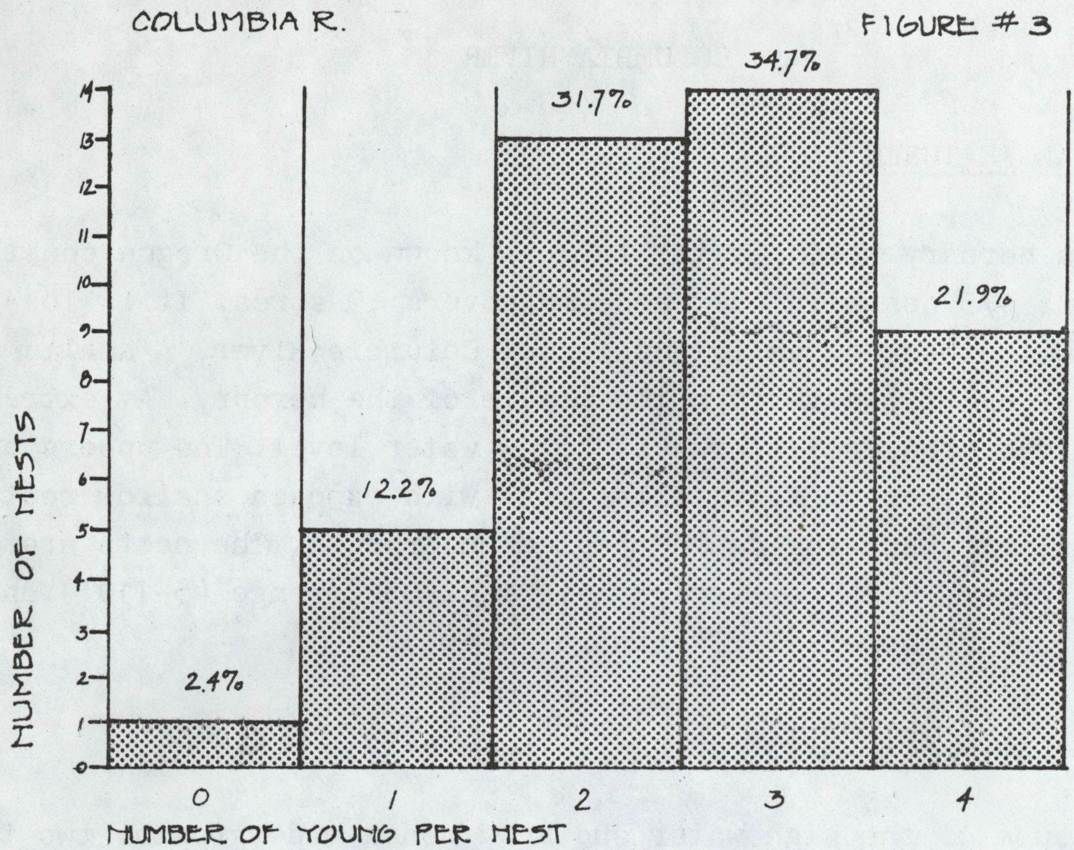
COLUMBIA RIVER

PHYSICAL FEATURES

This heronry which is the largest known on the Oregon coast contains 175 nests in 48 trees and covers .9 acres. It is located on the bank of an island in the Columbia River. A small muddy slough flows through the middle of the heronry. At extreme high tides, the entire area is below water level. The upperstory is moderately open. Many fallen logs with exposed shallow root systems lay among the dense tangled underbrush. The nests are in sitka spruce, with an average height of 83' (range 45-110') and an average diameter of 27" (range 14-44").

BIOLOGICAL FINDINGS

Because of the high water and very dense undergrowth, two temporary tree blinds were constructed for observation. Fourteen visits were made between March 2 and July 12. A sample of 43 nests (31 per cent) was observed regularly for activity after the original nest count was made. The progress and number of young per nest was easily seen from the blinds and productivity counts were based on several days' observations throughout the season. Egg shell counts showed that hatching activity peaked in early to mid-April and was finished by the end of May. By extrapolation, arrival time was in mid-February and fledging occured at the beginning of July. Breeding activity at this heronry seemed to begin early and extend for a relatively long period of time. One hundred sixty one of the nests (95 per cent) were estimated to be active this season. Productivity measurements were made from the last week of May until June 15. The average number of fledged birds per active nest was 2.7. Based on an average clutch size of 4.19 (Henny and Bethers, 1971) this shows that 36.7 per cent of the original clutch did not survive to fledge. Distribution of young per nest is shown in figure 3. An estimated 442 young birds were produced in the heronry this season.



LAND USE

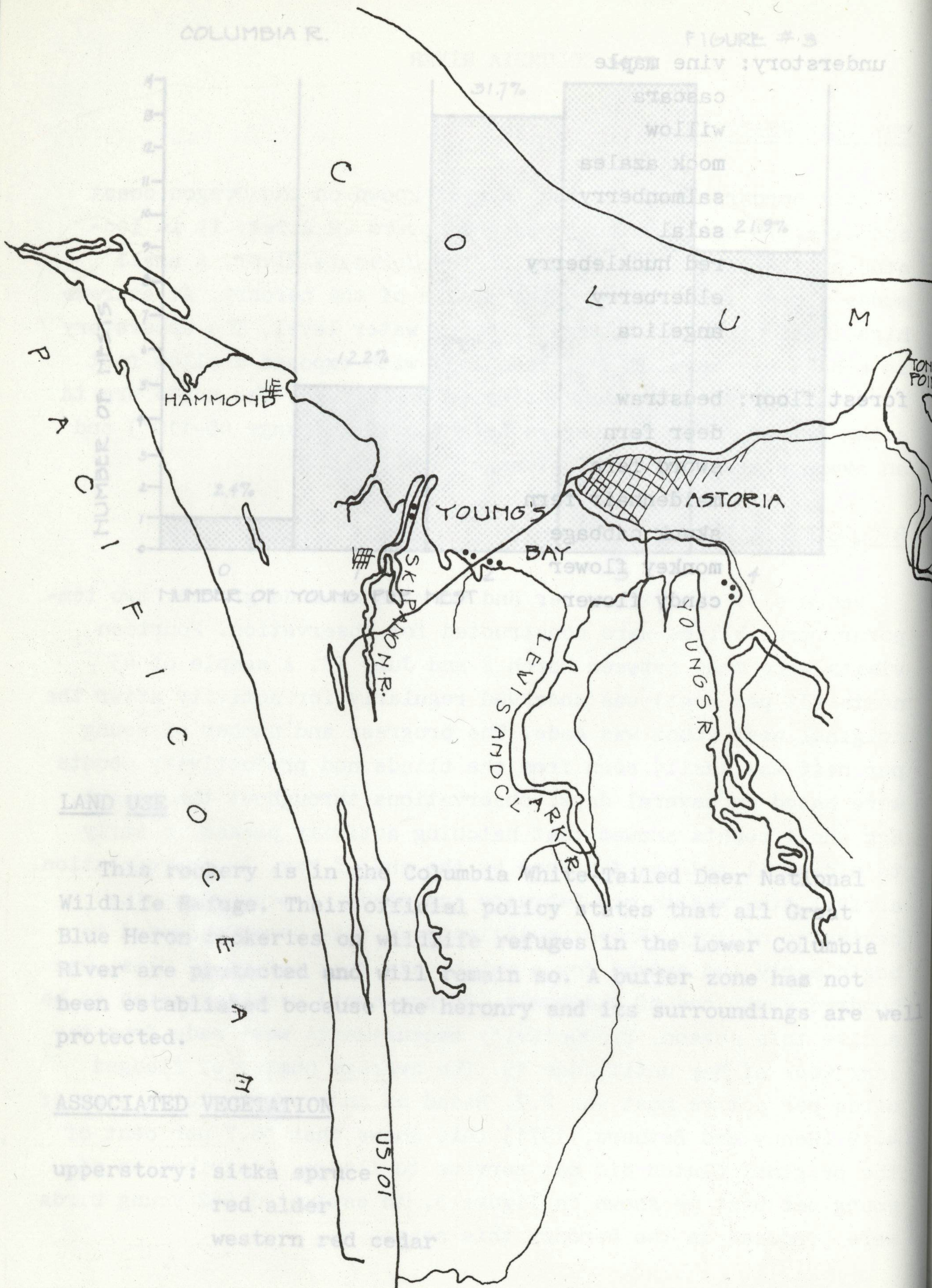
This rookery is in the Columbia White-Tailed Deer National Wildlife Refuge. Their official policy states that all Great Blue Heron rookeries on wildlife refuges in the Lower Columbia River are protected and will remain so. A buffer zone has not been established because the heronry and its surroundings are well protected.

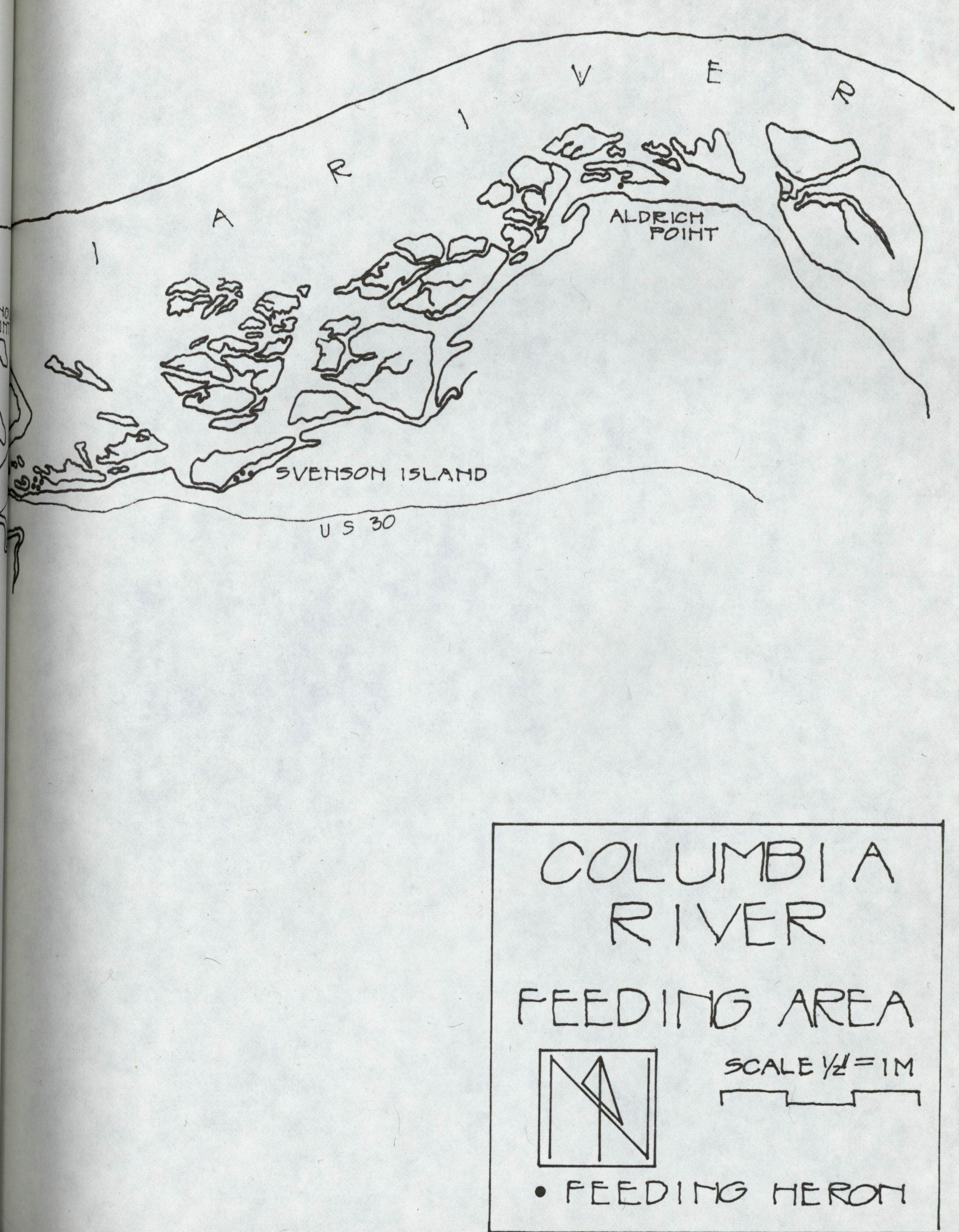
ASSOCIATED VEGETATION

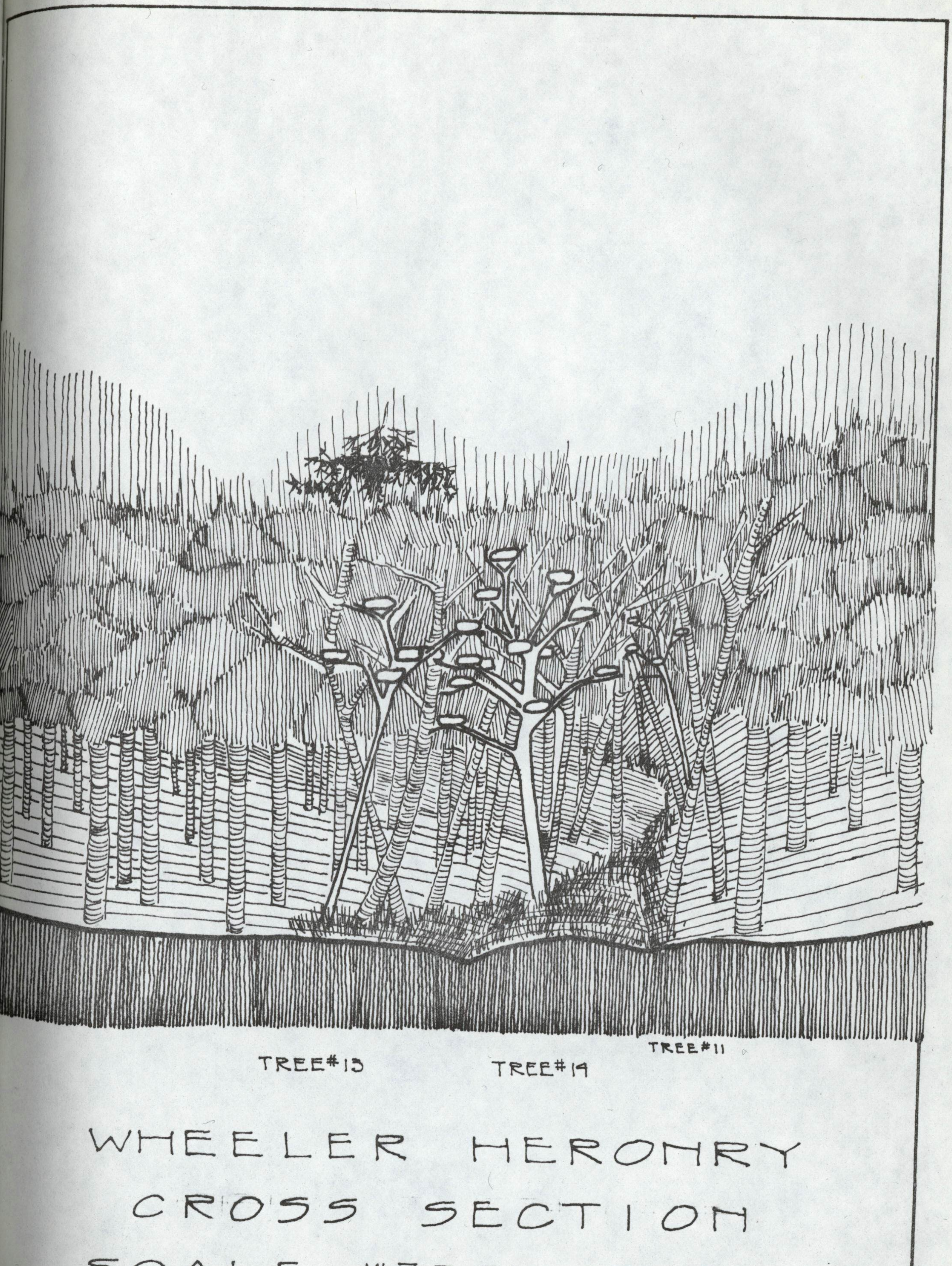
upperstory: sitka spruce
red alder
western red cedar

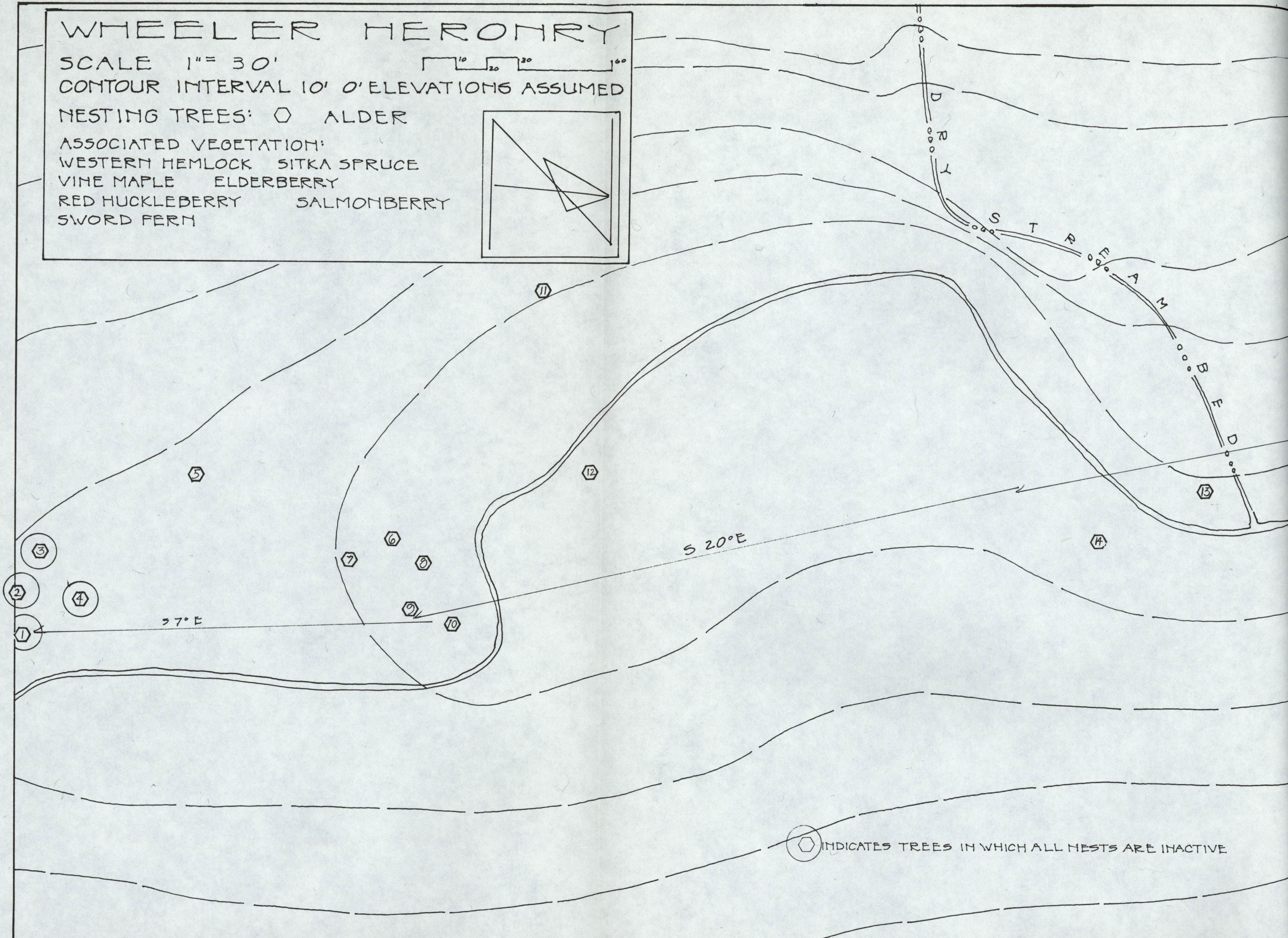
understory: vine maple
cascara
willow
mock azalea
salmonberry
salal
red huckleberry
elderberry
angelica

forest floor: bedstraw
deer fern
sword fern
maidenhair fern
skunk cabbage
monkey flower
candy flower

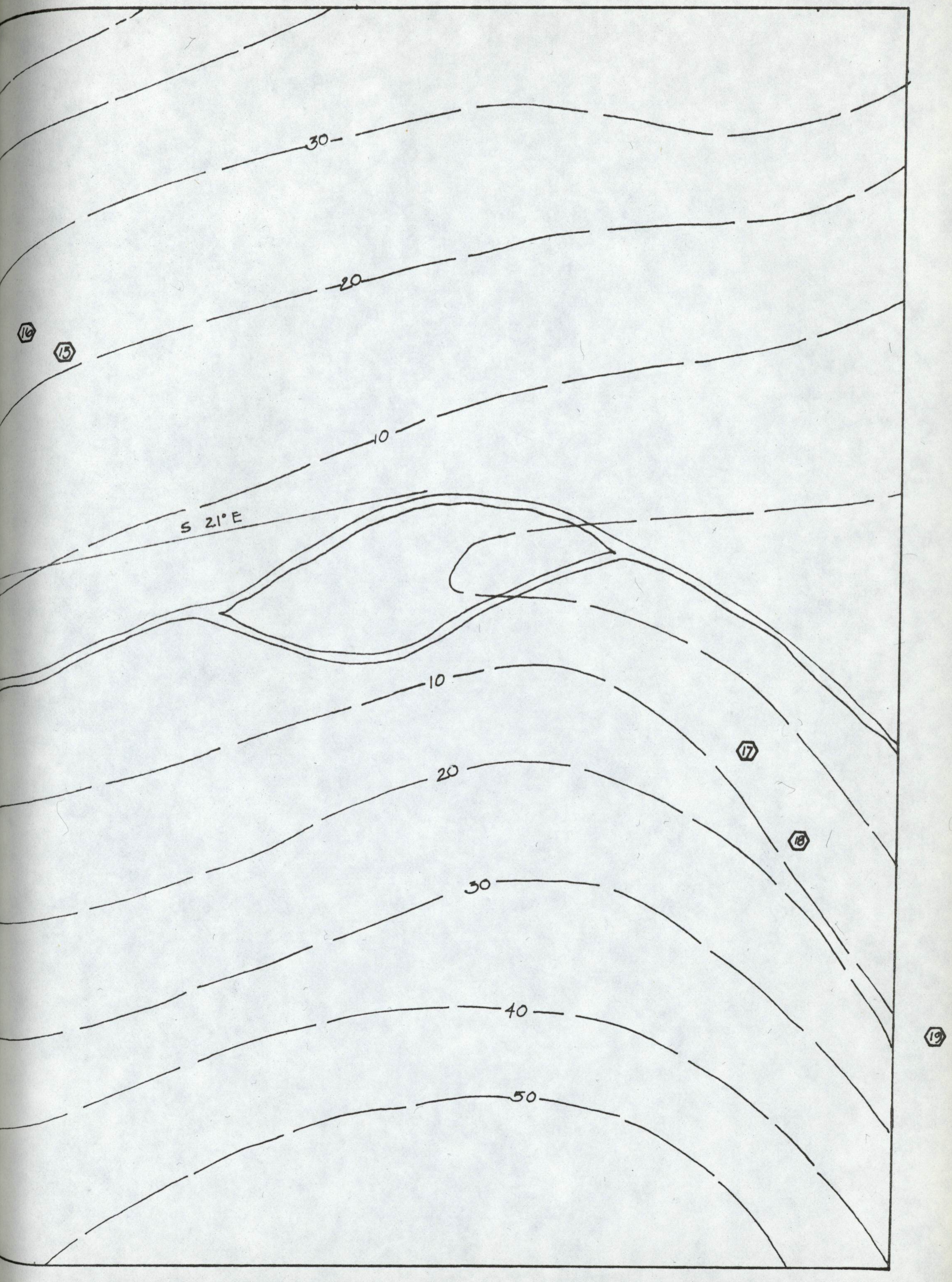

PACIFIC OCEAN
COLUMBIA
HAMMOND
YOUNG'S BAY
ASTORIA
TONGUE POINT
SKIPANON R.
LEWIS AND CLARK R.
YOUNGS R.
US 101


RIVER
ALDRICH POINT
SVENSON ISLAND
US 30
COLUMBIA RIVER
FEEDING AREA
SCALE 1/2" = 1M
• FEEDING HERON


TREE#13
TREE#14
TREE#11
WHEELER HERONRY
CROSS SECTION
SCALE 1" = 30'



WHEELER HERONRY
SCALE 1" = 30'
CONTOUR INTERVAL 10' O' ELEVATIONS ASSUMED
NESTING TREES: O ALDER
ASSOCIATED VEGETATION:
WESTERN HEMLOCK SITKA SPRUCE
VINE MAPLE ELDERBERRY
RED HUCKLEBERRY SALMONBERRY
SWORD FERN
DRY STREAM BED
S 20° E
S 7° E
1
2
3
4
5
6
7
8
9
10
11
12
13
14
INDICATES TREES IN WHICH ALL NESTS ARE INACTIVE



30
20
16
15
10
S 21° E
10
17
20
18
30
40
19
50

WHEELER

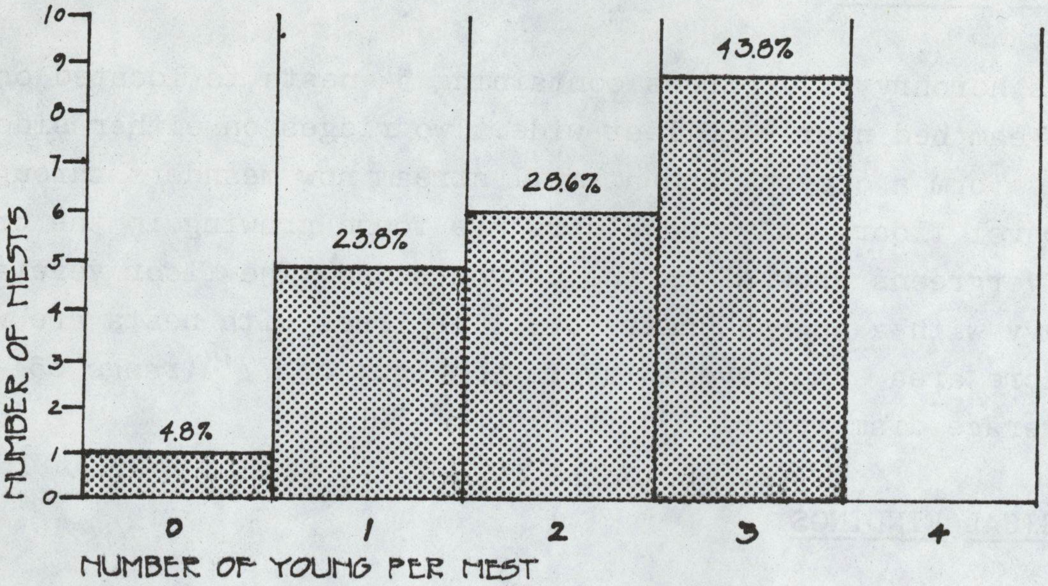
PHYSICAL FEATURES

This heronry of 19 trees containing 54 nests is located on an old stream bed nearly 80 feet wide. Two ridges on either side of the bed form a canyon, and a small stream now meanders through the gravel floor. Only red alders are found growing in the creek bed. Evergreens grow along the canyon sides. The floor vegetation is heavy with a sparce understory. The trees with nests are within a .6 acre area and have an average height of 77' (range 65'-85') and average diameter of 23" (range 18"-30").

BIOLOGICAL FINDINGS

Activity was determined in all of the nests, and productivity counts were taken in 21 nests (64 per cent of the active nests). Twenty visits were mande between March 15 and July 10. Observations were made from the ground and from two blinds constructed in trees. The first sign of hatching was the presence of egg shells on April 22. These had fallen since the April 17 visit. By extrapolation from this date, the arrival time of the adults to the nesting area was estimated to be the beginning of March. Hatching peaked in the first week of May and was completed by May 19. Thirty three of the nests were active (61 per cent of those constructed). The average number of fledged herons was observed to be 2.1 per successful nest for a projected 69 young produced in the heronry. Frequency of young fledged per active nest is shown in figure 4. Fifty per cent of the eggs layed produced young that survived to the fledging stage. Noticeable fledging had not begun prior to the last visit on July 10.

WHEELER FIGURE #4



LAND USE

The Wheeler heronry and surrounding acreage is owned by Crown Zellerbach and in past years logging operations had not occured near the site. In 1974, nearby slopes were designated to be clear-cut, and in the winter construction of logging roads and cutting operations began. An existing gravel road ran in a north, south direction parallel to the heronry and dead ended 240' southwest of the heronry trees. A new road was constructed at this dead end and circled around the southern end of the heronry about 300' away. Trees with nests could be seen, and noise of the herons heard from the road. The new road was used to haul timber cut on a nearby slope. During the observer's first visit on April 10, three adult birds were found dead under trees number 7, 9, and 10 with apparent gunshot wounds. Footprints were found from the road down the slope to the heronry and it appeared that the herons were shot on a recent visit by a human intruder.

Four nests in trees number 1, 2, 3 and 4 were inactive in the 1974 season. Number 5 was the southern-most tree which had active nests. Trees 5 to 12 had 16 nests from the last season, only 6 of these were active, and no new nests were constructed. The nests in the northern-most section were much more extensively used. Trees 13 to 19 had 26 nests, 14 of which were constructed in the 1974 breeding season, and one was inactive. The southern-most section of the heronry (trees 1 to 12) had 27 per cent activity, and nests in the northern-most section had 96 per cent activity.

Throughout the study, the breeding population was easily flushed when the observer entered the heronry and was seen to return only after the intruder was well hidden. This behavior contrasts with populations in more secluded heronries where the birds returned while the observer was still in clear view.

The purpose of establishing a protective zone around the Wheeler site would be to limit disturbances during the breeding season. It is felt that the newly constructed road already serves to bring traffic and people close enough to pose a threat to the breeding herons. The recent clearcutting may have already exposed the trees in the heronry to strong coastal winds capable of blowing both trees and nests down.

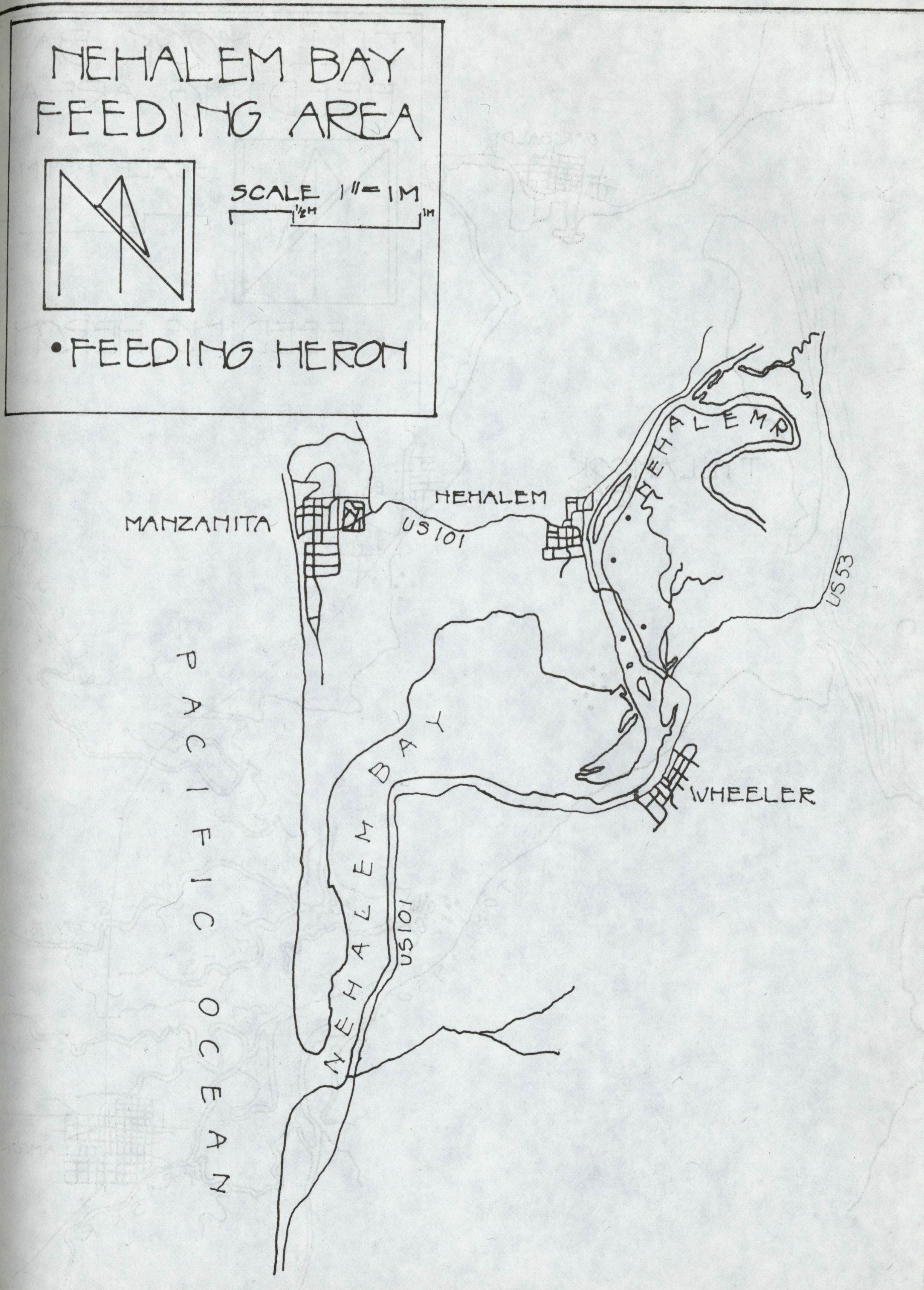
According to a representative for the Crown Zellerbach Corporation, their policy is one that aims to protect wildlife habitats, if they are aware of them. They are well aware of this heron rookery.

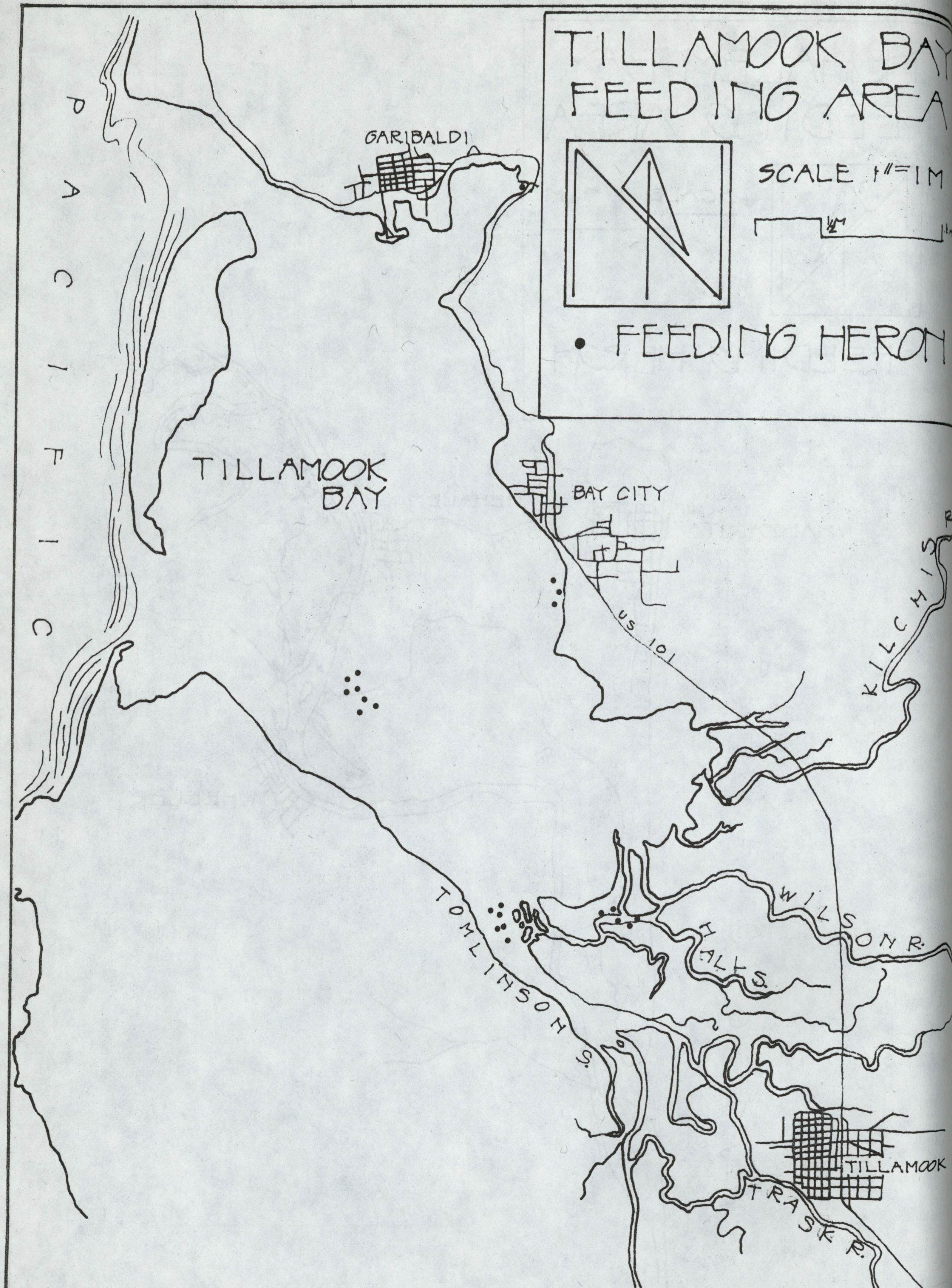
ASSOCIATED VEGETATION

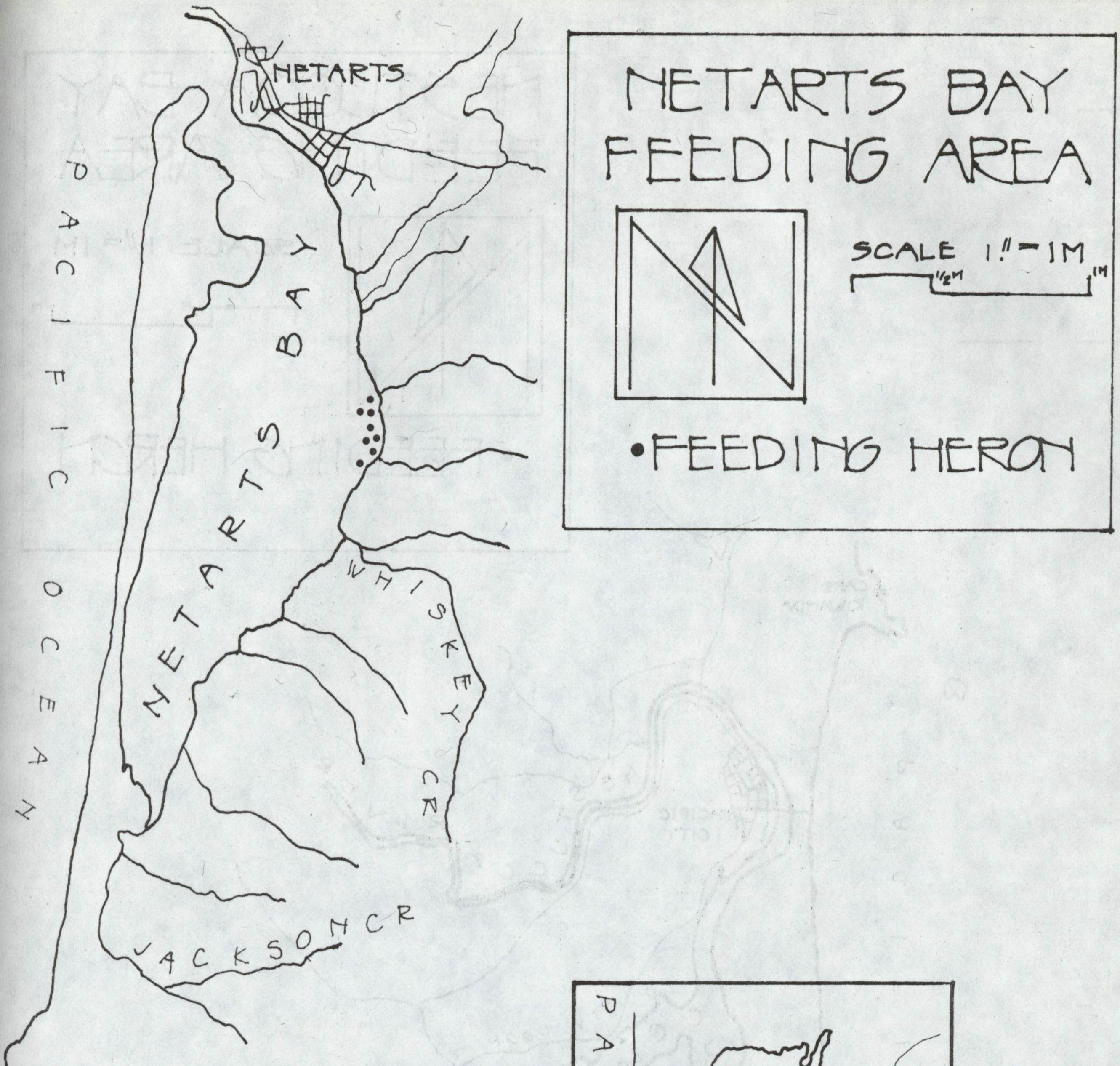
upperstory: red alder
western hemlock
sitka spruce

understory: salmonberry - dominant
wild cucumber
devils club - dominant
elderberry
vine maple
Vinca

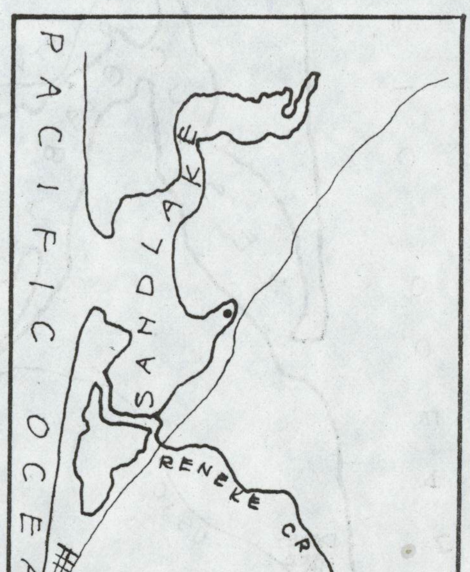
forest floor: candy flower
Scrophularia
wood sorrel
skunk cabbage
false lily of the valley
bleeding heart
foxglove
pearly everlasting
sword fern
deer fern
bracken fern
monkey flower

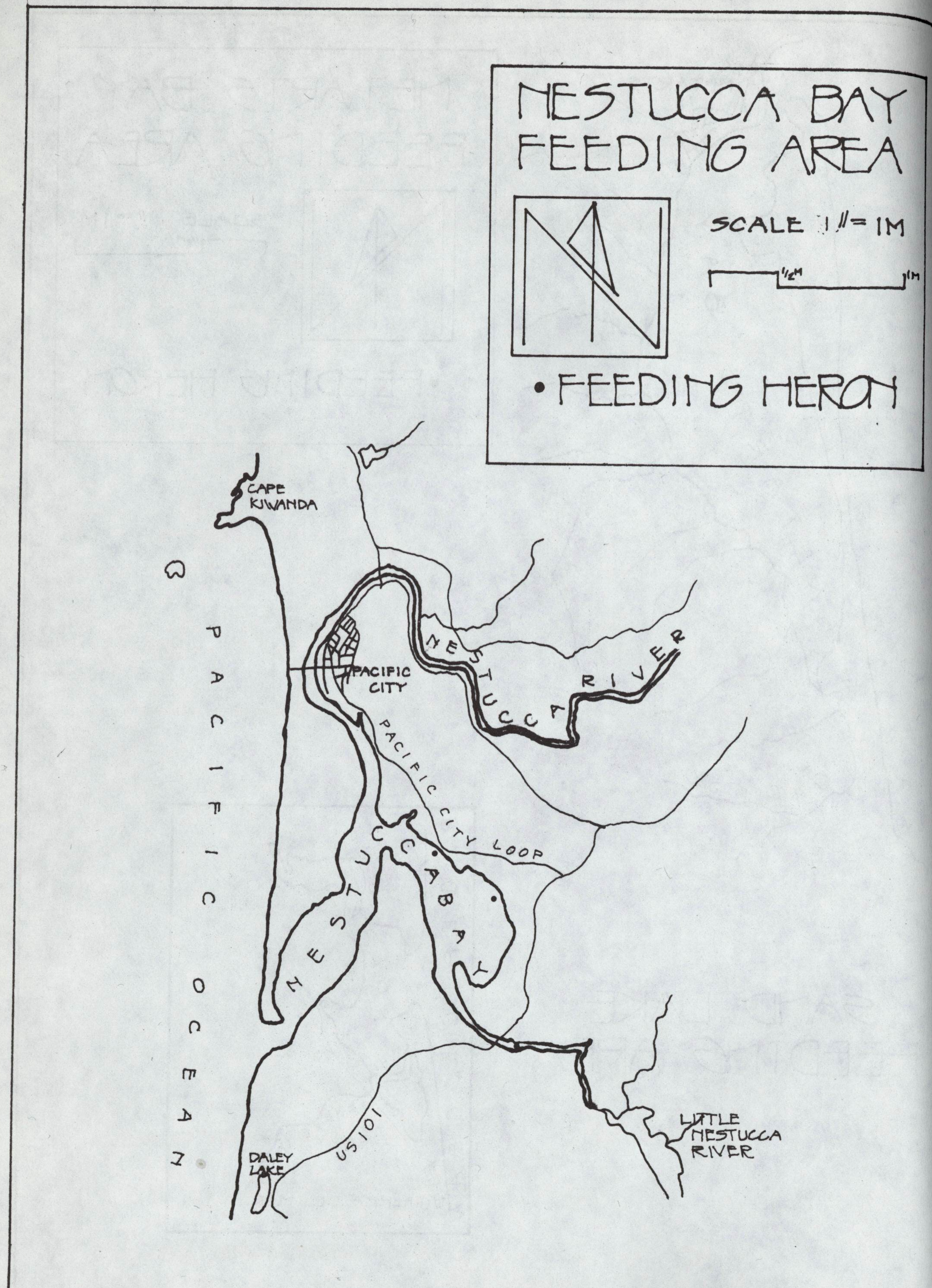

NEHALEM BAY
FEEDING AREA
SCALE 1" = 1M
1/2M
1M
• FEEDING HERON
MANZANITA
NEHALEM
US101
NEHALEM R
US53
NEHALEM BAY
US101
WHEELER
PACIFIC OCEAN

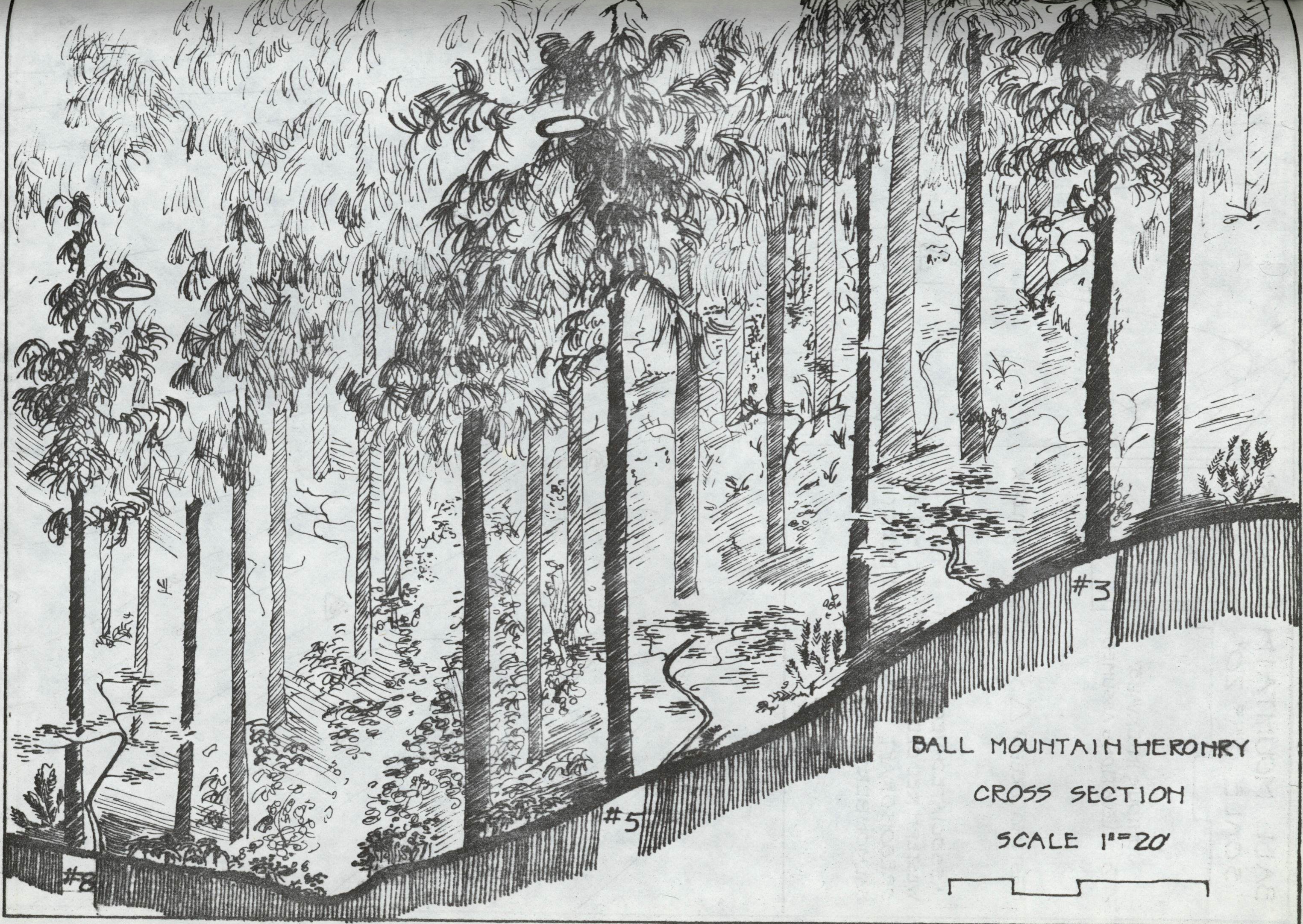

TILLAMOOK BAY
FEEDING AREA
SCALE 1" = 1 M
½ M
• FEEDING HERON
GARIBALDI
PACIFIC
TILLAMOOK
BAY
BAY CITY
US 101
KILCHIS R.
WILSON R.
HALLS
TOMLINSONS.
TILLAMOOK
TRASK R.

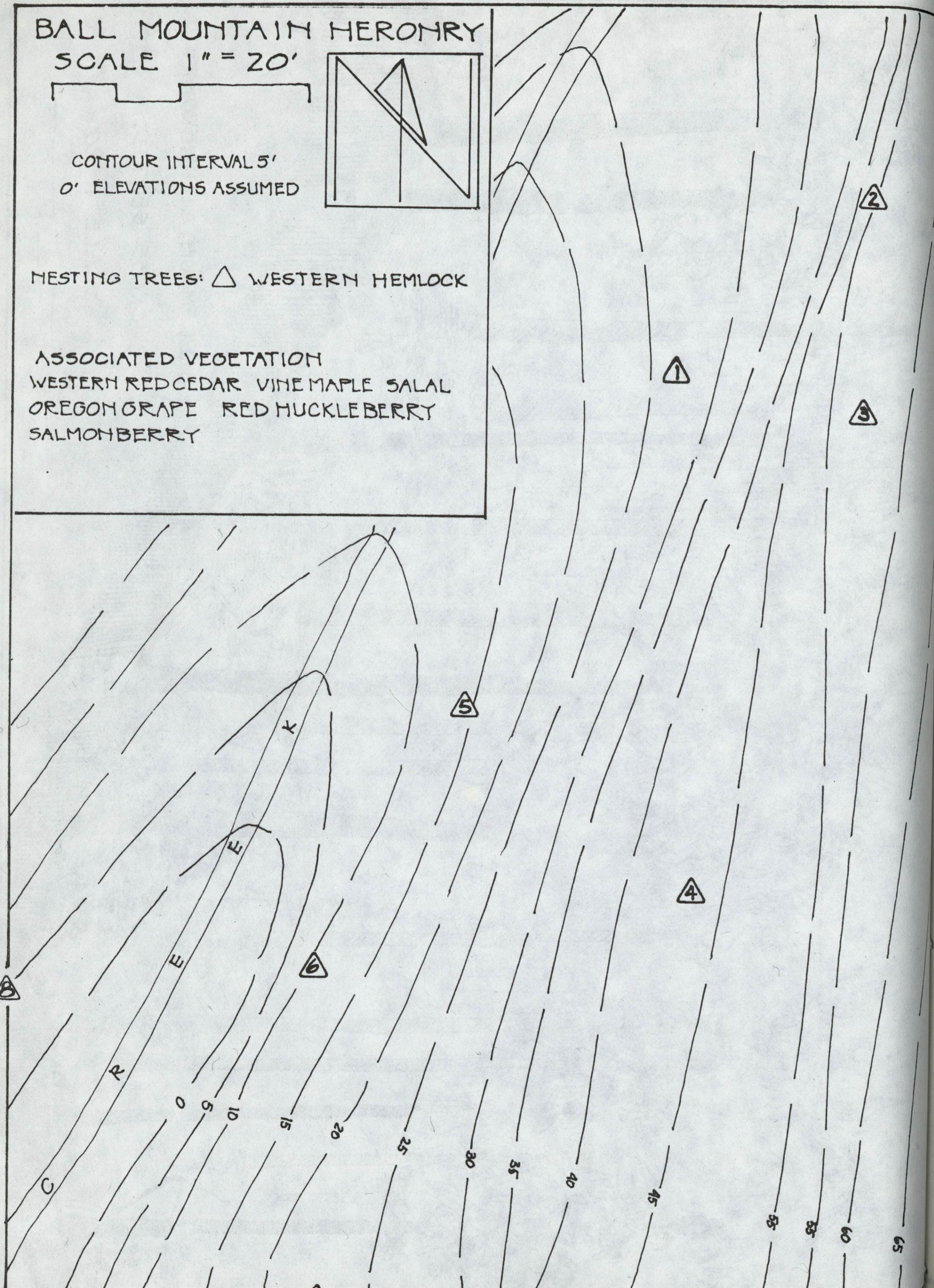


SAND LAKE FEEDING AREA




NESTUCCA BAY
FEEDING AREA
SCALE 1" = 1M
½M
1M
• FEEDING HERON
CAPE KIWANDA
PACIFIC OCEAN
PACIFIC CITY
NESTUCCA RIVER
PACIFIC CITY LOOP
NESTUCCA BAY
LITTLE NESTUCCA RIVER
US 101
DALEY LAKE


#8
#5
#3
BALL MOUNTAIN HERONRY
CROSS SECTION
SCALE 1"=20'


BALL MOUNTAIN HERONRY
SCALE 1" = 20'
CONTOUR INTERVAL 5'
0' ELEVATIONS ASSUMED
NESTING TREES: △ WESTERN HEMLOCK
ASSOCIATED VEGETATION
WESTERN REDCEDAR VINE MAPLE SALAL
OREGON GRAPE RED HUCKLEBERRY
SALMONBERRY
CREEK
0
5
10
15
20
25
30
35
40
45
60
65
1
2
3
4
5
6
7
8

BALL MOUNTAIN

PHYSICAL FEATURES

This heronry of approximately 8 large trees with 15 nests is in a V shaped canyon with steep slopes and a narrow, fairly straight stream bed. It encompasses .3 acres. The understory is heaviest near the creek and thins out further up the slope. The upperstory is composed of old growth timbers, which are thick on the gradual slope towards the top of the canyon. Timber is less dense on the steep banks of the stream, where the nests are located. All of the trees containing nests are hemlock with an average height of 116' (range 100'-125') and diameter of 40" (range 30"-48").

This site was first discovered on June 12 with Ed Gory of the United States Forest Service. A nearby heronry of 29 nests had blown down in the winter of 1974, and he suspected that the herons had relocated in the area. It was not possible to determine if the newly discovered heronry was established by the displaced herons, or existed in addition to it. Two more visits were made to the area to observe activity, tag trees, approximate number of nests, and survey. Because the heronry was discovered late in the season, no attempts were made to determine productivity and hatching times.

LAND USE

This heronry is on Siuslaw National Forest land, owned by the United States Forest Service, which has a general policy of protecting wildlife habitats. A plan for future management of the Siuslaw National Forest is being developed at the present time. When the plan is completed, in the fall of 1975, a definite policy for the heronries and the area in which they occur will be available.

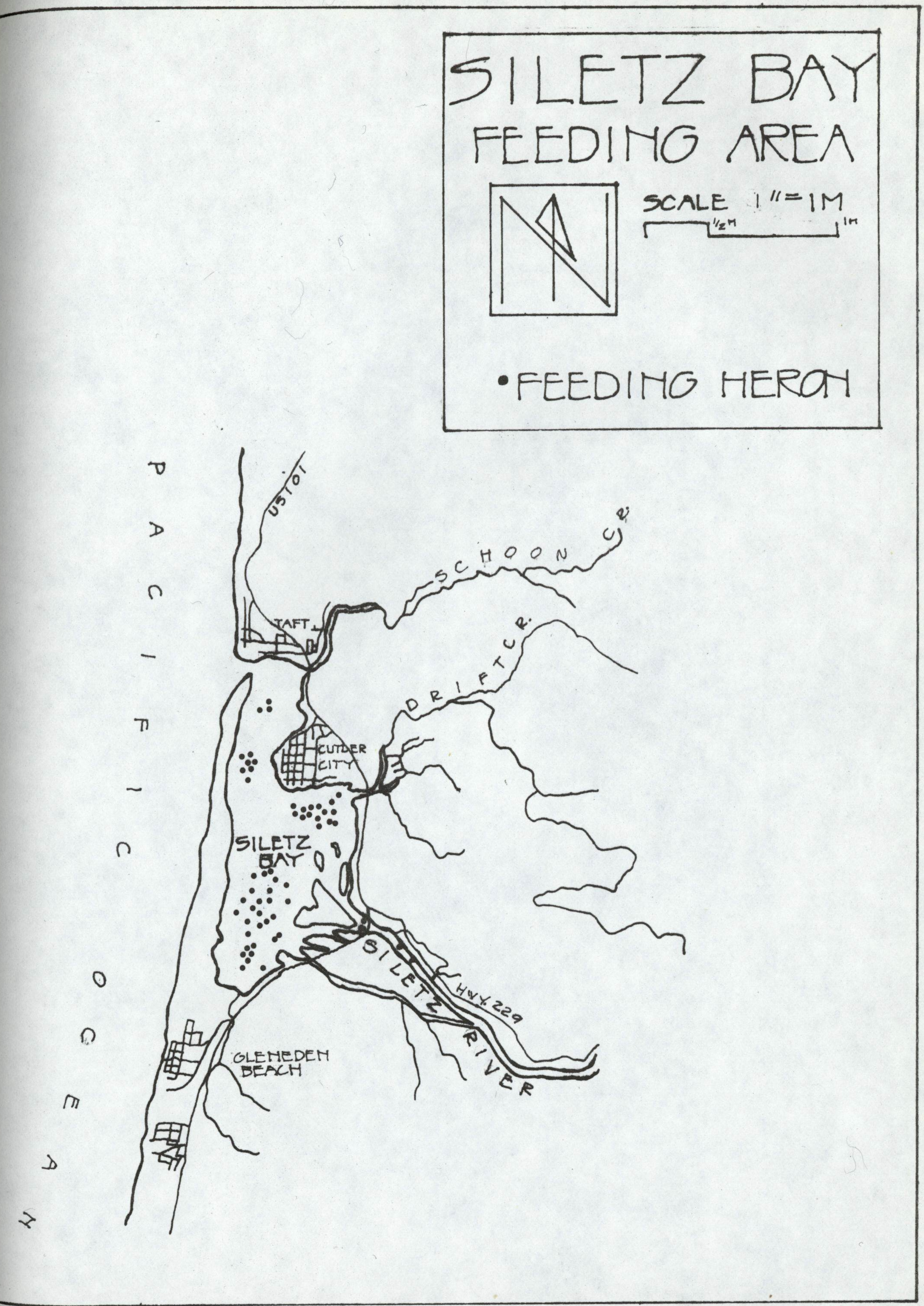
Logging operations are scheduled to begin on the top of the west slope in 1975. Whether this will have an adverse affect on the heronry is not known; however, Mr. Gory did not feel that it will pose a large threat to the heronry because the trees are located well below the steep slope.

ASSOCIATED VEGETATION

upperstory: western hemlock
western red cedar

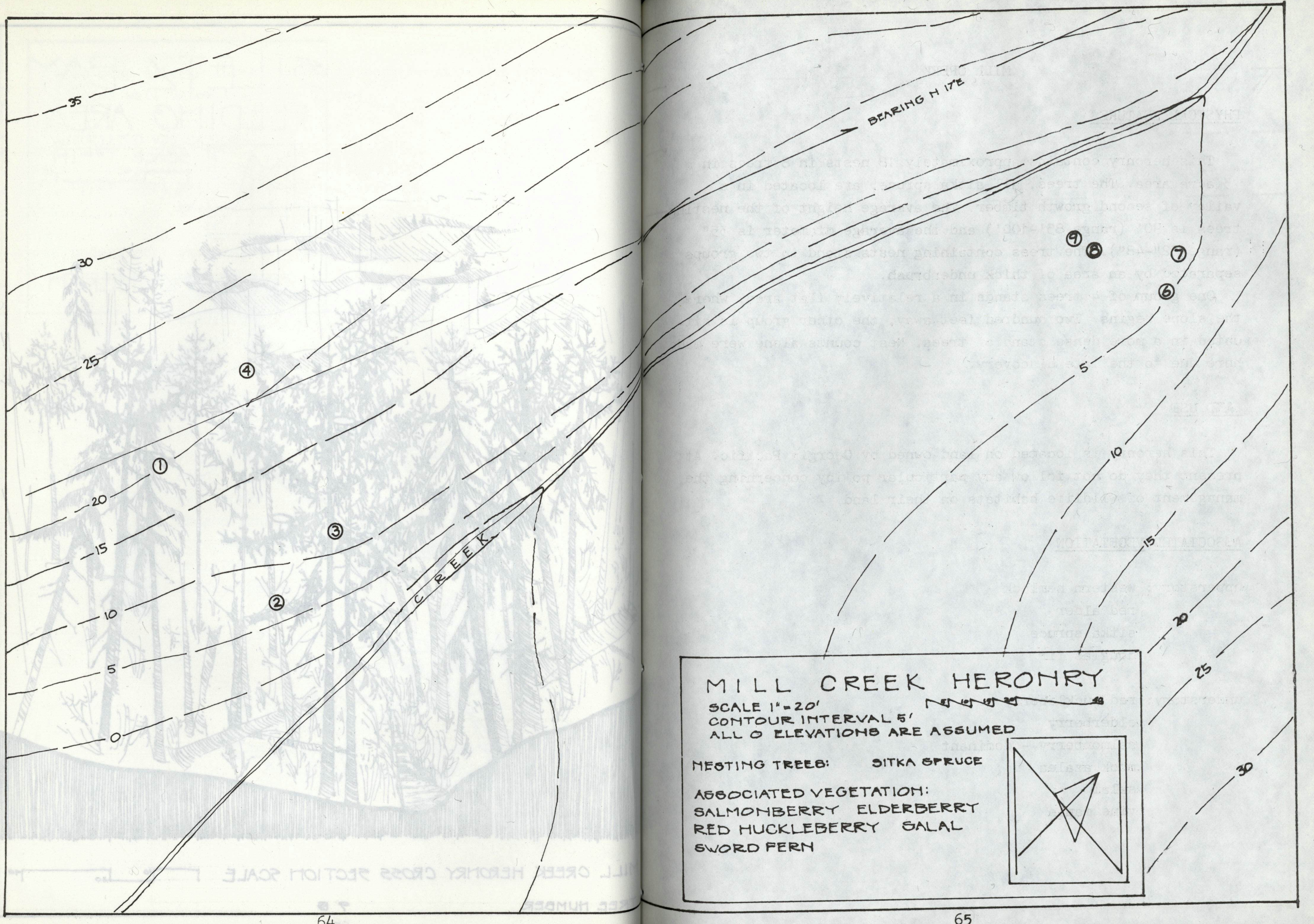
understory: salmonberry - dominant
vine maple
red huckleberry
elderberry
devils club
Vinca

forest floor: lady-fern
deer fern
sword fern
candy flower
wood sorrel
Oregon grape
Scrophulariaceae
trillium
skunk cabbage


SILETZ BAY
FEEDING AREA
N
SCALE 1" = 1M
1/2M
1M
• FEEDING HERON
PACIFIC OCEAN
US 101
SCHOON CR
TAFT
DRIFT CR
CUTLER CITY
SILETZ BAY
SILETZ RIVER
HWY. 229
GLENEDEN BEACH

MILL CREEK HERONRY CROSS SECTION SCALE 10 20 40

TREE NUMBER 9 8


35
30
25
20
15
10
5
0
CREEK
BEARING N 17°E
①
②
③
④
⑥
⑦
⑧
⑨
5
10
15
20
25
30
MILL CREEK HERONRY
SCALE 1" = 20'
CONTOUR INTERVAL 5'
ALL 0 ELEVATIONS ARE ASSUMED
NESTING TREES: SITKA SPRUCE
ASSOCIATED VEGETATION:
SALMONBERRY ELDERBERRY
RED HUCKLEBERRY SALAL
SWORD FERN

MILL CREEK

PHYSICAL FEATURES

This heronry contains approximately 18 nests in 8 trees in a 3 acre area. The trees, all sitka spruce, are located in a valley of second growth timber. The average height of the nesting trees is 90' (range 85'-100') and the average diameter is 35" (range 32"-48"). The trees containing nests stand in two groups separated by an area of thick underbrush.

One group of 4 trees stands in a relatively flat area, where the slope begins. Two hundred feet away, the other group is situated in a more dense stand of trees. Nest counts alone were made here due to the late discovery.

LAND USE

This heronry is located on land owned by Georgia Pacific. At present they do not follow any particular policy concerning the management of wildlife habitats on their land.

ASSOCIATED VEGETATION

upperstory: western hemlock
red alder
sitka spruce
douglas fir

understory: red huckleberry
elderberry
salmonberry - dominant
mock azalea
salal
vine maple

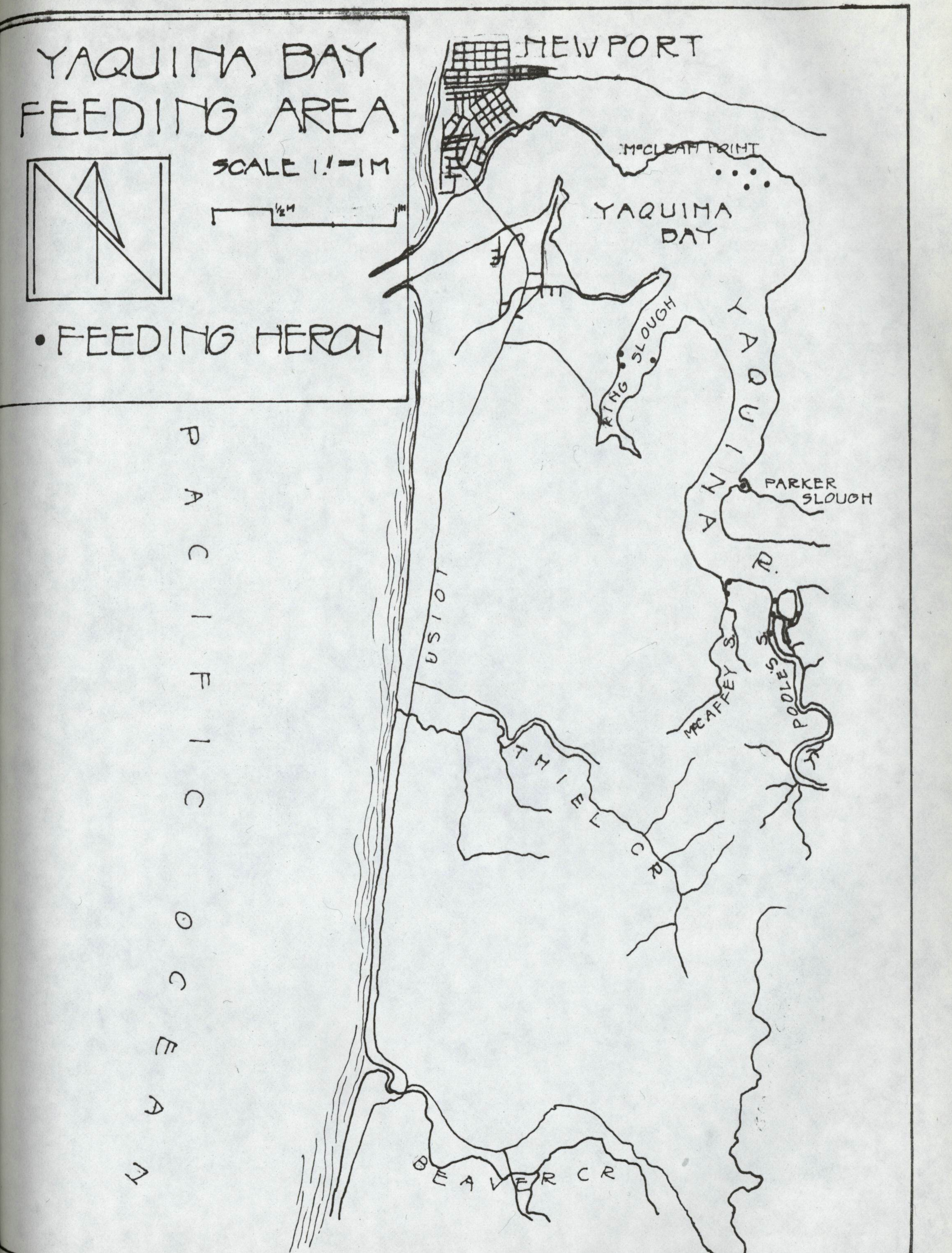
forest floor: Scrophulariaceae
wood sorrel
deer fern
sword fern
lady-fern
skunk cabbage
false lily of the valley
trillium
false solomon's seal

YAQUINA BAY

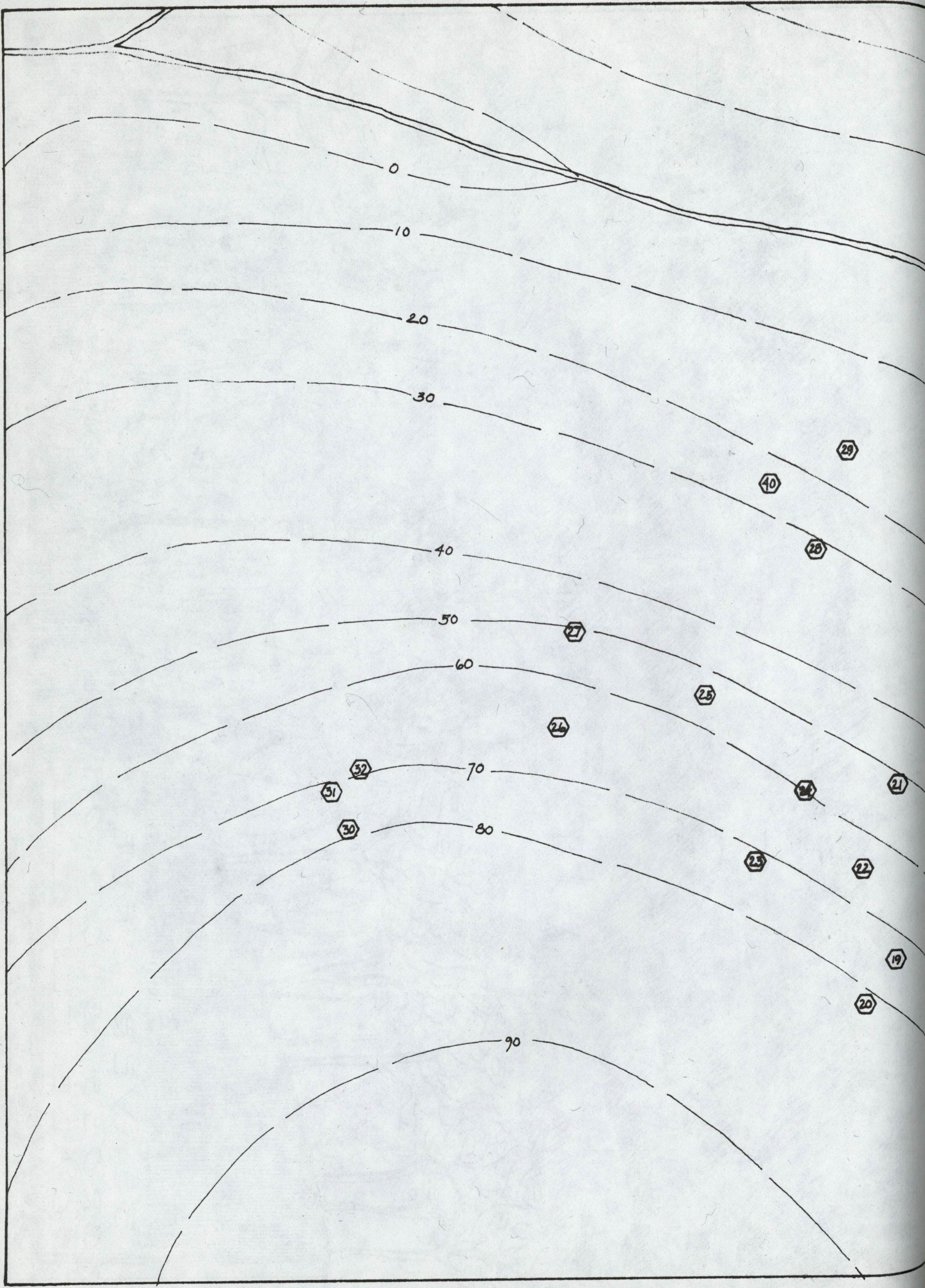
This heronry was observed by Range Bayer, a graduate student from Oregon State University, studying heron feeding behavior in the Yaquina Bay area. This group of birds had been disturbed during the 1973 season. In order to limit human disturbance in the 1974 season, he agreed to provide us with information concerning this heronry.

In 1973 a Georgia Pacific log landing was built in the middle of the heronry in late spring after the eggs were layed. This heronry then contained 35 known nests. Most fledging took place before July 10, but 3 pairs that had renested because of the landing were still present on September 1.

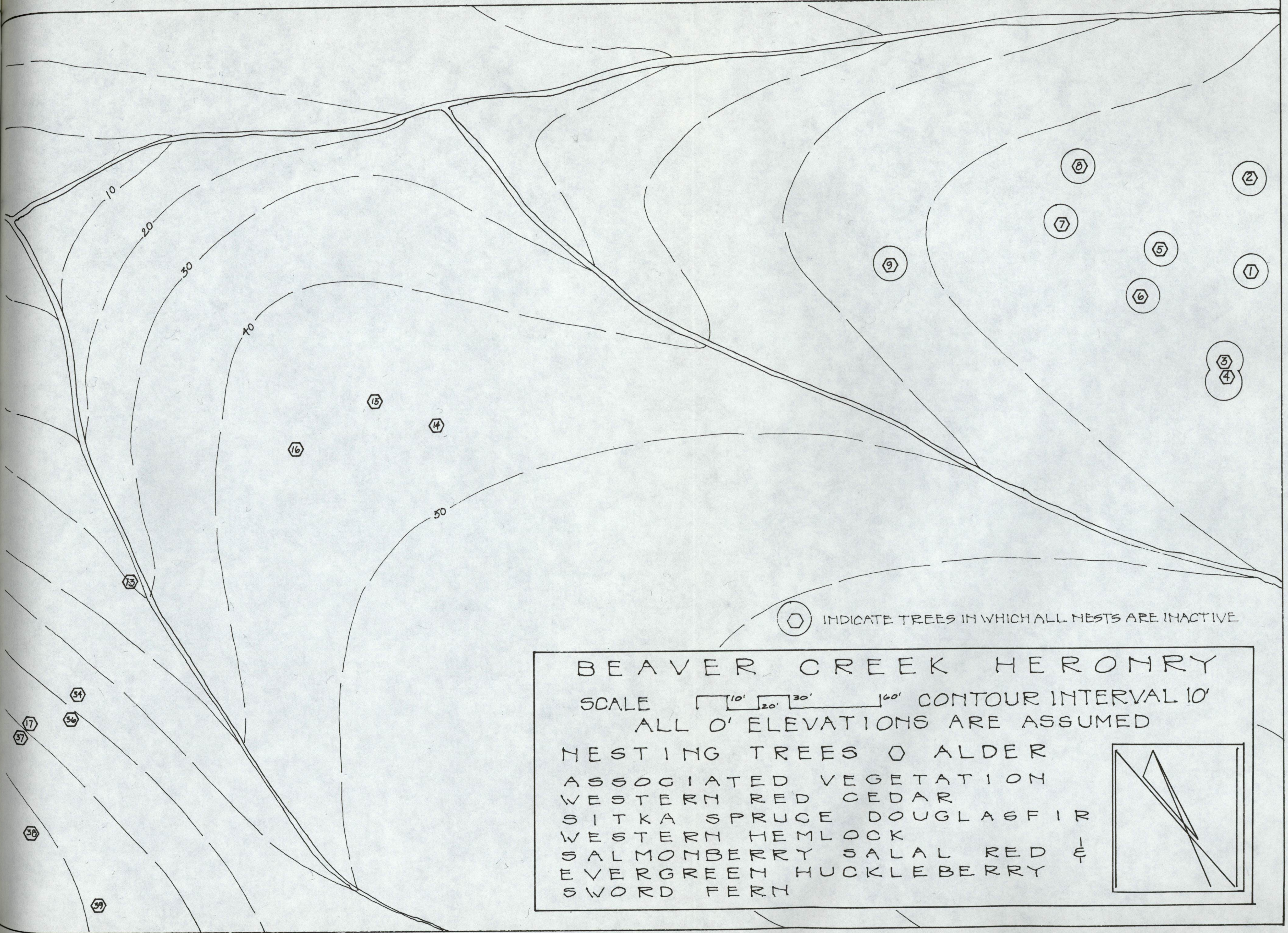
In the late fall and winter when the herons were away from the colony, the entire heronry was logged. In the spring of 1974, the herons returned to roost within one half mile of the old heronry. The Georgia Pacific Corporation was notified of the new site, and they stated that the heronry would be left alone. In the spring of 1974 between March 2 and April 12, logging operations took place within 150 feet of the new site. All the birds abandoned the site to find a third location. Thirty-four nests were constructed; 32 nests in spruce trees and the remainder in hemlock. The peak fledging period was between July 20 and August 1. The area was not visited by project members.


YAQUINA BAY
FEEDING AREA
SCALE 1" = 1M
1/2M
1M
• FEEDING HERON
NEWPORT
McCLEAN POINT
YAQUINA BAY
KING SLOUGH
YAQUINA R.
PARKER SLOUGH
McCAFFEY S.
POOLE'S S.
US 101
THIEL CR
BEAVER CR
PACIFIC OCEAN

BEAVER CREEK
CROSS SECTION
SCALE
10
20
30
#30 #31 #32
#26
#27
#28
#15



0
10
20
30
40
50
60
70
80
90
29
40
28
27
25
26
32
31
30
24
21
23
22
19
20


10
20
30
40
50
8
2
7
5
9
1
6
3
4
15
14
16
13
34
36
17
37
38
39
INDICATE TREES IN WHICH ALL NESTS ARE INACTIVE
BEAVER CREEK HERONRY
SCALE 10' 20' 30' 60' CONTOUR INTERVAL 10'
ALL 0' ELEVATIONS ARE ASSUMED
NESTING TREES O ALDER
ASSOCIATED VEGETATION
WESTERN RED CEDAR
SITKA SPRUCE DOUGLAS FIR
WESTERN HEMLOCK
SALMONBERRY SALAL RED &
EVERGREEN HUCKLEBERRY
SWORD FERN

BEAVER CREEK

PHYSICAL FEATURES

At this heronry with 50 nests in 35 trees, nesting trees are situated along the steep sides of 3 ridges. Streams flow at the base of each ridge. All the nesting trees are alder, with an average height of 71' (range 55'-85') and an average diameter of 19" (range 13"-24"). The main concentration of 22 trees is grouped on the west side of the largest stream. The slope is steep and the trees lean out at sharp angles toward the water. Evergreens grow up the slope from the alders and on the top of this ridge. Understory is moderately thick under the evergreens, and becomes increasingly dense down the slope due to the stream. A second group of 3 nesting trees grows on the level top of the adjacent ridge (120' across the stream, to the east). A third group of trees is found by traveling 150' further to the west across another stream and to the top of the next ridge. This group has 9 trees with 16 nests, which grow on the wide, flat ridge top and is bordered by a 14 year old clearcut to the northeast. The second and third groups of trees have sparse understory beneath them, and several fallen trees. No herons nested in the third group of trees in the 1974 breeding season. The total area of the three groups is 1 acre.

BIOLOGICAL FINDINGS

All the nests were observed for activity during 9 visits from April 12 to July 12. There was no suitable observation point above the nests, therefore activity was observed from the ground and no counts of young were made. The first hatched egg shells fell from the nests between April 19 and 25. Arrival time was estimated to be between February 25 and March 2 by back dating from the time of the first hatch. Hatching peaked near the beginning of the third week of May. Thirty-two nests in 19 trees (64 per cent of the nests) were active; and 18 nests in 16 trees were unoccupied. In the third week of July, fledging activities peaked.

The total abandonment of nests in the third group of trees has several possible explanations. Unlike the major group of trees which were active, this site was on top of a flat ridge in very large alders. Some of the trees containing nests were dead. Perhaps without folliage they did not offer sufficient protection for the herons. The area had several blown down trees and some nests had fallen on the ground. The branches may have been too old and fragile to support them, or the wind may have blown them down. Unsuitable nesting conditions may possibly be linked to the clearcut approximately 60 yards from the nests, although this is difficult to determine without an accurate date for the last year of nesting activity.

Logging may expose an area to higher winds resulting in possible disruption of breeding activities, or blowdown of trees and branches. This may be significant if it is determined that herons require a specific nest density in the colony and will relocate if the numbers of branches becomes too low to accomodate enough nests

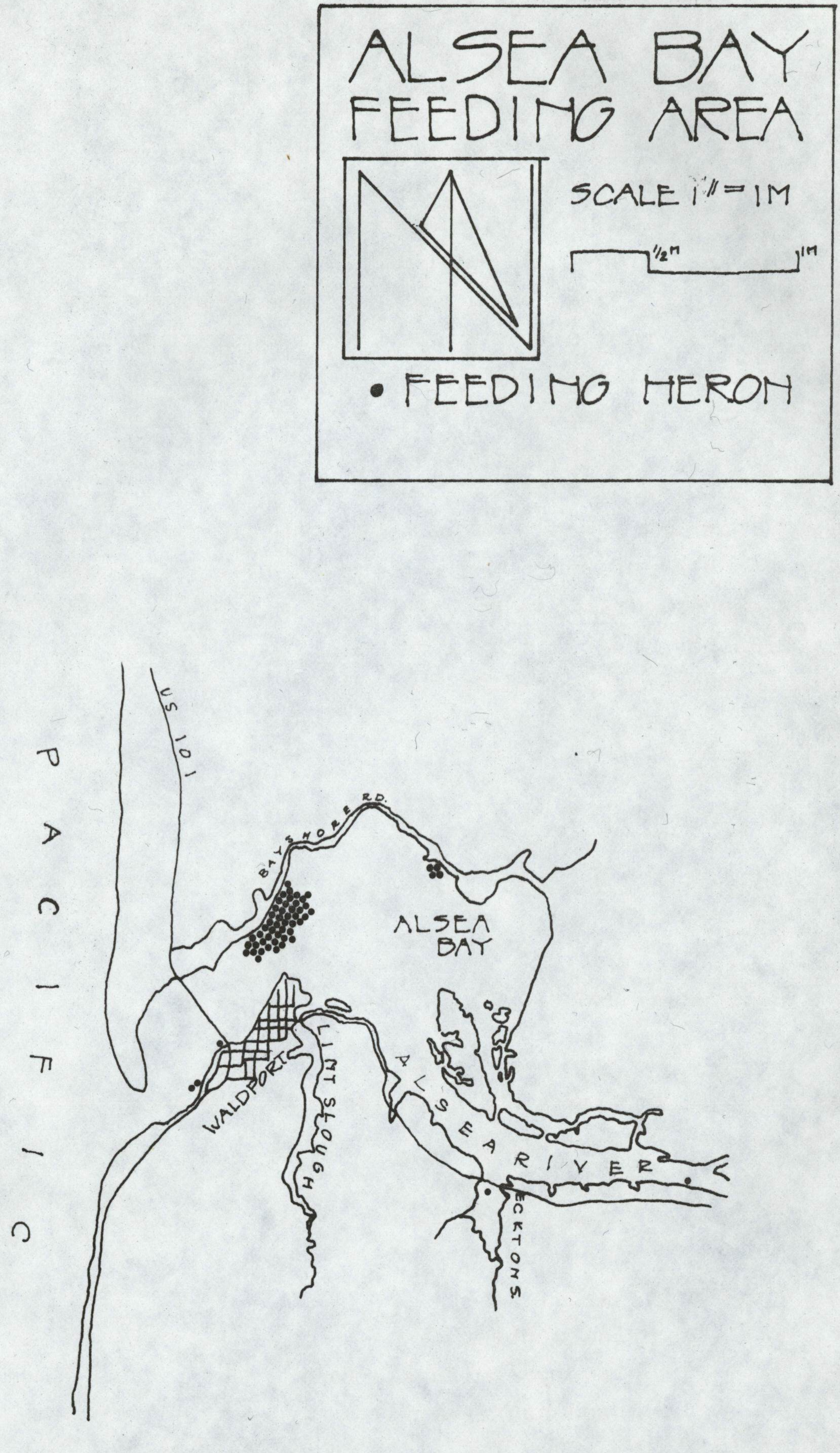
LAND USE

This rookery is on Forest Service land, and their policy concerning wildlife protection is stated in the Ball Mountain Land Use section.

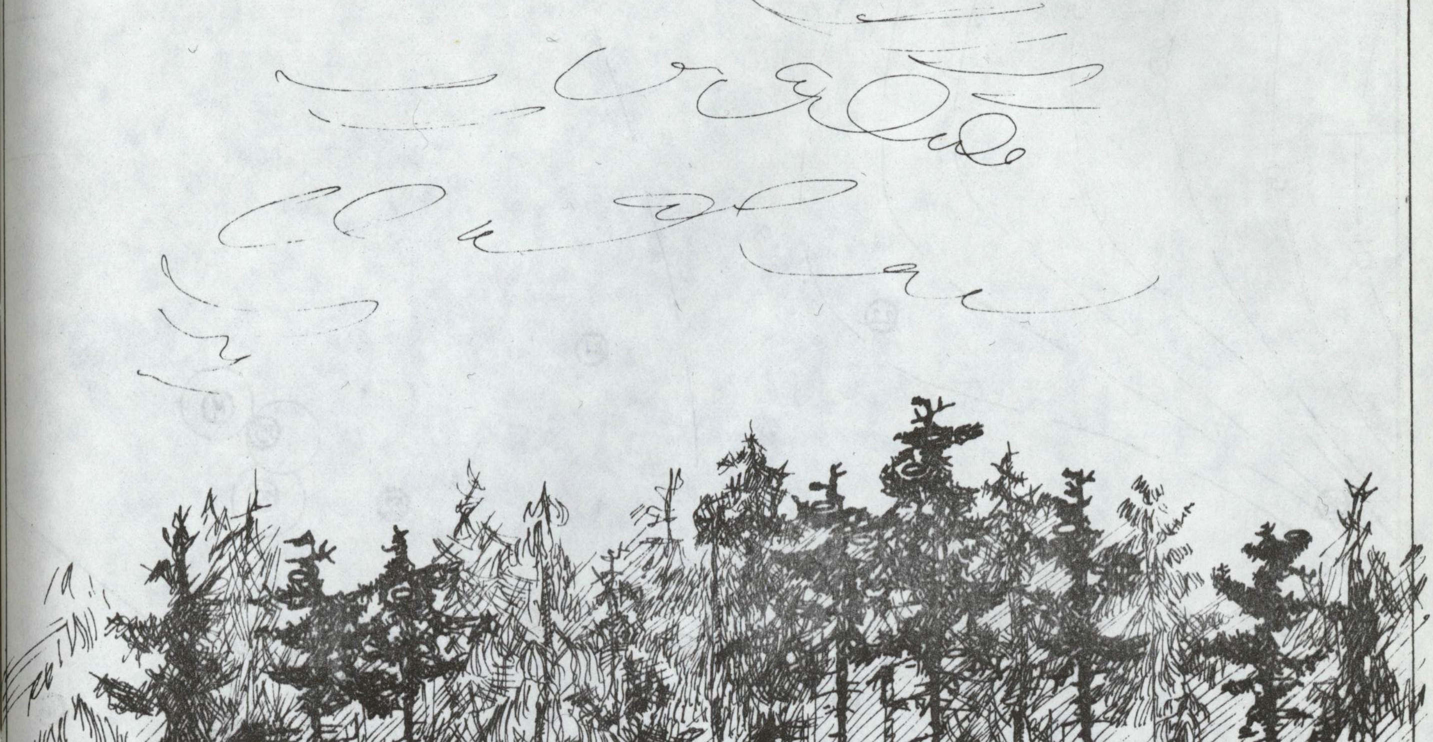
ASSOCIATED VEGETATION

upperstory: western hemlock
western red cedar
red alder
sitka spruce
douglas fir

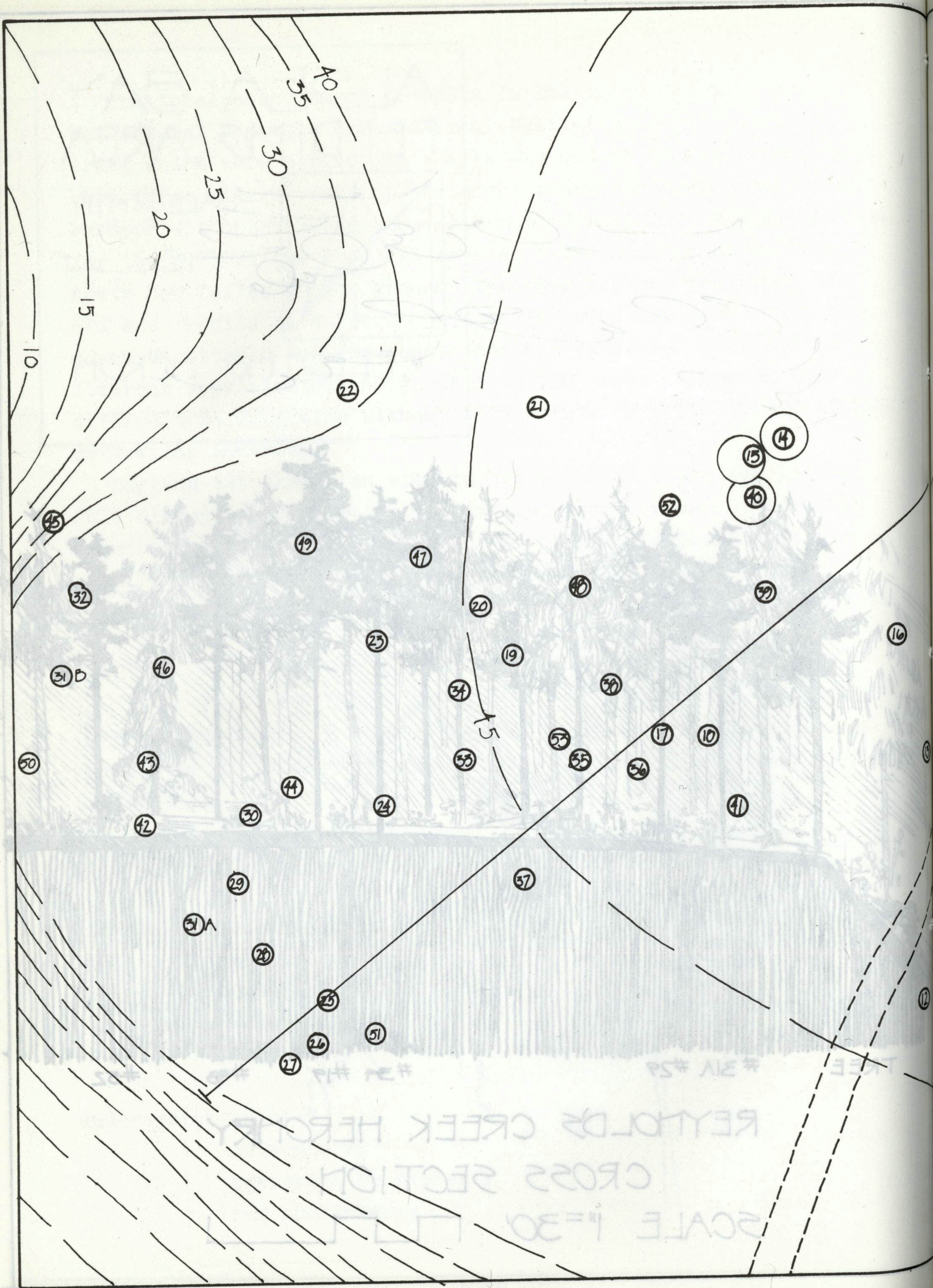
understory: salal
salmonberry
evergreen huckleberry
red huckleberry



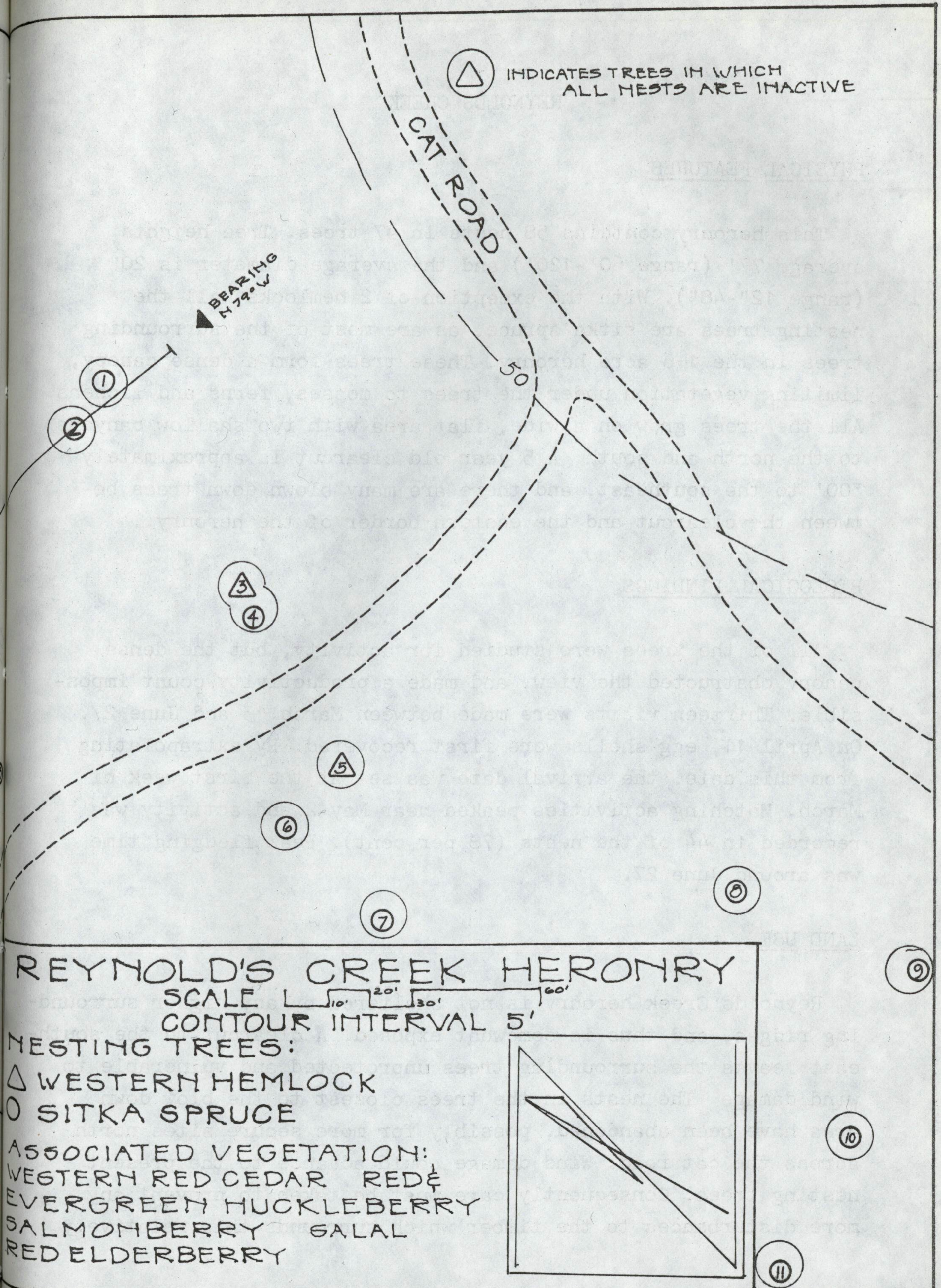
ALSEA BAY
FEEDING AREA
SCALE 1" = 1M
1/2M
1M
• FEEDING HERON
US 101
PACIFIC
BAYSHORE RD.
ALSEA
BAY
WALDPORT
LINT SLOUGH
ALSEA RIVER
ECKTONS



REYNOLD'S CREEK HERONRY
CROSS SECTION
SCALE 1" = 30'



40
35
30
25
20
15
10
15
22
21
14
15
40
52
45
49
47
32
48
39
20
16
23
19
31 B
46
34
38
17
10
53
35
50
43
33
36
44
24
41
42
30
29
37
31 A
28
25
51
26
27
12


INDICATES TREES IN WHICH ALL NESTS ARE INACTIVE
CAT ROAD
BEARING N 79° W
50
1
2
3
4
5
6
7
8
9
10
11
REYNOLD'S CREEK HERONRY
SCALE 10' 20' 30' 60'
CONTOUR INTERVAL 5'
NESTING TREES:
WESTERN HEMLOCK
SITKA SPRUCE
ASSOCIATED VEGETATION:
WESTERN RED CEDAR RED&
EVERGREEN HUCKLEBERRY
SALMONBERRY GALAL
RED ELDERBERRY

REYNOLDS CREEK

PHYSICAL FEATURES

This heronry contains 58 nests in 47 trees. Tree heights average 77' (range 60'-120') and the average diameter is 20" (range 12"-48"). With the exception of 2 hemlocks, all the nesting trees are sitka spruce, as are most of the surrounding trees in the 1.6 acre heronry. These trees form a dense canopy, limiting vegetation under the trees to mosses, ferns and lichens. All the trees grow on a wide, flat area with two shallow canyons to the north and south. A 5 year old clearcut is approximately 300' to the southeast, and there are many blown down trees between the clearcut and the eastern border of the heronry.

BIOLOGICAL FINDINGS

All of the trees were studied for activity, but the dense canopy obstructed the view, and made a productivity count impossible. Thirteen visits were made between March 13 and June 27. On April 11, egg shells were first recovered. By extrapolating from this date, the arrival date was set at the first week of March. Hatching activities peaked near May 2 and activity was recorded in 44 of the nests (78 per cent). Peak fledging time was around June 27.

LAND USE

Reynolds Creek heronry is not sheltered by any higher surrounding ridges, and thus is somewhat exposed. A clearcut to the southeast leaves the surrounding trees unprotected and vulnerable to wind damage. The nests in the trees closest to the blow down area have been abandoned, possibly for more secure sites north across the cat road. Wind damage could advance to the present nesting trees. Consequently care must be taken to prevent any more disturbances to the timber which surrounds this relatively flat piece of land.

Well used logging roads, and a flat approach to the nesting birds make it easy for man to intrude. On July 6, 1974, 14 dead immature herons were found below the nests by Range Bayer, a graduate student from Oregon State University, studying Great Blue Herons in the Yaquina Bay area. The birds had been dead between 2 and 3 days. Federal law enforcement officers were contacted. Cartridges found at the site indicated that 3, .22 caliber weapons had been used. This heronry is located on United States Forest Service land. See Ball Mountain, Land Use section for their policy.

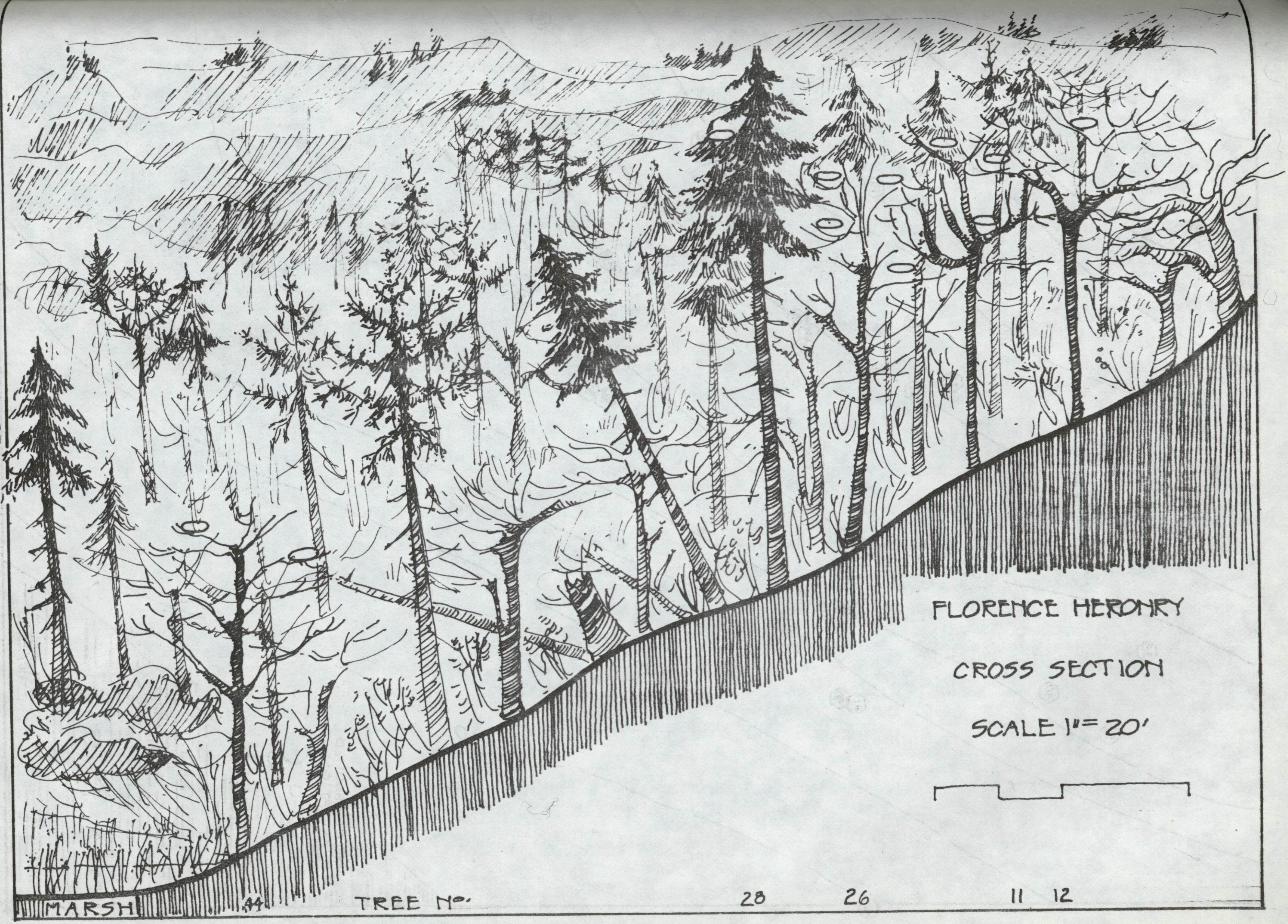
ASSOCIATED VEGETATION

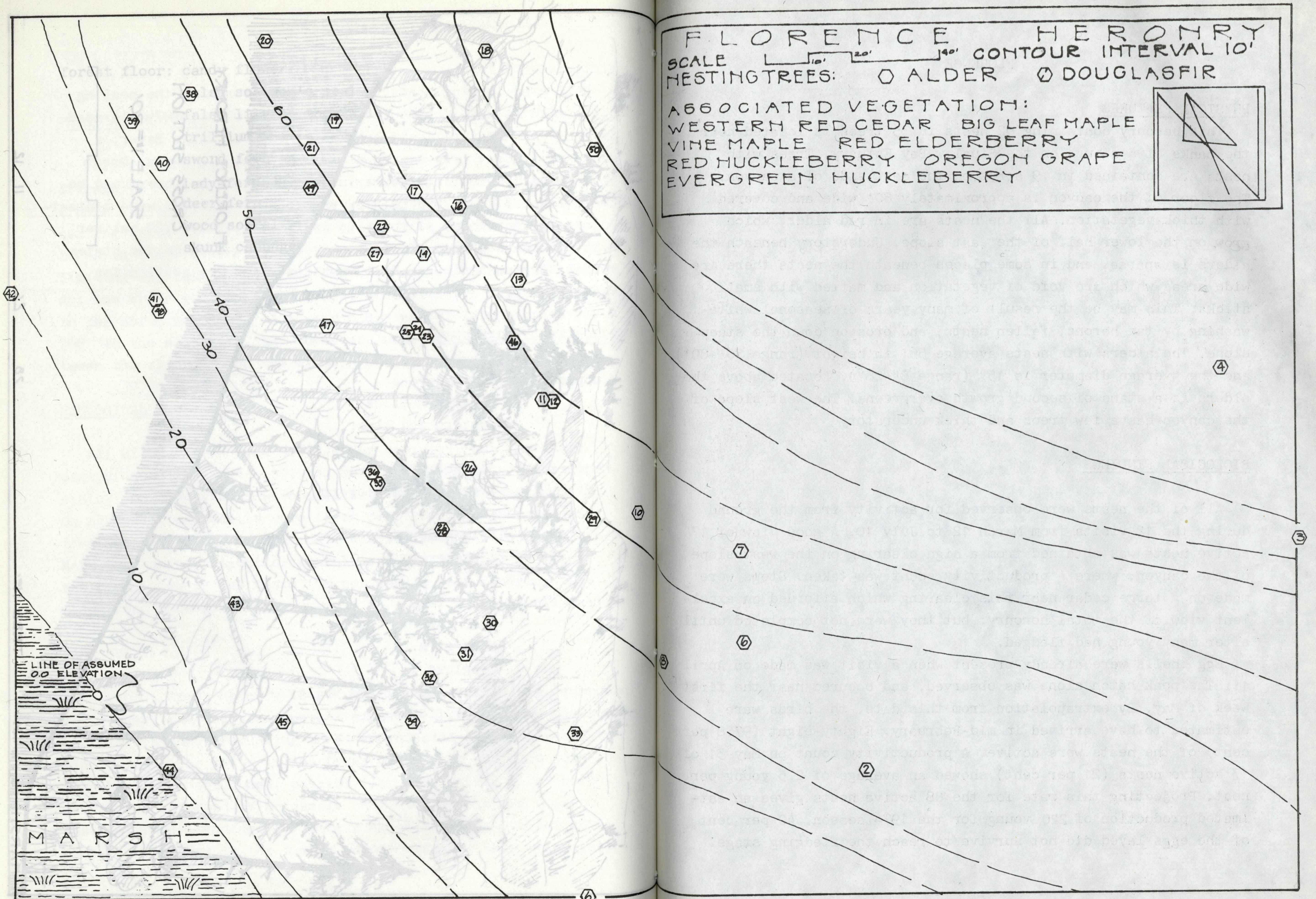
upperstory: sitka spruce
western hemlock
western red cedar

understory: red huckleberry
evergreen huckleberry
salal
salmonberry
elderberry

forest floor: sword fern
deer fern
lady-fern
foxglove
false lily of the valley
candy flower

forest floor: candy flower
false solomon's seal
false lily of the valley
trillium
sword fern
lady-fern
deer fern
wood sorrel
skunk cabbage


FLORENCE HERONRY
CROSS SECTION
SCALE 1" = 20'
MARSH
44
TREE No.
28
26
11
12


FLORENCE HERONRY
SCALE 10' 20' 40'
CONTOUR INTERVAL 10'
NESTING TREES: ALDER DOUGLAS FIR
ASSOCIATED VEGETATION:
WESTERN RED CEDAR BIG LEAF MAPLE
VINE MAPLE RED ELDERBERRY
RED HUCKLEBERRY OREGON GRAPE
EVERGREEN HUCKLEBERRY
60
50
40
30
20
10
LINE OF ASSUMED 0.0 ELEVATION
MARSH

FLORENCE

PHYSICAL FEATURES

This heronry containing 92 nests in 35 trees is located near the banks of a slough on the Siuslaw Bay Estuary. Trees with nests are contained in .9 acres on the east side of a canyon. The floor of the canyon is approximately 80' wide and covered with thick vegetation. All the nests are in red alder, which grow on the lower half of the east slope. Understory beneath the alders is sparse, and in some places beneath the nests there are wide areas which are void of vegetation and matted with small sticks. This may be the result of many years of seasonal white-washing by the herons, fallen nests, and erosion down the steep slope. The alders with nests average 56' in height (range 50'-80') and the average diameter is 15" (range 8"-28"). Located above the alders is a stand of second growth evergreens. The west slope of the canyon has a few trees and thick understory

BIOLOGICAL FINDINGS

All of the nests were observed for activity from the ground during the 12 visits from March 12 to July 10. A good view of 17 active nests was obtained from a high clearing on the west slope of the canyon, where a productivity count was taken. Steps were made on a large cedar near this clearing which afforded an excellent view of the total heronry; but they were not completed until after many young had fledged.

Egg shells were already present when a visit was made on April 11. The peak hatch alone was observed, and occured near the first week of May. By extrapolation from this date, the birds were estimated to have arrived in mid-February. Eighty-eight (97.8 per cent) of the nests were active. A productivity count on May 31 of 17 active nests (21 per cent) showed an average of 2.5 young per nest. Projecting this rate for the 88 active nests gives an estimated production of 220 young for the 1974 season. 40 per cent of the eggs layed did not survive to reach the fledging stage.

Fledging activities peaked near June 29.

LAND USE

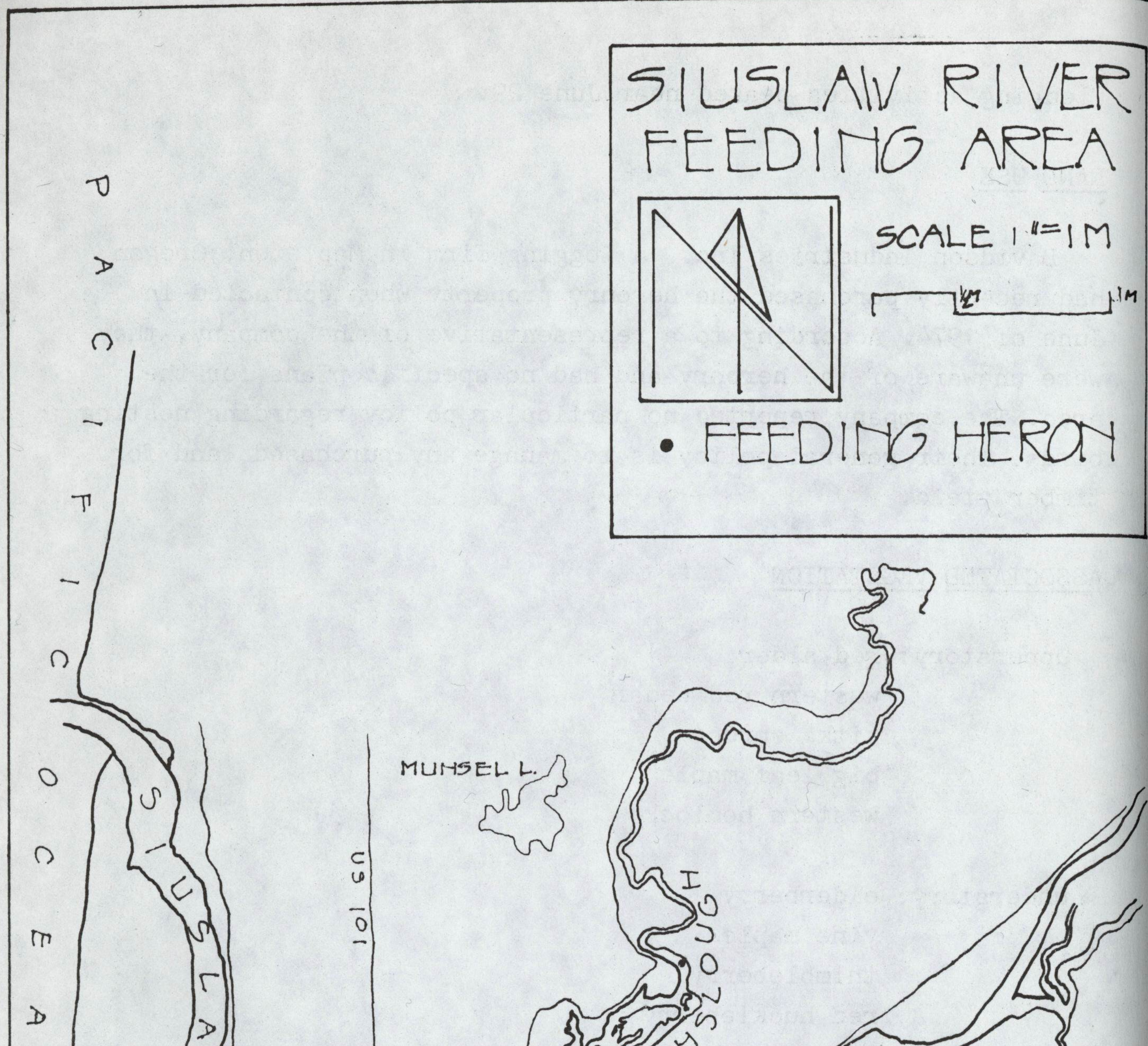
Davidson Industries Inc., a logging firm in Mapleton, Oregon had recently purchased the heronry property when contacted in June of 1974. According to a representative of the company, they were unaware of the heronry and had no specific plans for the area. The company reported no particular policy regarding nesting birds. Their general policy is to manage any purchased land for timber yield.

ASSOCIATED VEGETATION

upperstory: red alder
western red cedar
sitka spruce
big leaf maple
western hemlock

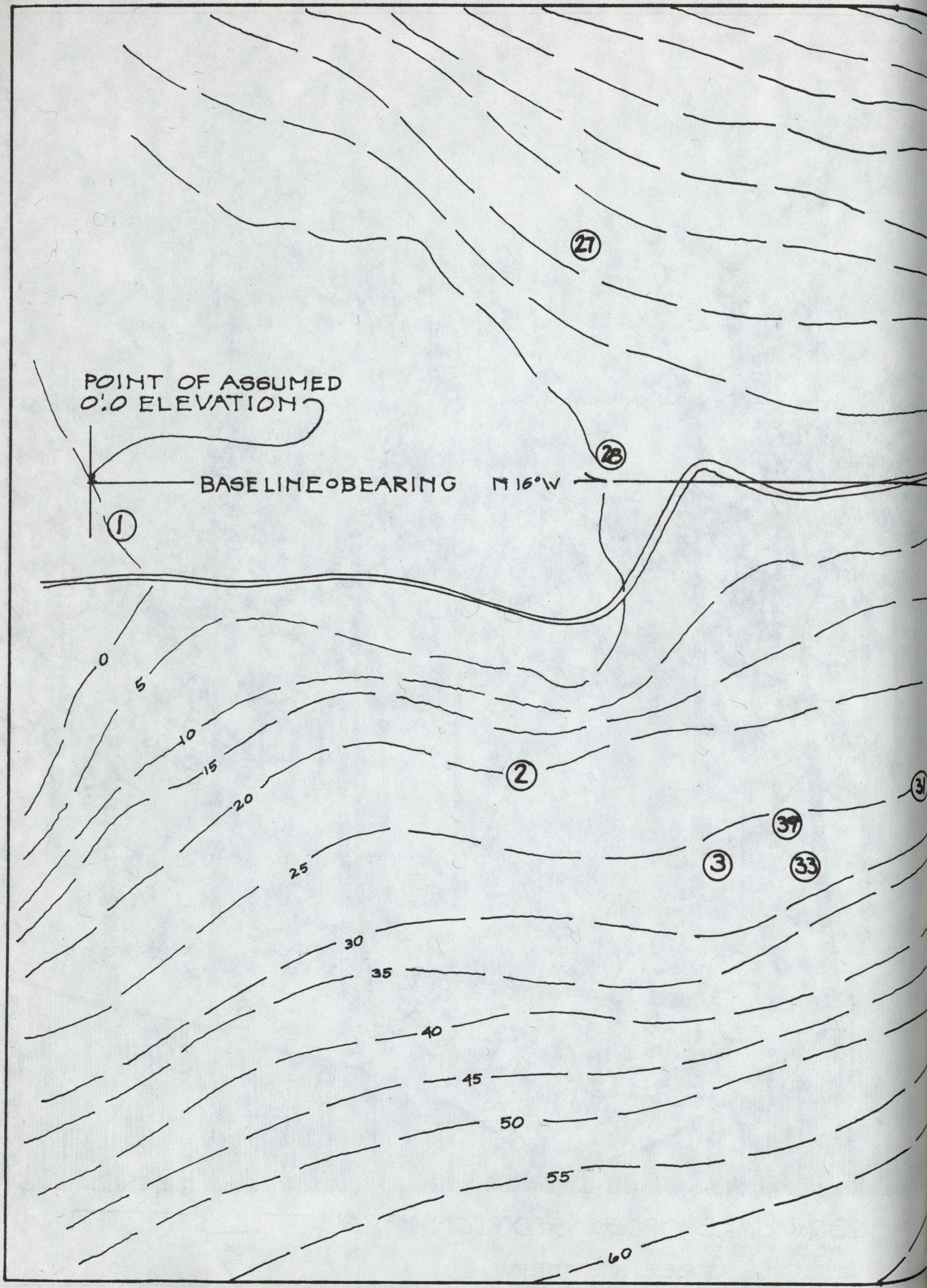
understory: elderberry
vine maple
thimbleberry
red huckleberry
evergreen huckleberry
ocean spray
wild filbert
salal
wild cucumber

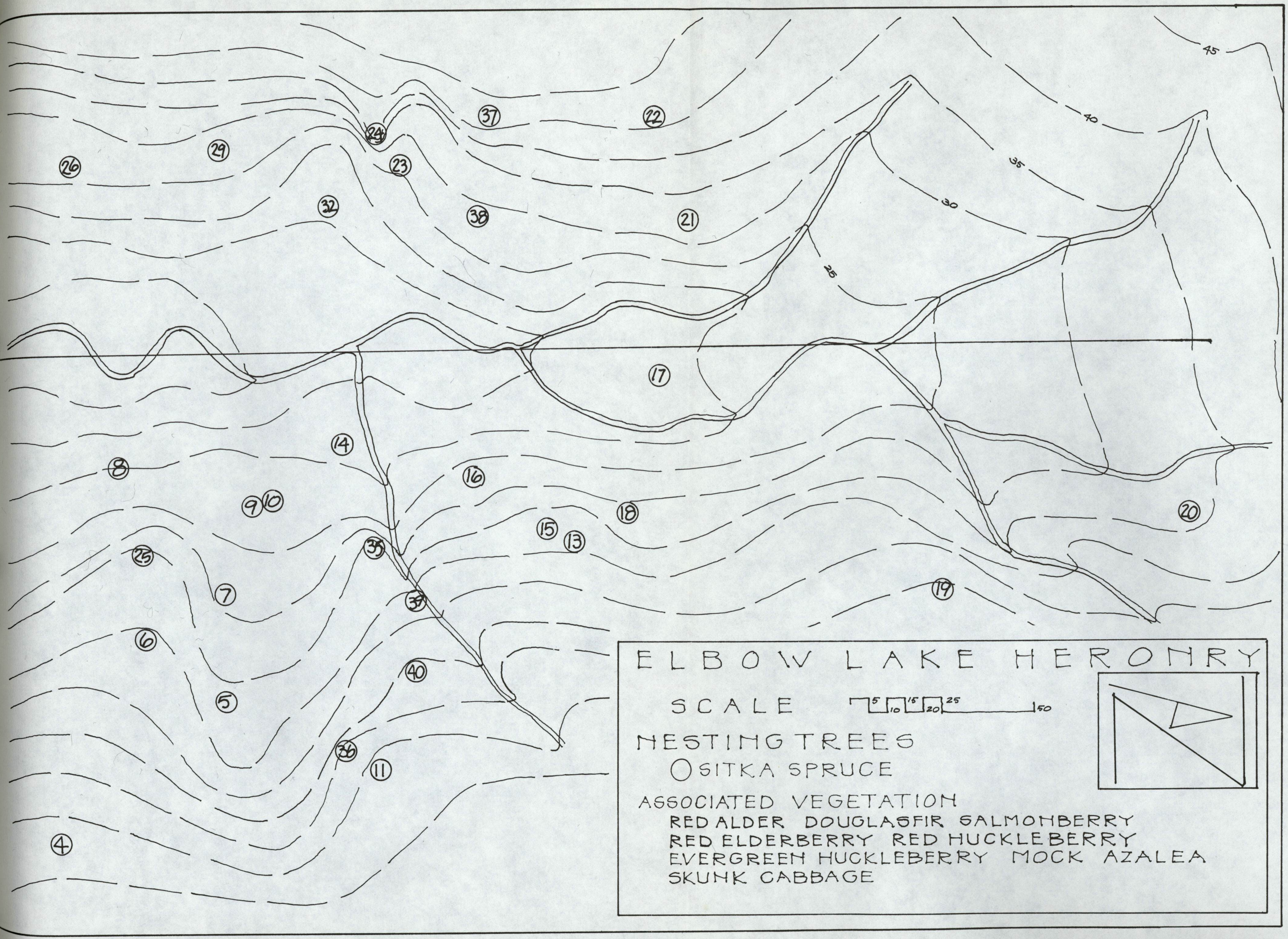
forest floor: candy flower
bleeding heart
wood sorrel
solomon's seal
lady-fern
Oregon grape
false lily of the valley
wild ginger


SIUSLAW RIVER
FEEDING AREA
SCALE 1"=1M
KM
1M
• FEEDING HERON
PACIFIC OCEAN
SIUSLAW RIVER
US 101
MUNSEL L.
FLORENCE
NORTH SLOUGH
S SLOUGH
S INLET

ELBOW LAKE CROSS SECTION 1"=20'

29 TREE NUMBER 7 5


POINT OF ASSUMED
0'.0 ELEVATION
BASELINE BEARING N 16°W
1
2
3
27
28
31
33
39
0
5
10
15
20
25
30
35
40
45
50
55
60


ELBOW LAKE HERONRY
SCALE 5 10 15 20 25 50
NESTING TREES
O SITKA SPRUCE
ASSOCIATED VEGETATION
RED ALDER DOUGLASFIR SALMONBERRY
RED ELDERBERRY RED HUCKLEBERRY
EVERGREEN HUCKLEBERRY MOCK AZALEA
SKUNK CABBAGE
45
40
35
30
25

ELBOW LAKE

PHYSICAL FEATURES

This heronry was first visited this season in June. The general location was reported in the 1972 Audubon Survey, but exact directions were difficult to obtain. The 43 nests are in 40 sitka spruce trees growing along the bottom and up both sides of a valley. The average height of the nesting trees is 75' (range 60'-120') and the diameter is 20" (range 14"-36"). The trees with nests are contained in an area of .7 acres.

The canopy of sitka spruce is extremely dense, making observations of the nests impossible from the ground. The understory is sparse on the valley sides and almost non-existent on the valley floor. Mosses and lichens thrive in this cool, well shaded spot.

LAND USE

The Elbow Lake Heronry is located within a canyon that is bordered by steep ridges running east and west. A clearcut at the top of the western ridge could leave the heronry unprotected from this direction. If timber is left at the ridge lines, it may provide protection for the nesting trees. However much more study is necessary in order to understand how disturbances will affect the microclimate that surrounds and includes the heronry.

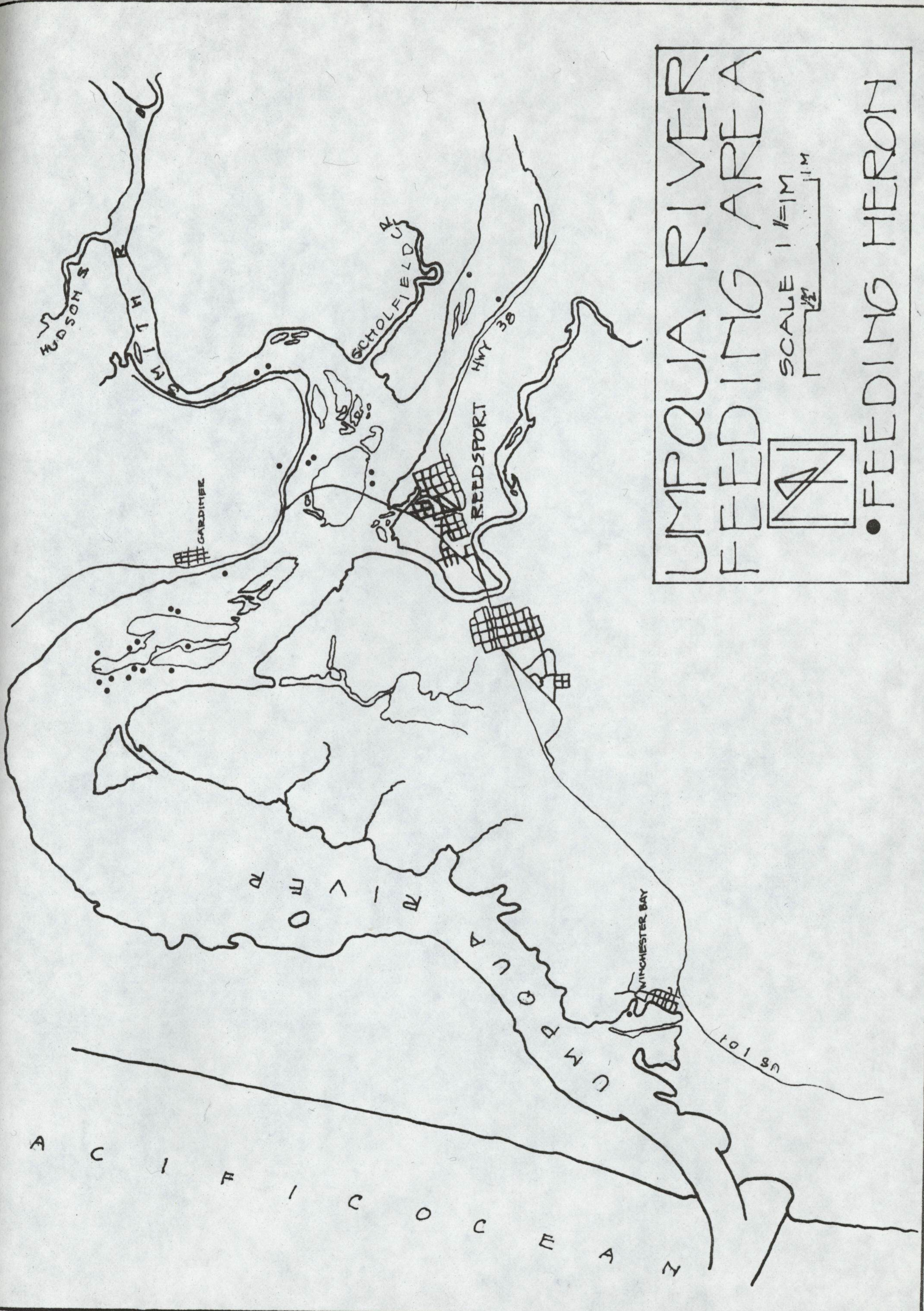
Like Ball Mountain, Beaver Creek, and Reynold's Creek, this heronry is on United States Forest Service land. See the Ball Mountain, Land Use section for a policy statement on these areas. Since this heronry was located far into the breeding season, no attempts were made to estimate significant breeding dates.

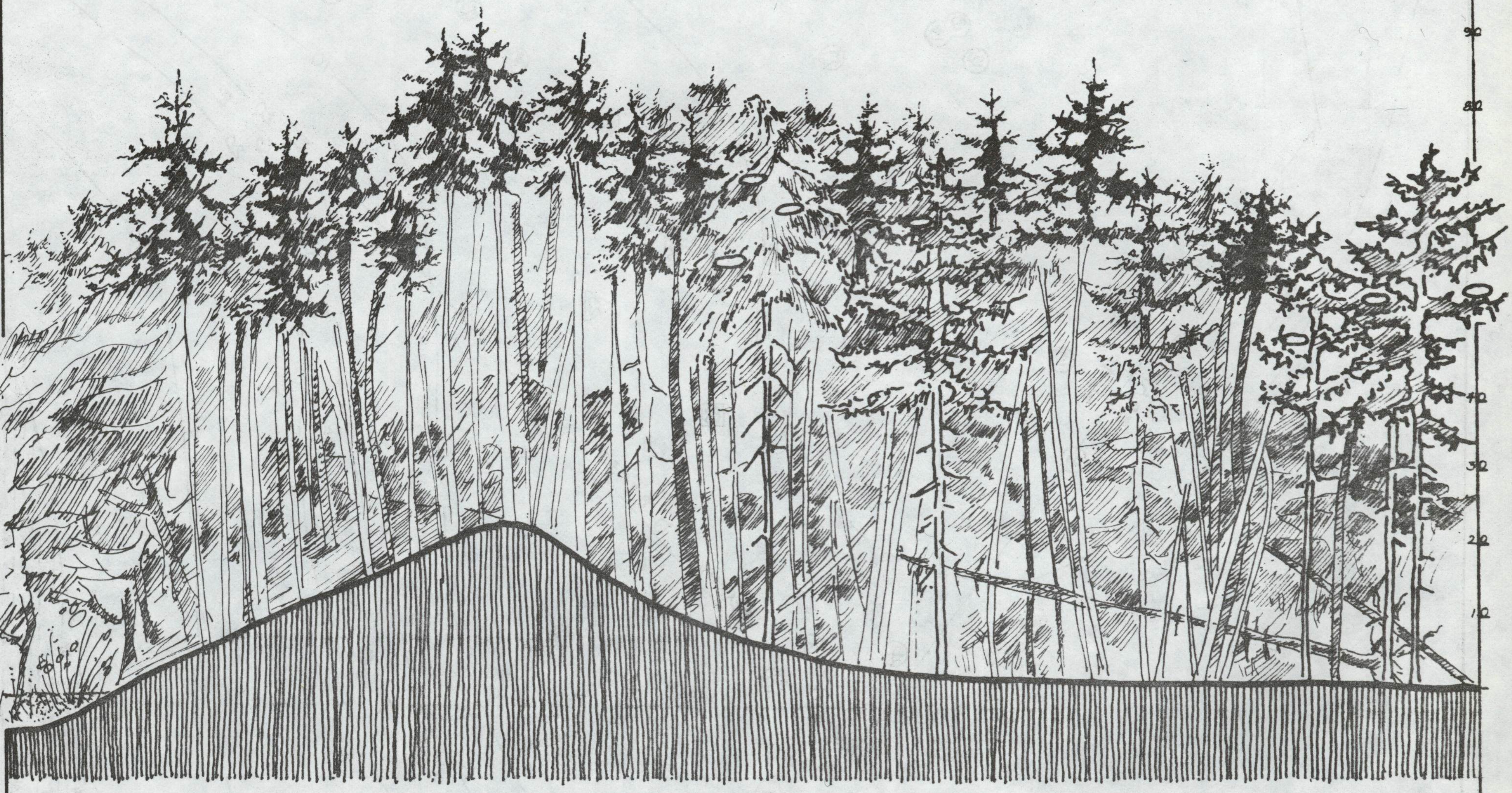
ASSOCIATED VEGETATION

upperstory: sitka spruce
douglas fir
red alder

understory: salmonberry
elderberry
red huckleberry
evergreen huckleberry
mock azalea

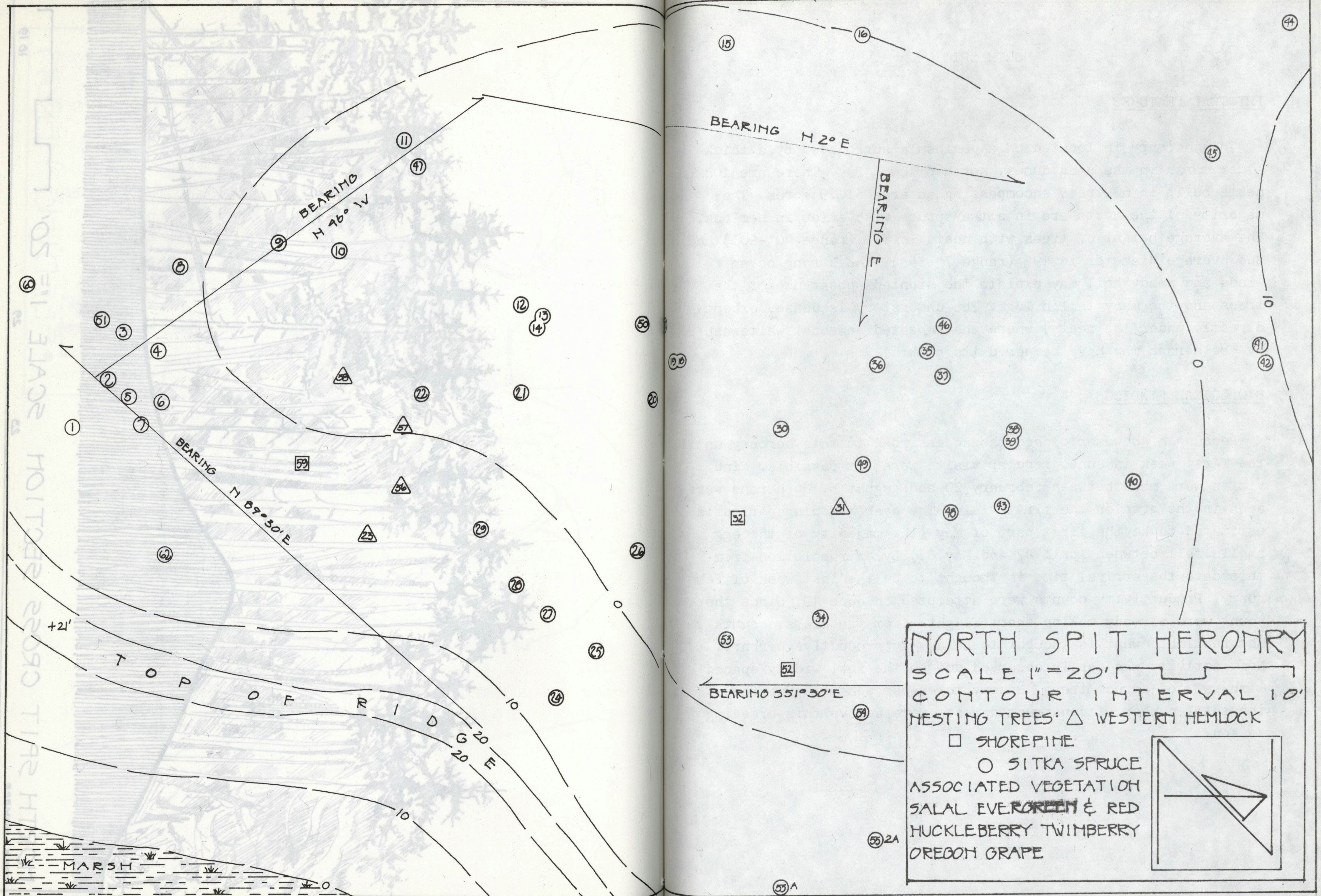
forest floor: candy flower
lady-fern
deer fern
sword fern - dominant
horsetail
false lily of the valley
false Solomon seal
wood sorrel
monkey flower
skunk cabbage
bedstraw
wild ginger


UMPQUA RIVER
FEEDING AREA
SCALE 1"=1M
½M
1M
• FEEDING HERON
REEDSPORT
HWY 38
SCHOLFIELD CR
SMITH R
HUDSONS
GARDINER
WINCHESTER BAY
US 101
UMPQUA RIVER
PACIFIC OCEAN



NORTH SPIT CROSS SECTION SCALE 1" = 20'

TREE NUMBER 23 29 18 19


NORTH SPIT HERONRY
SCALE 1"=20'
CONTOUR INTERVAL 10'
NESTING TREES: △ WESTERN HEMLOCK
□ SHOREPINE
○ SITKA SPRUCE
ASSOCIATED VEGETATION
SALAL EVERGREEN & RED
HUCKLEBERRY TWINBERRY
OREGON GRAPE
BEARING N 46° W
BEARING N 89°30'E
BEARING N 2° E
BEARING E
BEARING S51°30'E
TOP OF RIDGE
MARSH
+21'
0
10
20

NORTH SPIT

PHYSICAL FEATURES

This heronry is located on a peninsula surrounded by a thick alder marsh in the sand dunes, north of Coos Bay. There are 108 nests built in 67 trees encompassing an area of .9 acres. The majority of the nests are in sitka spruce with a few in hemlock. The average height of trees with nests is 56' (range 40'-90') and the average diameter is 19" (range 7"-34"). The strong ocean winds and sandy soil may explain the stunted appearance of the trees and the many fallen logs. The understory is dense, except directly under the nests, where the repeated seasonal whitewash by the herons may have hampered its growth.

BIOLOGICAL FINDINGS

Because high water closed the access road to this heronry until the first week in June, regular visits were not possible. Nine visits were made between February 20 and August 5. No herons were seen in the area on the first visit. The peak hatching period is estimated to be the first part of May (the majority of the egg shells fell between April 27 and May 8.) By extrapolation from this date the arrival time is thought to be the last week of February. Productivity counts were attempted on June 19. Since the young were already making short flights from the nests, counts underestimate what is thought to be a very productive heronry. Nest activity was easily observed due to the low, widely spaced limbs of the spruce trees. Ninety three per cent (104 nests) of the total number of constructed nests were active this breeding season.

LAND USE

This heronry is located on land owned by the Army Corps of Engineers. It is being retained as a possible site for future dredge spoil deposits. It will be two years before the economic feasibility is known and another 5 years before the dredging project would begin. If the Army Corp decides against the dredging project and no other use or need for that land can be determined then it will be termed "in excess." In which case it will be returned to the people of the state via State or Federal agencies.

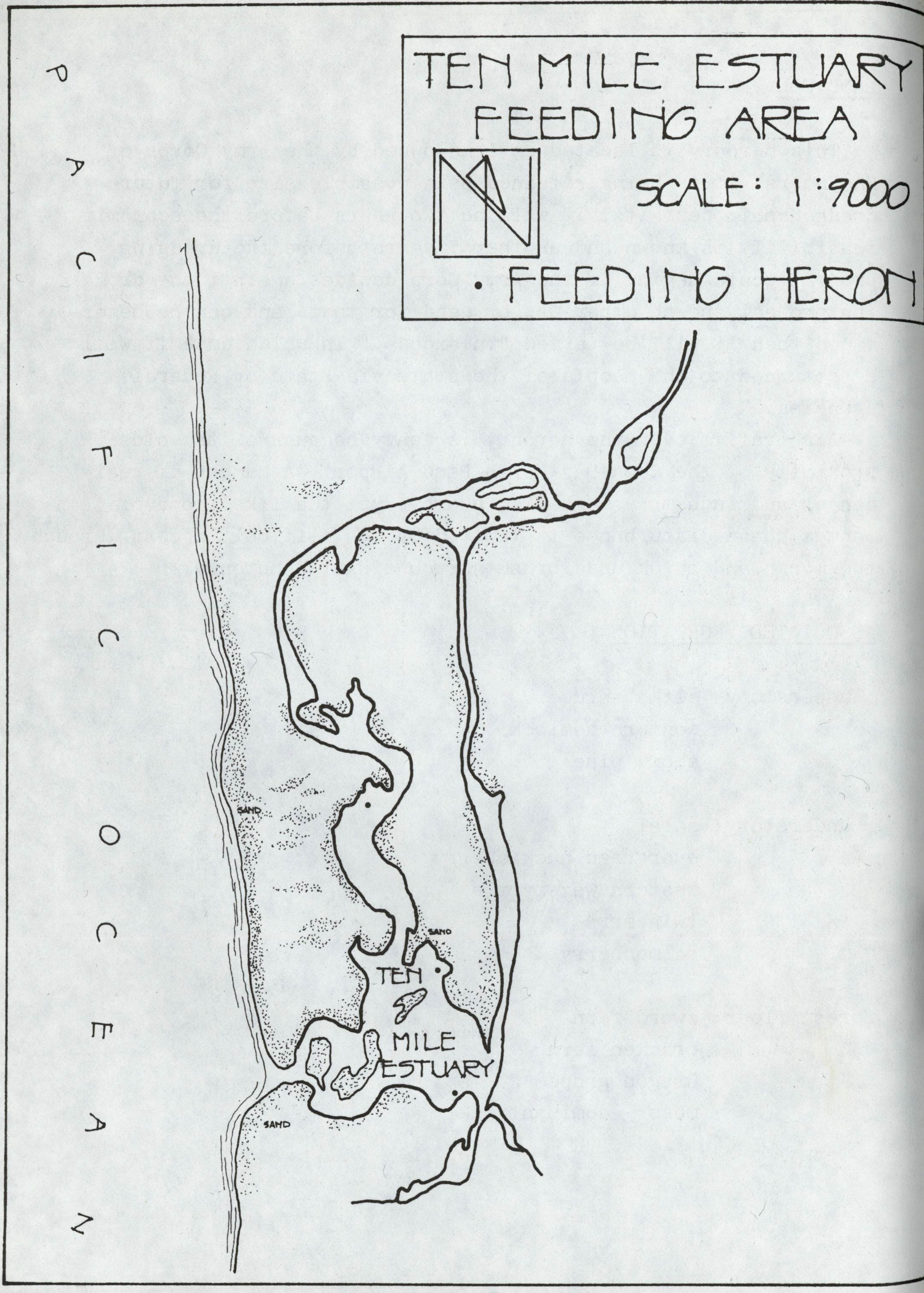
Air traffic over the heronry is heavy because of the close proximity of the Coos Bay-North Bend Airport. A number of residences and industries are also nearby; yet the likelihood of casual human disturbance is limited by the difficult access through the marsh and thick underbrush surrounding the heronry.

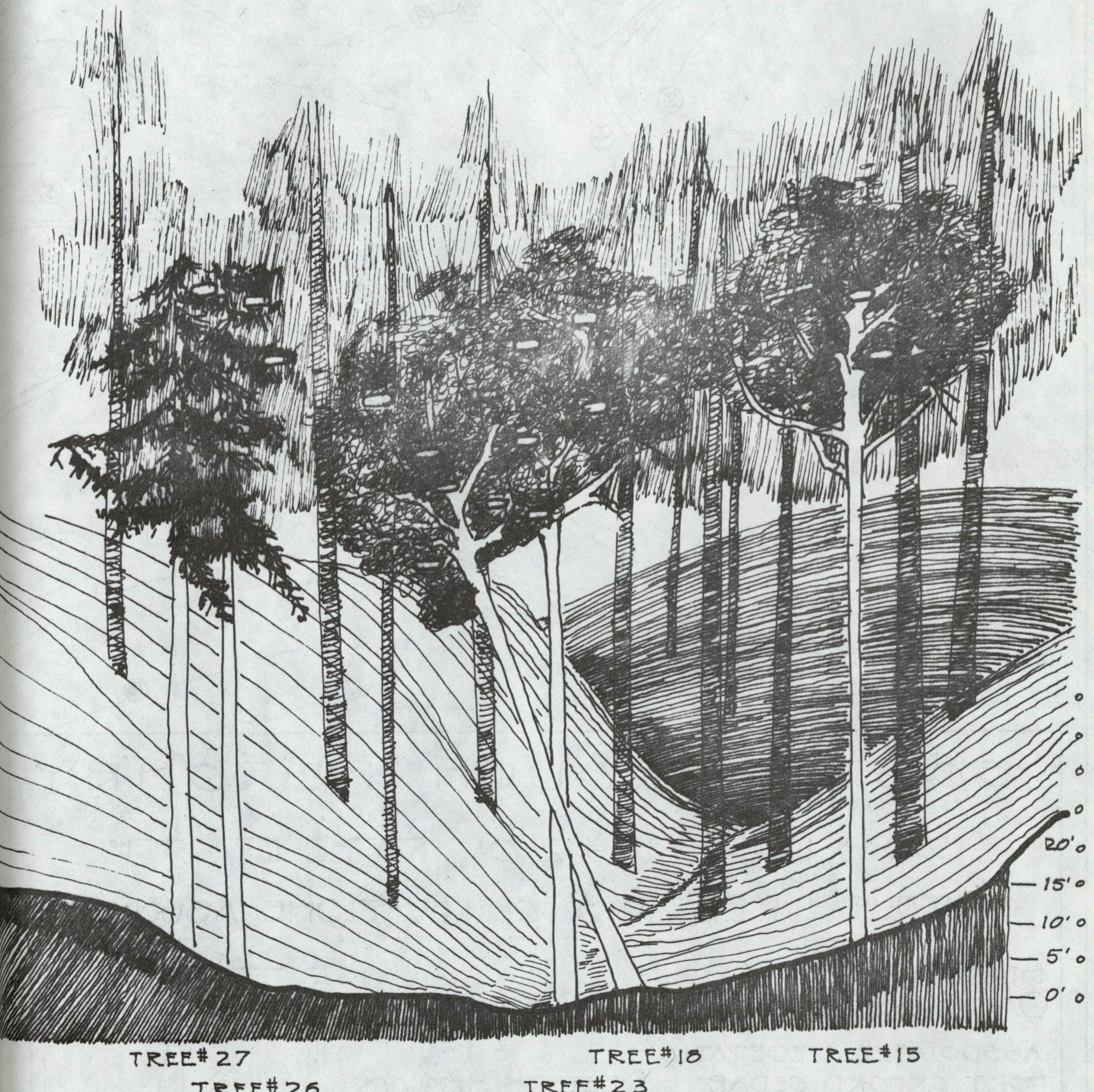
ASSOCIATED VEGETATION

upperstory: sitka spruce
western hemlock
shore pine

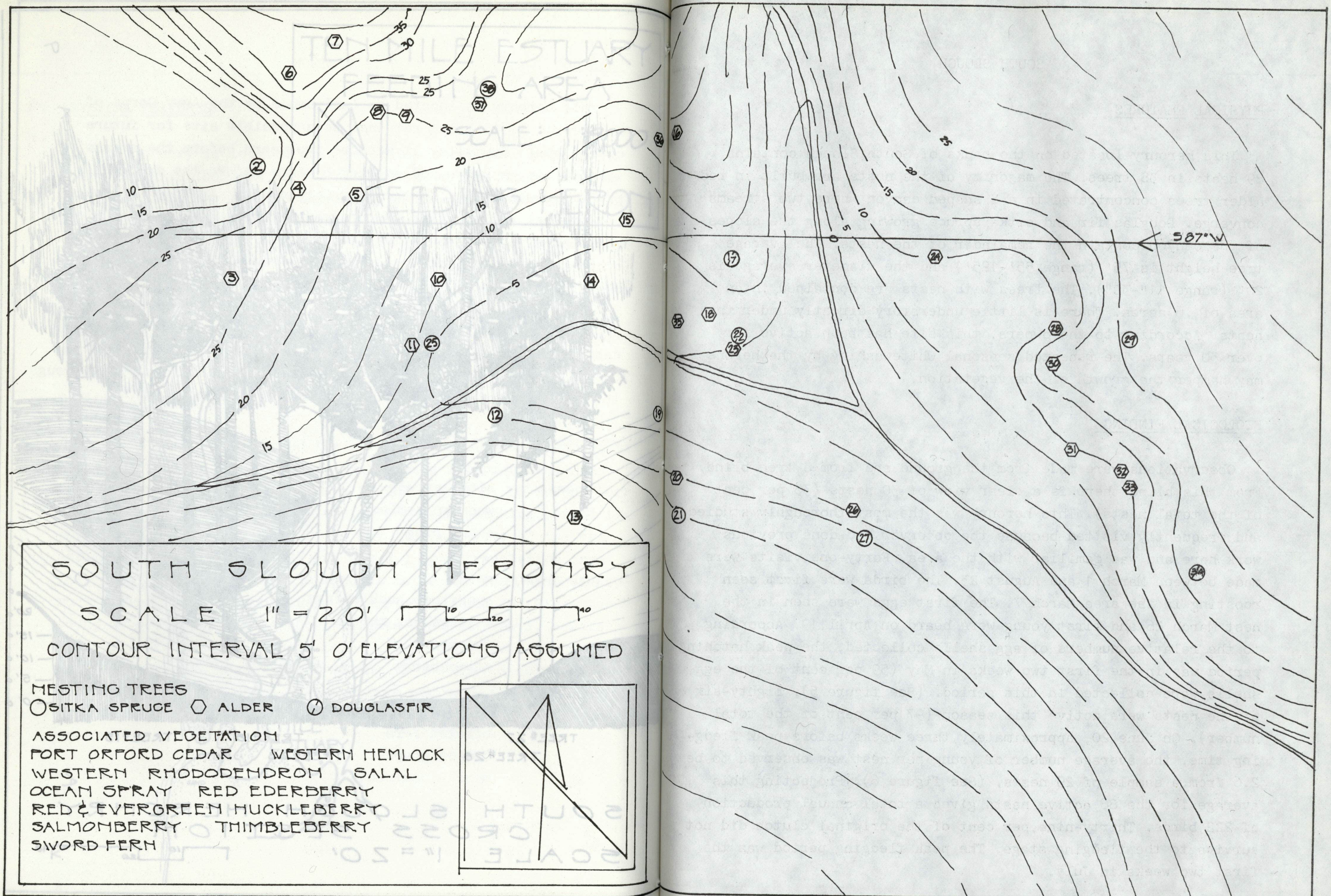
understory: salal
evergreen huckleberry
western wax myrtle
twinberry
salmonberry

forest floor: sword fern
bracken fern
Oregon grape
moss - dominant


TEN MILE ESTUARY
FEEDING AREA
N
SCALE: 1:9000
• FEEDING HERON
P A C I F I C O C E A N
SAND
SAND
SAND
TEN MILE ESTUARY



SOUTH SLOUGH HERONRY
CROSS SECTION
SCALE 1" = 20'



SOUTH SLOUGH HERONRY
SCALE 1" = 20'
10
20
40
CONTOUR INTERVAL 5' 0' ELEVATIONS ASSUMED
NESTING TREES
SITKA SPRUCE
ALDER
DOUGLASFIR
ASSOCIATED VEGETATION
PORT ORFORD CEDAR
WESTERN HEMLOCK
WESTERN RHODODENDRON
SALAL
OCEAN SPRAY
RED EDERBERRY
RED & EVERGREEN HUCKLEBERRY
SALMONBERRY
THIMBLEBERRY
SWORD FERN
S87°W

SOUTH SLOUGH

PHYSICAL FEATURES

This heronry located on the banks of South Slough contains 89 nests in 38 trees. The majority of the nests are built in red alder trees concentrated in a Y shaped canyon where two streams converge. Douglas fir and sitka spruce growing along the slopes of the canyon contain the remainder of the nests. The average tree height is 75' (range 55'-125') and the diameter average is 20" (range 11"-30"). The trees with nests are contained in an area of .6 acres. There is little understory directly under the nests. According to the owners, this site has been active for over 30 years. The repeated seasonal whitewashing by the herons may hamper the growth of the vegetation.

BIOLOGICAL FINDINGS

Observations were made from the ground and from a tree blind. From this blind there is a clear view of 30 nests (35 per cent of the total nests). This heronry was the most thoroughly studied and frequently visited because the observer had done previous work here and was familiar with the area. Forty-one visits were made between March 1 and August 23. The birds were first seen roosting in the area March 7. The first eggs were seen in the nest March 26 and first young were heard on April 19. According to the relative numbers of egg shells collected, the peak hatching period was in the first two weeks in May (59 per cent of the egg shells were collected in this period. (See figure 5). Eighty-six of the nests were active this season (97 per cent of the total number). On June 20, approximately three weeks before peak fledging time, the average number of young per nest was observed to be 2.6 from a sample of 29 nests. (See figure 6). Projecting this average for the 86 active nests gives a total annual production of 222 birds. Thirty-nine per cent of the original clutch did not survive to the fledging stage. The peak fledging period was the first two weeks in July.

ure 6). The peak fledging period was the first two weeks in July.

Most of the behavioral observations were made at this heronry. A sentinal position was evidenced by whitewash and dropped fish repeatedly found at a spot along the trail between the bank of the slough and the nesting trees. Visits to the heronry were made most frequently by canoe. At nearly every visit a bird flew from the suspected sentinal vacinity, squaking loudly as the canoe got within 30 or 40 feet of the shore. The bird usually flew over the canoe, out over the water, then circled around to settle in a stand of tall trees approximately 300 yards south.

Competition among siblings was observed on many occasions. On May 21, 2 young herons attacked their youngest sibling in a nest of 4. The second to the youngest was the most aggressive in the squabble. It took the youngest bird by the neck with its bill and shook its entire body, back and forth. When the victim became motionless the 2 attacking siblings pecked at it raising their bills above the edge of the nest with feathers in them. It was not possible to see if the young heron was eaten because the edges of the nest obstructed the view. The largest of the 4 siblings and the adult made no visible responce to the activity in the nest. No sounds audible from a distance of 90' were made by any of the birds.

This heronry has been visited regularly for more than 3 breeding seasons by biology students. The birds flush more easily than they do at the more isolated heronries. The visits were quiet and usually made by only 1 or 2 observers. The overall breeding success of the herons did not seem to be adversely affected.

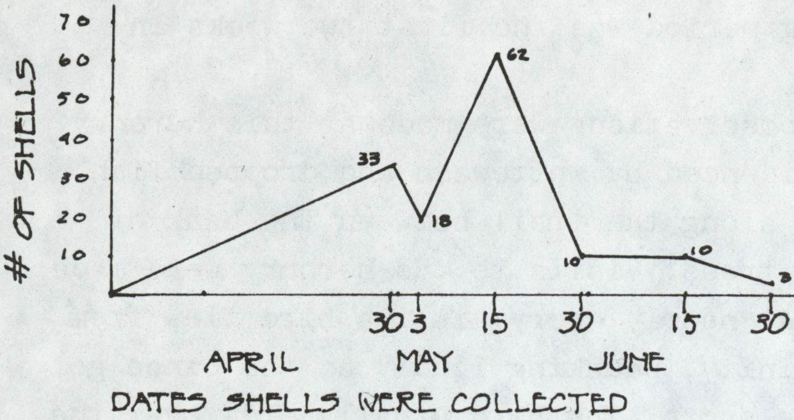
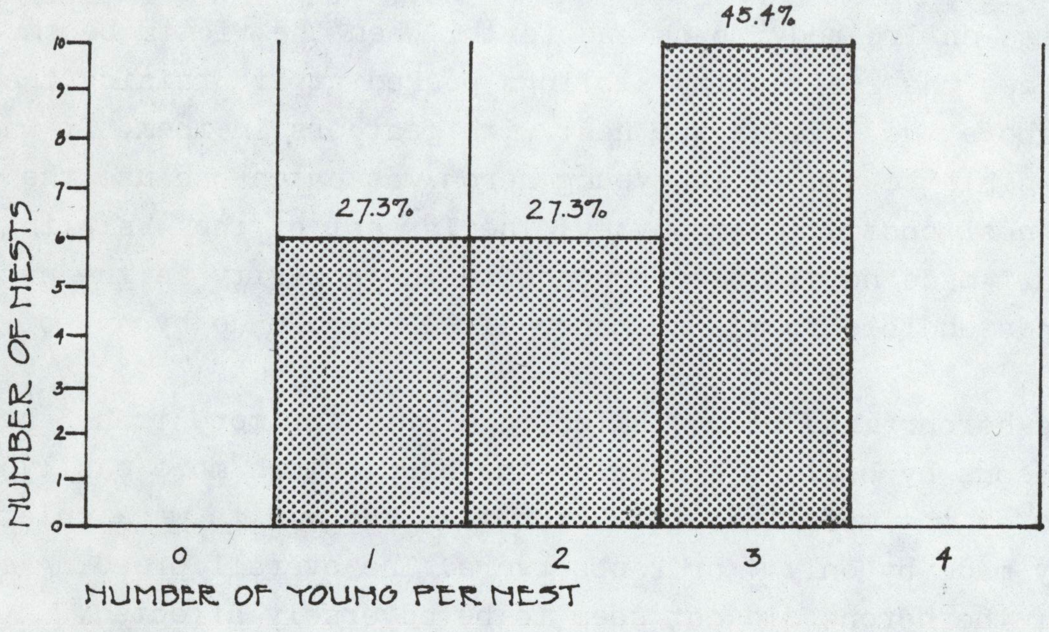


FIG 5
SOUTH SLOUGH

SOUTH SLOUGH

FIG #6



LAND USE

George and Crystal Barton own 110 acres on the South Slough. The land is divided into two 40 acre lots on the upland, and one 30 acre lot containing the heronry. The upper 40 acre lots will probably be logged in the near future. The 30 acre lot bordering the waters of the South Slough shows promise of being preserved.

The Bartons, who have a great appreciation of wildlife have been aware of the herons nesting on their property for over 30 years. They have been very cooperative in letting students study the nesting colony.

An approximately 10 acre area would be sufficient to protect the trees with nests from wind and human activity. The breeding population is protected from strong summer winds by a ridge to the north covered with tall evergreens. The ridges also run along the west and south sides of the heronry, providing a natural protection for the trees in the nesting area. The boundary to the east is formed by the bank of the South Slough. Tall trees between the nesting trees and the water obscure the view of the nests.

ASSOCIATED VEGETATION

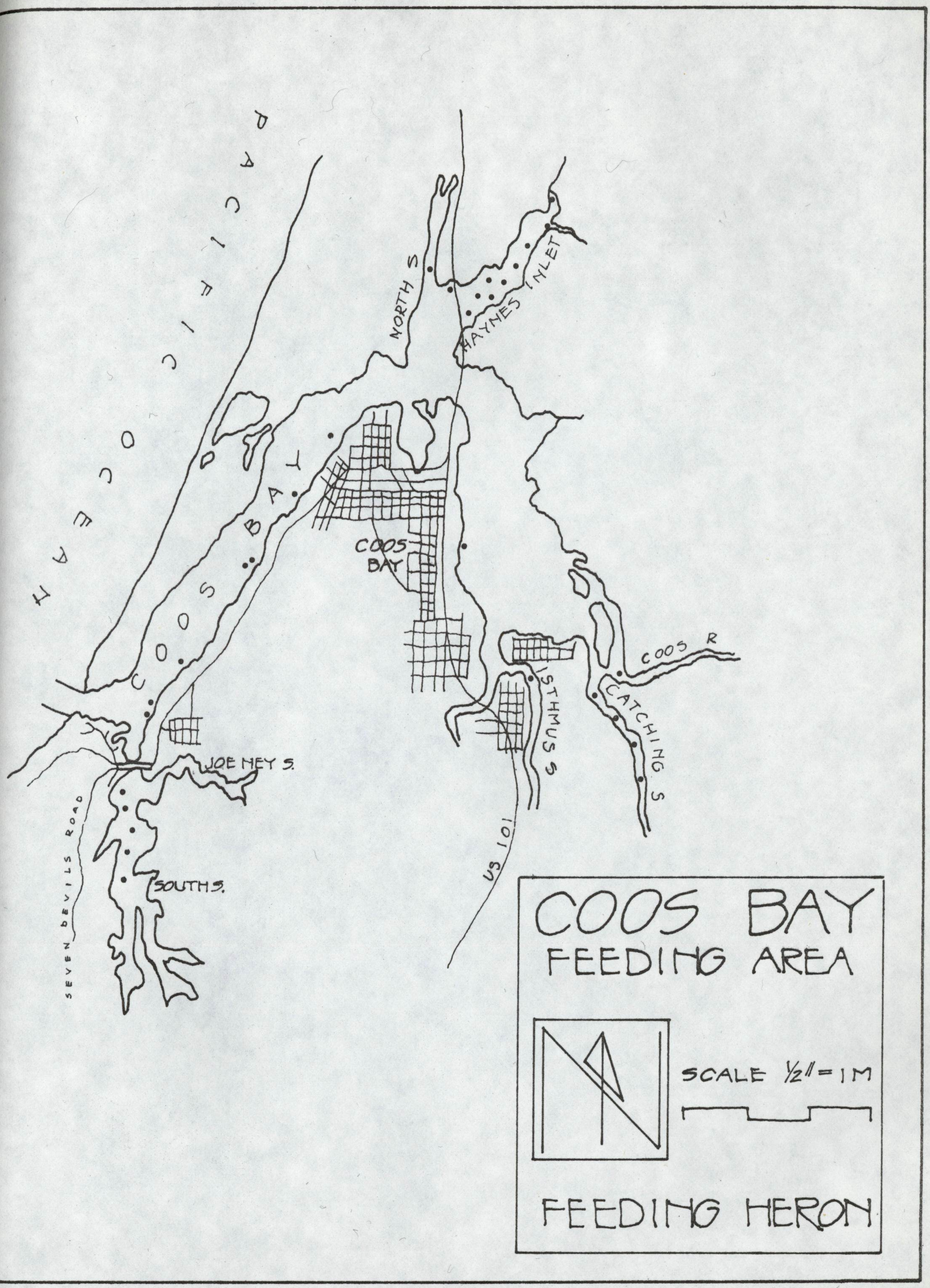
upperstory: Port Orford cedar
douglas fir
sitka spruce
western hemlock
red alder

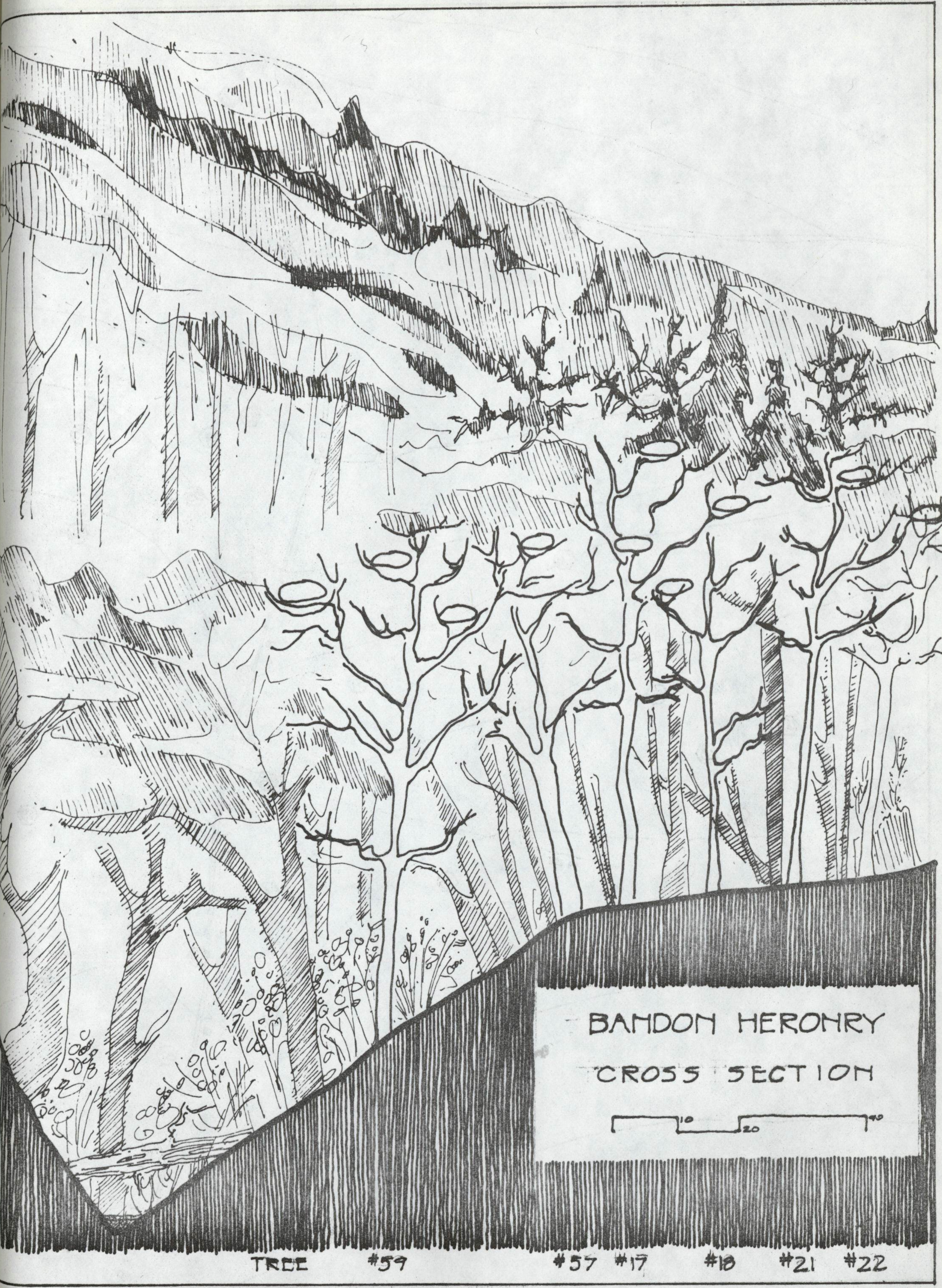
understory: salmonberry
salal
red huckleberry
evergreen huckleberry
rhododendron
red elderberry
thimbleberry
ocean spray

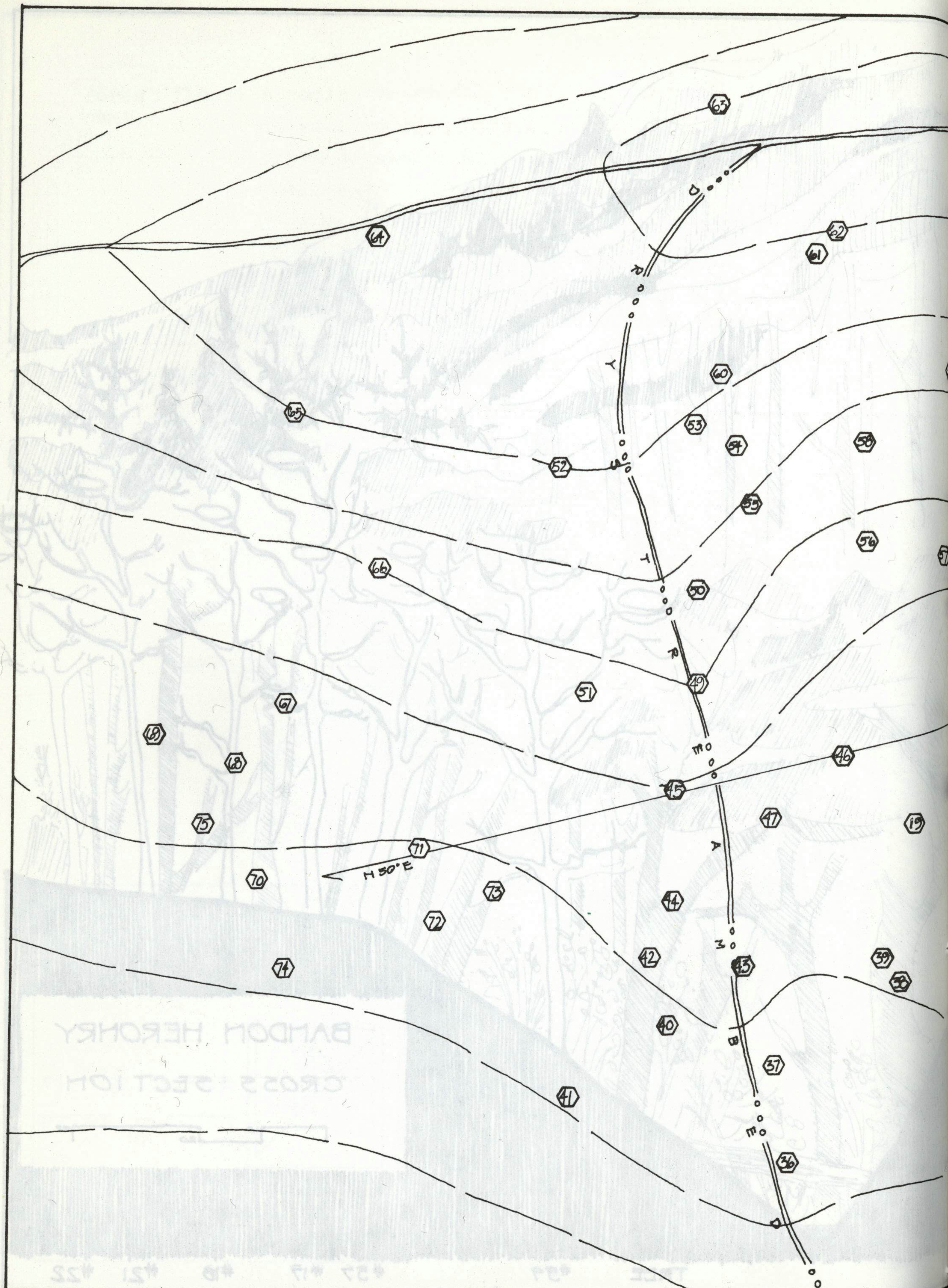
forest floor: wood sorrel
candy flower
sword fern
skunk cabbage

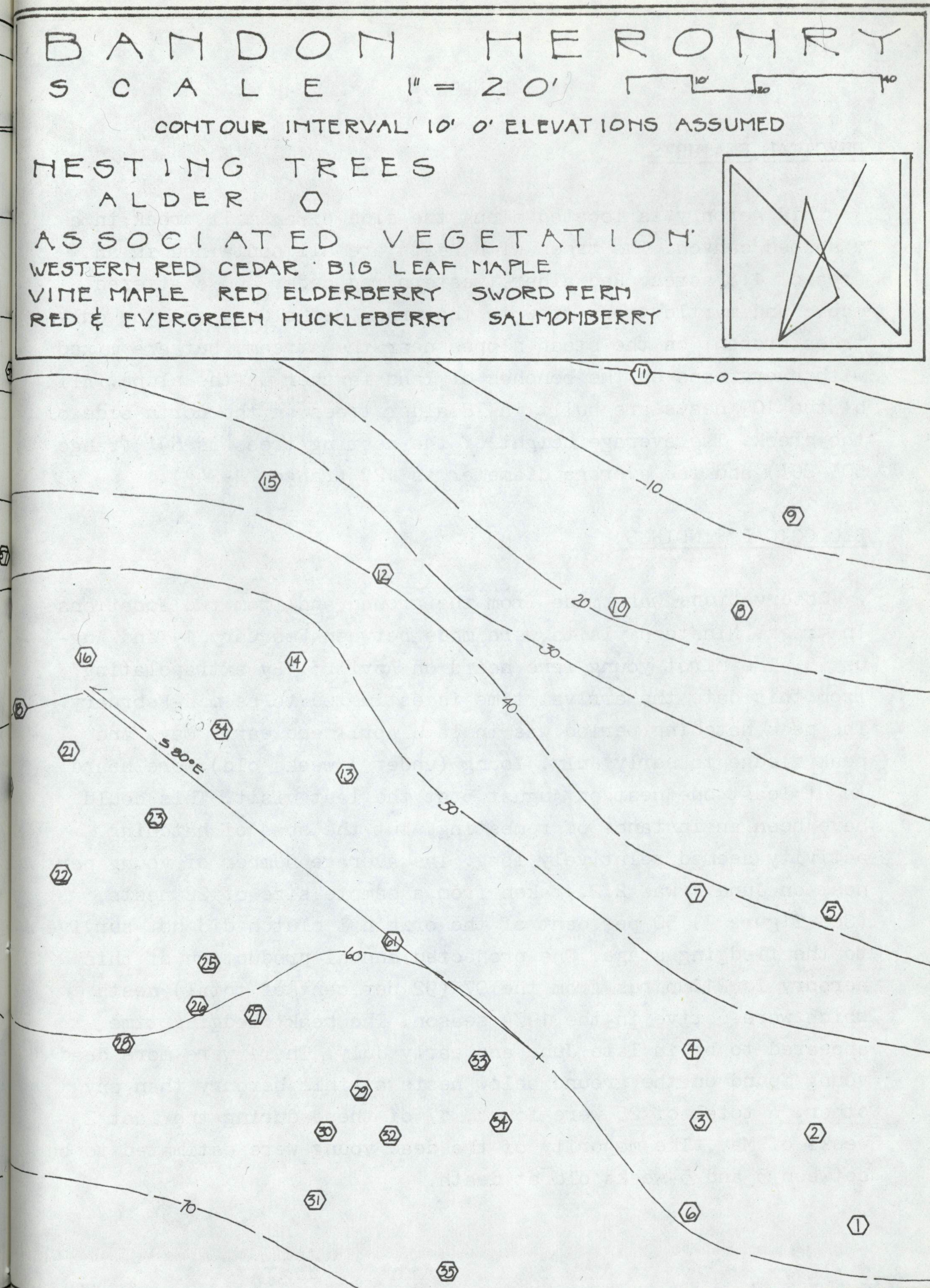
forest floor: bleeding heart
cont.

- false lily of the valley
- false solomon's seal
- lady-fern
- deer fern
- horsetail
- monkey flower


PACIFIC OCEAN
COOS BAY
NORTH S
HAYNES INLET
COOS BAY
ISTHMUS S
COOS R
CATCHING S
JOE NEY S.
SOUTH S.
SEVEN DEVILS ROAD
US 101
COOS BAY
FEEDING AREA
SCALE 1/2" = 1 M
FEEDING HERON


BANDON HERONRY
CROSS SECTION
10
20
40
TREE #59
#57 #17
#18
#21 #22


N 50°E


BANDON HERONRY
SCALE 1" = 20'
CONTOUR INTERVAL 10' 0' ELEVATIONS ASSUMED
NESTING TREES
ALDER
ASSOCIATED VEGETATION
WESTERN RED CEDAR BIG LEAF MAPLE
VINE MAPLE RED ELDERBERRY SWORD FERN
RED & EVERGREEN HUCKLEBERRY SALMONBERRY
S 80°E

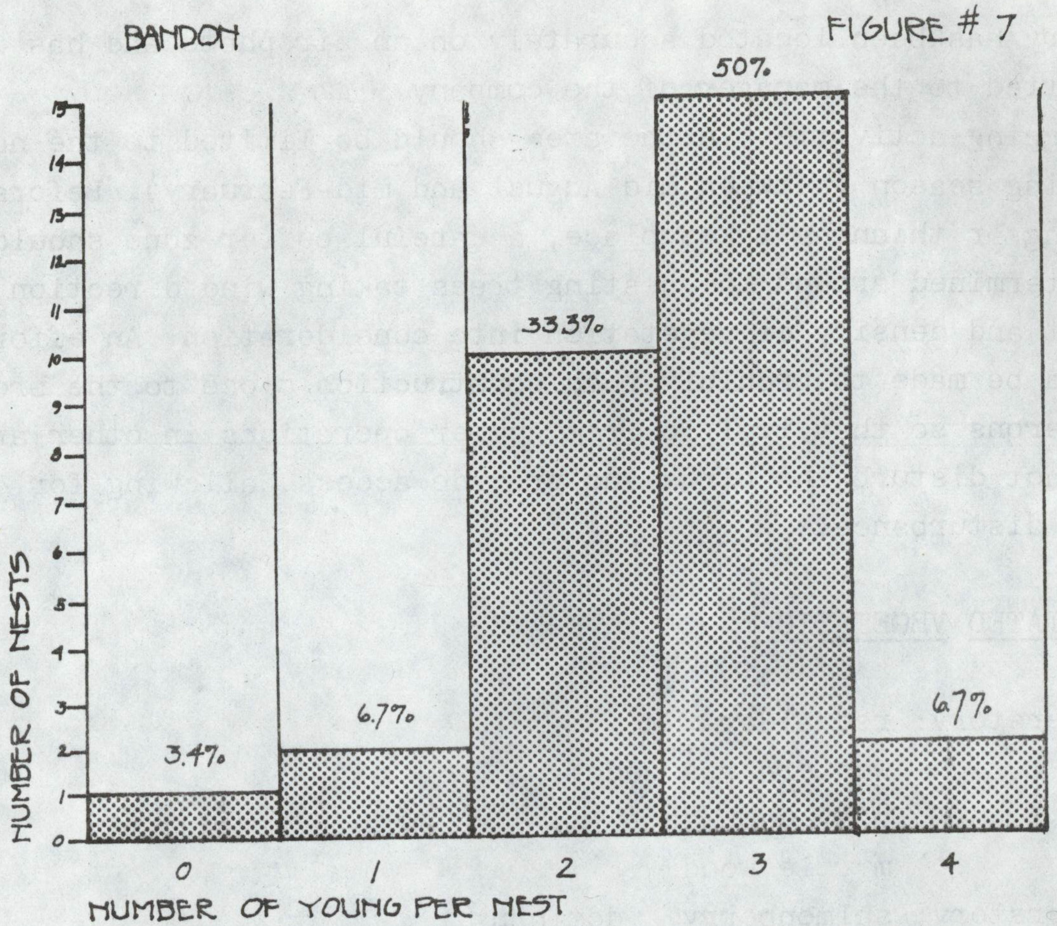
BANDON

PHYSICAL FEATURES

This heronry is located along the side of a small creek in a v shaped canyon. The trees with nests are all contained in an area of 1.3 acres. Red alder, western red cedar and scattered maple and myrtle trees grow in the area. Red alders are the only trees present on the steep slopes near the stream, but are mixed with evergreens on the benches of land farther up the slope. All of the 109 nests are built in 78 alder trees on the north side of the creek. The average height of the nesting trees is 64' (range 50'-80') and the average diameter is 12" (range 7"-24").

BIOLOGICAL FINDINGS

Observations were made from the ground and from two locations in trees. Nineteen visits were made between February 14 and August 5. The first young were heard on April 3. By extrapolating from this date the arrival time is estimated to be mid-February. The peak hatching period was in late April and early May, and peak fledge in early July. Young (under 3 weeks old) were heard in at least one nest on August 5 at the last visit. This could have been an instance of renesting, but the span of hatching activity seemed relatively long. The average number of young per nest on June 1 was 2.2, taken from a sample size of 22 nests, (See figure 7) 50 per cent of the original clutch did not survive to the fledging stage. The projected annual production of this heronry is 212 birds from the 97 (92 per cent of total) nests which were active in the 1974 season. The peak fledging time appeared to be in late June and early July. There were more dead young found on the ground below nests at this heronry than any other. A total of 25 were found, 17 of these during the last 2 weeks of May. The majority of the dead young were estimated to be between 3 and 5 weeks old at death.



LAND USE

This heronry has been active for at least 12 years. It has had very little human disturbance before the 1974 season due to its isolated location. When the heronry was approached quietly, the birds did not leave the nests or show the expected signs of alarm. Even when observers were directly below the nests, the birds circled and returned within a few minutes.

This heronry is located on land owned by Seneca Sawmill of Eugene. When the company was contacted by members of this project they were unaware of the heronry. They have no specific policy for wildlife habitats. Thinning will occur in some parts of the area surrounding the heronry in the summer of 1975. No other activity is scheduled for this land in the nest few years. The rookery has been located accurately on an air photo and has been submitted to the manager of the company.

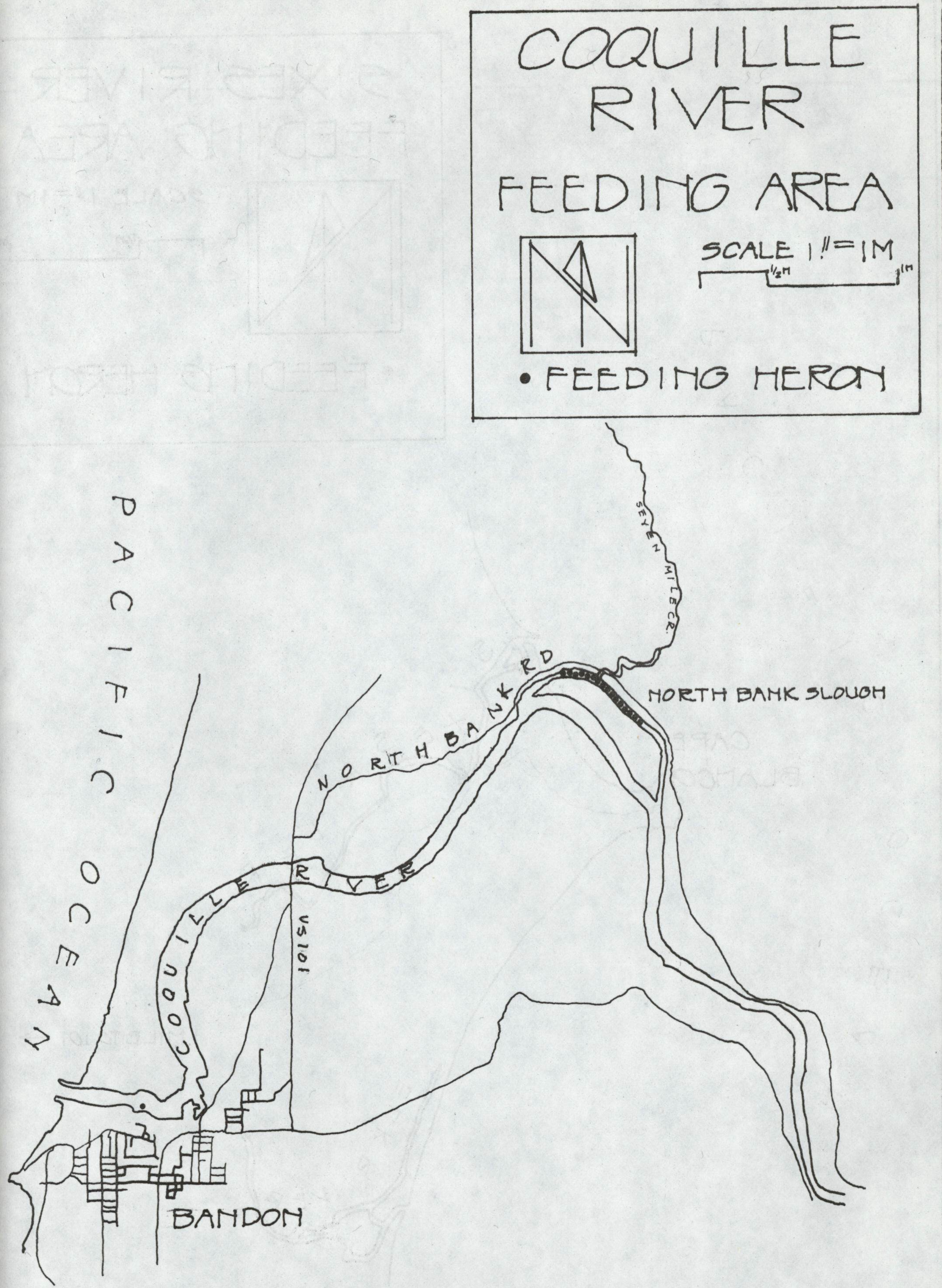
Logging activities in the area should be limited to the non-breeding season (between mid-August and mid-February). Before logging or thinning takes place, a careful buffer zone should be determined around the nesting trees taking wind direction, height and density of vegetation into consideration. An effort should be made to prohibit road construction close to the breeding herons so that traffic from summer operations in other areas will not disturb the birds and provide access, allowing for human disturbance.

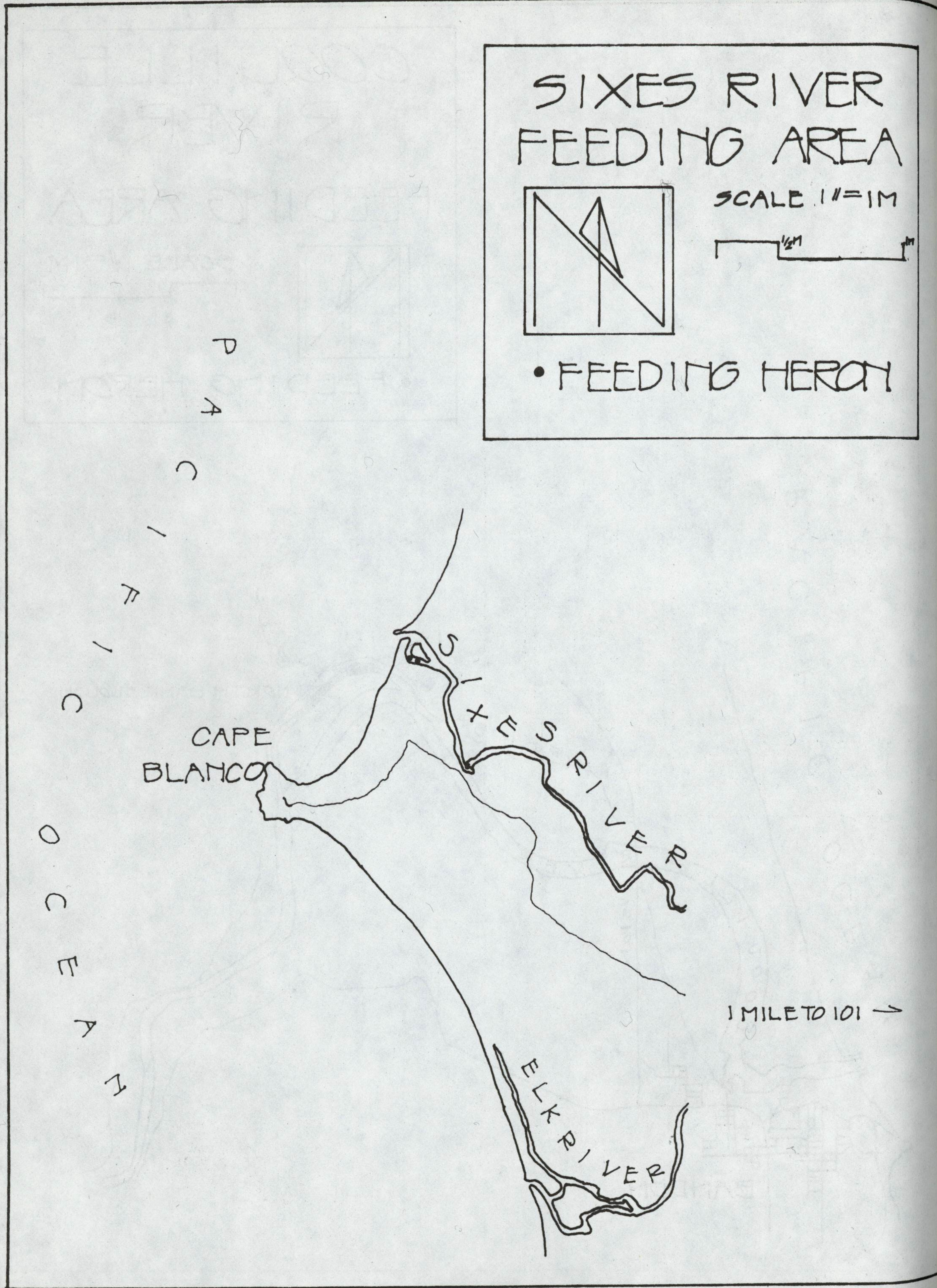
ASSOCIATED VEGETATION

upperstory: red alder
western red cedar
big leaf maple
myrtle wood

understory: salmonberry - dominant
evergreen huckleberry
vine maple
red huckleberry

forest floor: skunk cabbage
ginger
deer fern
false solomon's seal
wood sorrel
candy flower
sword fern

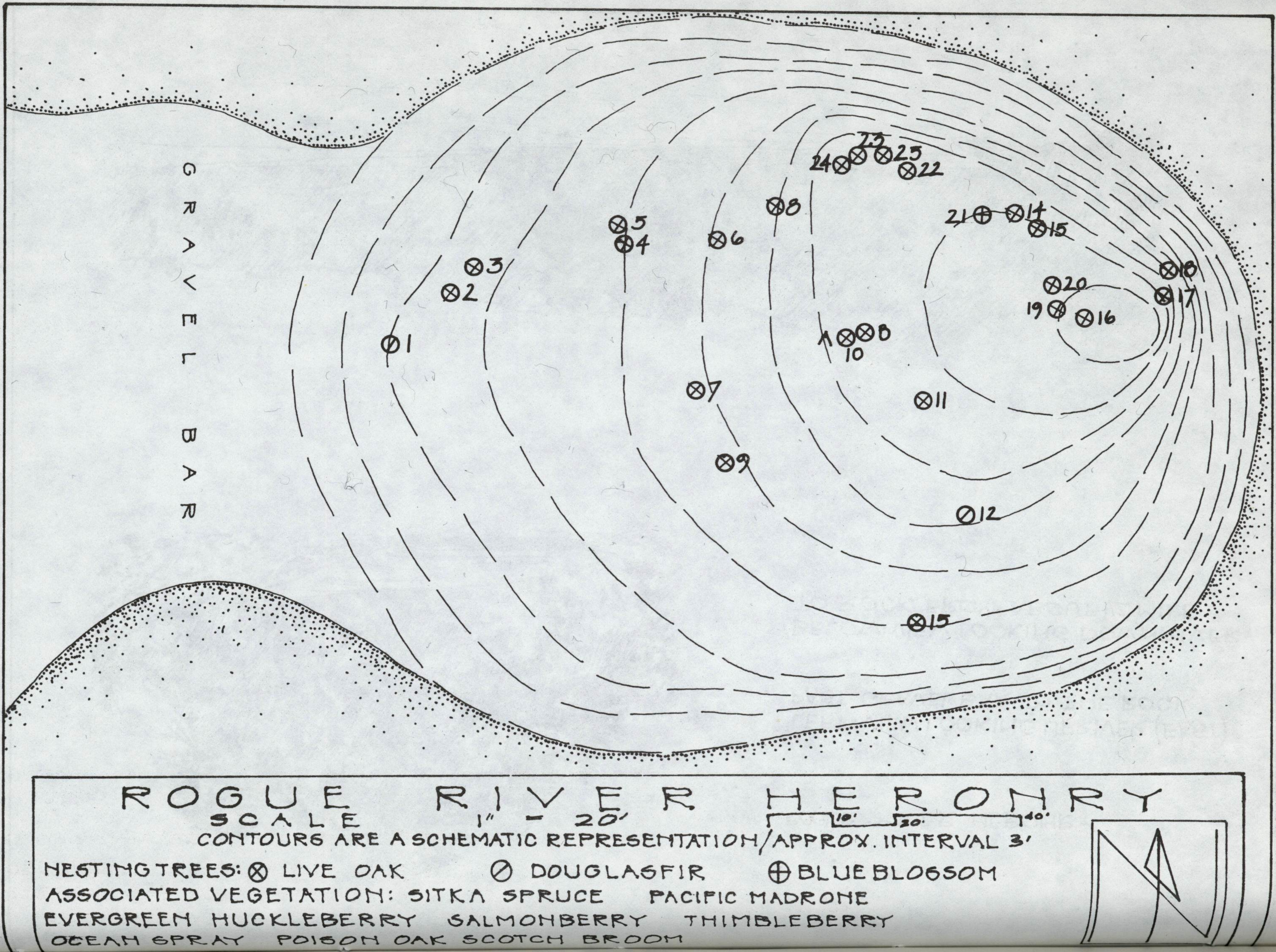

COQUILLE RIVER
FEEDING AREA
SCALE 1" = 1M
• FEEDING HERON
PACIFIC OCEAN
SEVEN MILE CR.
NORTH BANK RD
NORTH BANK SLOUGH
COQUILLE RIVER
US 101
BANDON


SIXES RIVER
FEEDING AREA
SCALE 1"=1M
1/2M
1M
• FEEDING HERON
PACIFIC OCEAN
CAPE BLANCO
SIXES RIVER
1 MILE TO 101 →
ELK RIVER

ROGUE RIVER HERONRY

LEFT: VIEW LOOKING UPRIVER (EAST) PAST GRAVEL BAR TO THE ROCK

BELOW: VIEW LOOKING DOWNRIVER TO ROCK FROM ABOUT 1/2 MILE


GRAVEL BAR
1
2
3
4
5
6
7
8
9
10
11
12
14
15
16
17
18
19
20
21
22
23
24
25
ROGUE RIVER HERONRY
SCALE 1" - 20'
10' 20' 40'
CONTOURS ARE A SCHEMATIC REPRESENTATION/APPROX. INTERVAL 3'
NESTING TREES: ⊗ LIVE OAK ⊘ DOUGLAS FIR ⊕ BLUE BLOSSOM
ASSOCIATED VEGETATION: SITKA SPRUCE PACIFIC MADRONE
EVERGREEN HUCKLEBERRY SALMONBERRY THIMBLEBERRY
OCEAN SPRAY POISON OAK SCOTCH BROOM

ROGUE RIVER

PHYSICAL FEATURES

This heronry has 38 nests in 26 trees on an island in the Rogue River. Twenty five of the nests are in live oaks and one is in a blue blossom (Ceanothus thyrsiflorus). The trees containing nests are in a .2 acre area. This is one of the few heronries which is not located in a canyon. The island is high in the center with steep slopes on the up-river side and a more gradual slope towards the ocean. The only protection that the nesting trees have from the strong winds that blow along the river is a thin circle of taller evergreen and madrone trees which grow along the edges of the island. The high winds and rocky soil may explain the stunted appearance of the trees and the location of the nests in lower branches. The average tree height is 49' (range 30'-100') and average diameter of 13" (range 5"-27").

Three visits were made to the island between March 15 and June 28. This season the water level and weather conditions made travel to the island difficult. Poison oak also thrives in the area under the trees with nests. These factors limited biological observations to determining numbers of nests and general activity.

This island would be an extremely good area for future study because the nests are built low to the ground so visibility and access to the nests are unusually good.

LAND USE

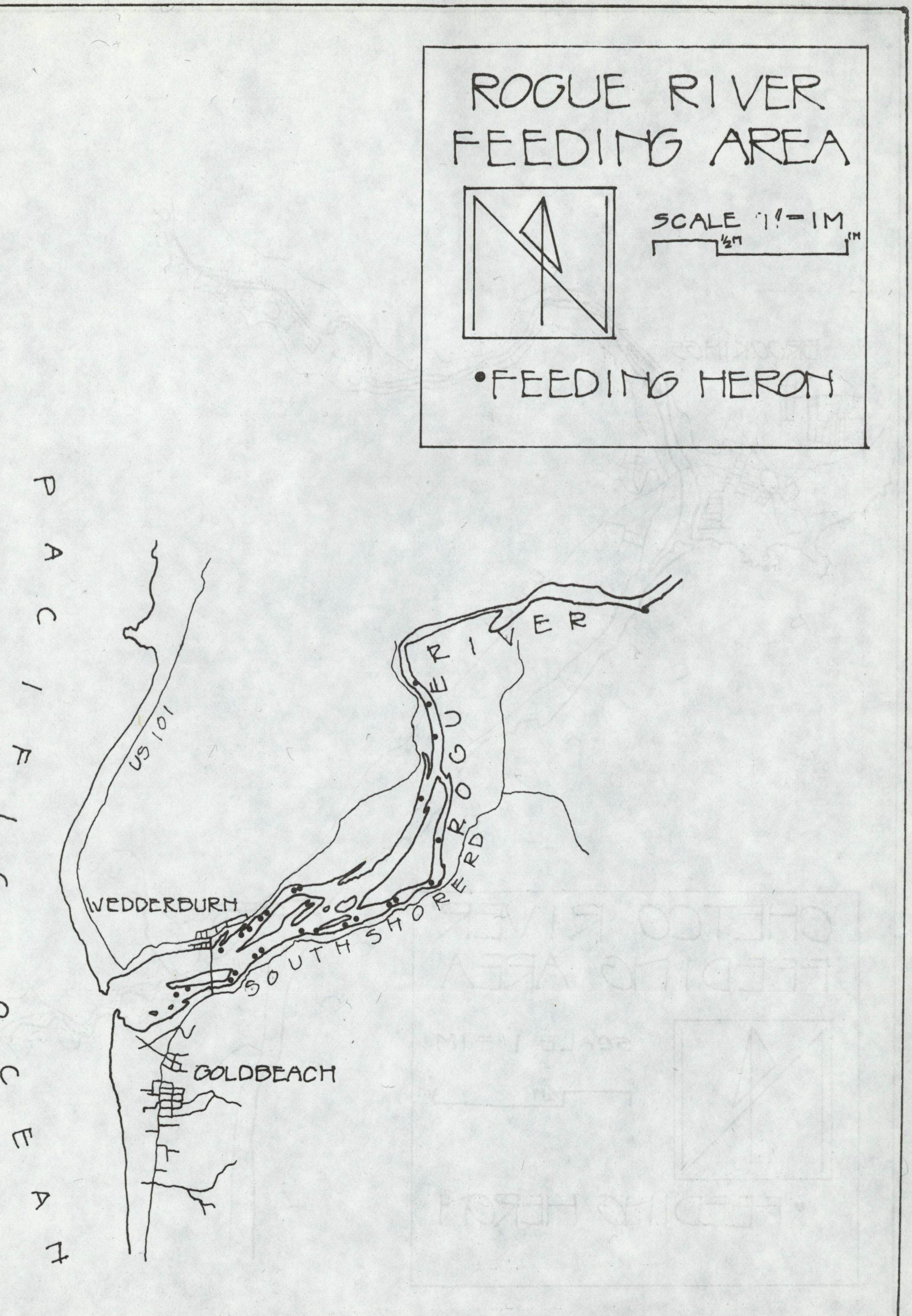
The Rogue River heronry is owned by U.S. Plywood. They are aware of the herons nesting there and have no plans to log. Their policy is one of protecting wildlife habitats.

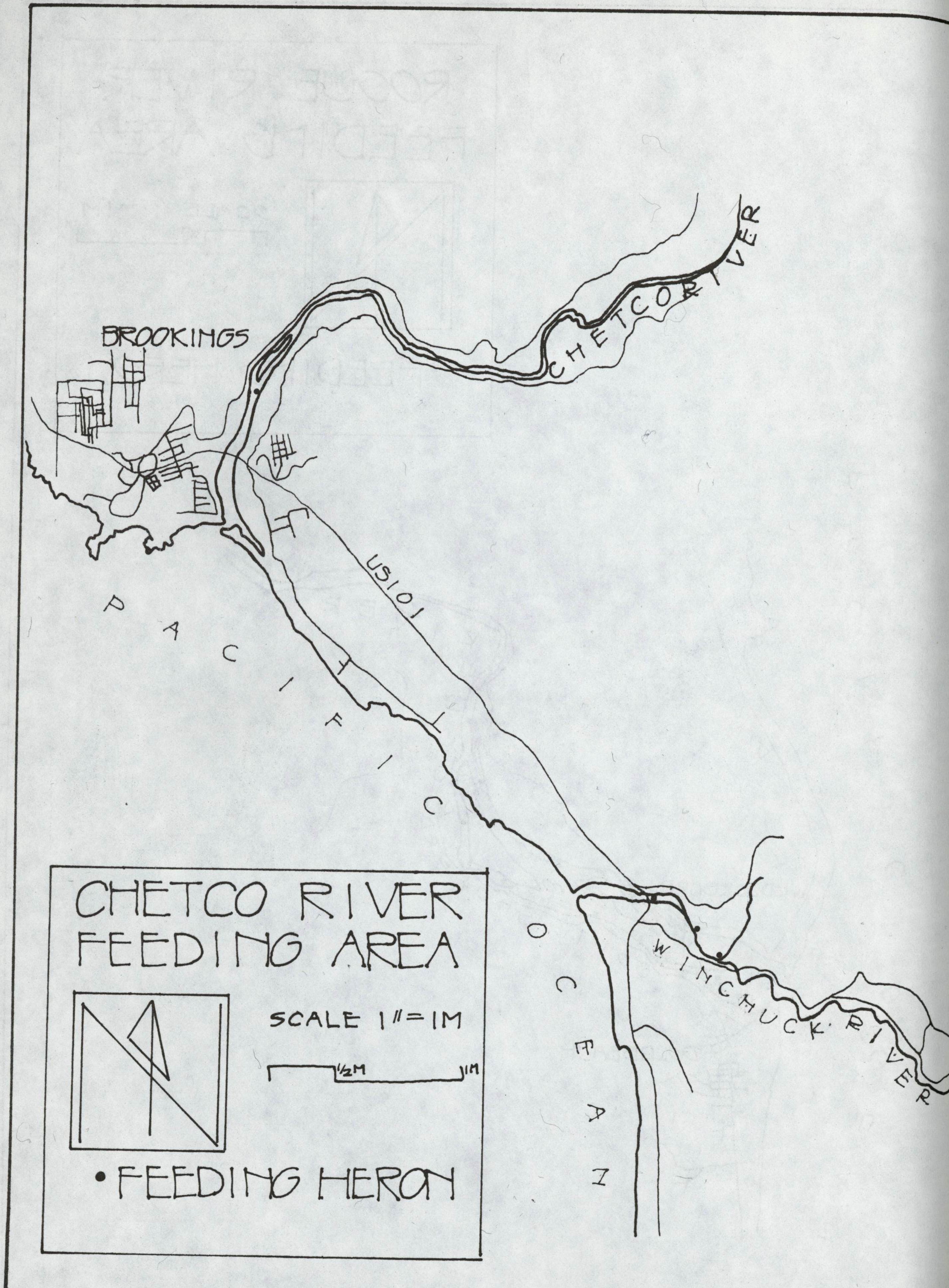
ASSOCIATED VEGETATION

upperstory: sitka spruce
douglas fir
blue blossom
live oak
madrone

understory: salal
ocean spray
red huckleberry
poison oak - dominant
salmonberry
evergreen blackberry

forest floor: poison oak
star flower
club moss
bracken fern
sword fern


ROGUE RIVER
FEEDING AREA
SCALE 1" = 1M
½M
1M
•FEEDING HERON
PACIFIC OCEAN
US 101
WEDDERBURN
GOLDBEACH
ROGUE RIVER
SOUTH SHORE RD


BROOKINGS
CHETCO RIVER
US 101
PACIFIC OCEAN
WINCHUCK RIVER
CHETCO RIVER FEEDING AREA
SCALE 1" = 1M
1/2M
1M
• FEEDING HERON

APPENDIX I

COMMON AND GENERIC NAMES OF PLANTS

beach knotweed	Polygonum Paronychia
bedstraw	Galium boreale
bleeding heart	Dicentra formosa
blue blossom	Ceanothus thyrsiflorus
bog club moss	Lycopodium inundatum
chilian aster	Aster chilensis
california poppy	Eschscholtzia californica
candy flower/western spring beauty	Montia sibirica
cascara	Rhamnus Purshiana
colts foot	Petasites frigida
common monkey flower	Mimulus guttatus
common wild rose	Rosa nutkana
cow parsnip	Heracleum lanatum
daisy (seaside)	Erigeron glaucus
deer fern	Struthiopteris Spicant
devil's club	Oplopanaz horridum
douglas fir	Pseudotsuga Menziesii
elderberry, blue	Sambucus glauca
elderberry, red	Sambucus callicarpa
european beach grass	Ammophila arenaria
evergreen blackberry	Rubus laciniatus
evergreen huckleberry	Vaccinium ovatum
false dandelion	Hypochaeris radicata
false solomon seal	Smilacina sessilifolia
fire weed	Epolobium angustifolium
fox glove	Digitalis purpurea
hairy manzanita	Arctostaphylos columbiana
himilaya blackberry	Rubus procerus
horsetail (common)	Equisetum arvense
incense cedar	Libocedrus decurrens
kinnikinnic	Arctostaphylos Uva-ursi

lady-fern	Arthyrium Felix-femina
large leaved maple	Acer macrophyllum
little hair grass	Aira praecox
live oak	Quercus chrysolepis
lodge pole pine	Pinus contorta
mock azalea	Menziesia ferruginea
monkey flower	Mimulus guttatus
nettle	Urtica lyallii
ocean spray	Holodiscus discolor
oregon grape	Mahonia Aquifolium
pacific labrador tea	Ledum glandulosum
pacific silver weed	Potentilla pacifica
pearly everlasting	Anaphalis margaritacea
poison oak	Rhus diversiloba
port orford cedar	Chamaecyparis Lawsoniana
red alder	Alnus rubra
red huckleberry	Vaccinium parvifolium
salal	Gaultheria shallon
salmonberry	Rubus spectabilis
salt rush	Juncus Lesueurii
sand mat	Cardionema ramosissim
scotch broom	Cytisus scoparius
sea coast angelica	Angelica Hendersonii
sea shore lupine	Lupinus littoralis
self heal	Prunella vulgaris
sitka alder	Alnus sinuata
sitka spruce	Picea sitchensis
slough sedge	Carex obnupta
swamp buttercup	Ranunculus flammula
sword fern	Polystichum munitum
thimbleberry	Rubus parviflorus
trillium	Trillium chloropetalum
twinberry	Lonicera ivolucrata
vine maple	Acer circinatum
western bracken fern	Pteridium aquilinum
western hemlock	Tsuga heterophylla

western maiden-hair fern	*Adiantum pedatum*
western red cedar	*Thuja plicata*
western rhododendron	*Rhododendron macrophyllum*
western tansey	*Tanacetum camphoratum*
western wax myrtle	*Myrica californica*
wild cherry	*Prunus emarginata*
wild cucumber	*Marah oregana*
wild lily of the valley	*Mianthemum bifolium*
wild mint	*Mentha arvensis*
wild pea	*Vicia americana*
willow	*Salix hookeriana*
wood sorrel	*Oxalis oregana*
yarrow	*Achilles Millefolium*

APPENDIX II

RECORD OF VISITS
<u>COLUMBIA RIVER</u>
Dave Werschkul

DATE	TIME	DESCRIPTION OF ACTIVITY
March 2	morning	initial observations, fresh broken egg shells found
April 15	all day	trail cut, tree count, blind number 1 constructed
April 20	all day	behavior, nest count
May 5	afternoon	behavior
May 6	all day	behavior, map of area, trees marked
May 17	all day	behavior of young and adult
May 18	all day	productivity count, behavior
June 1	all day	blind number 2 constructed, behavior
June 2	all day	productivity count, behavior
June 3	morning	productivity count, behavior
June 12	afternoon	productivity count, behavior
June 13	all day	productivity count
June 25	afternoon	fledging behavior
July 12	afternoon	tree marking
July 25	afternoon	surveying

RECORD OF VISITS

WHEELER

Dave Werschkul

DATE	TIME	DESCRIPTION OF ACTIVITY
March 15	morning	trees marked, initial observation
April 10	all day	behavior of adults, map constructed
April 12	all day	behavior
April 16	morning	nest activity, behavior
April 17	morning	nest activity
April 22	all day	egg shells collected, behavior
April 23	all day	blind number 1 constructed
April 29	all day	blind finished, egg shells collected
May 3	afternoon	behavior
May 4	morning	behavior
May 7	all day	egg shells collected, behavior
May 12	all day	behavior
May 13	morning	productivity count
May 19	all day	productivity count, behavior
May 31	all day	productivity count, blind number 2 constructed
June 11	all day	blind 2 finished
June 18	all day	productivity count
June 19	all day	productivity count
June 26	morning	finish productivity count
July 10	afternoon	finish data, remark trees
July 24	afternoon	surveyors

RECORD OF VISITS

BALL MOUNTAIN

Mary Leitschuh

DATE	TIME	DESCRIPTION OF ACTIVITY
June 12	11-12:30am	first located with ranger, trees marked with numbered plates, nests counted
June 21	10am-4pm	new nest count made, attempted to locate new trees with nests
July 23	8am-6:30pm	surveying and vegetation inventory

MILL CREEK

Mary Leitschuh

DATE	TIME	DESCRIPTION OF ACTIVITY
June 28	10am-3pm	nest count
July 14	9am-5pm	surveyors

RECORD OF VISITS

BEAVER CREEK

Mary Leitschuh

DATE	TIME	DESCRIPTION OF ACTIVITY
February 24	10am-6pm	trees marked, initial nest count
April 12	11am-4pm	trees tagged, initial observation
April 17	4-7pm	trees tagged, nest count made 49 nests in 39 trees
April 19	7:30-12:30am	behavior, new nest count, new trees tagged
April 25	2:30-6pm	map made, behavior, description of nest locations
May 3	12-3pm	egg shells collected, activity in nests recorded, trees numbered
May 27	2-4:30pm	activity in nests continued, egg shells counted
June 11	10:30-3pm	photos taken, inactive nests checked, activity continued
June 20	3-7:15pm	nest activity completed, final nest count
June 22	4-7pm	behavior, fledging percentage, surveyors
June 23	9am-4:30pm	surveyors

RECORD OF VISITS

REYNOLD'S CREEK

Mary Leitschuh

DATE	TIME	DESCRIPTION OF ACTIVITY
March 13	10am-1pm	trees tagged, initial counts made
April 11	11am-3pm	short observation, first visit by observer
April 20	3:45-7:15pm	map made, trees with new nests found, nests counted, 39 nests in 50 trees, shells collected
April 24	1:45-4:30pm	new trees tagged, nest location in trees described, nest activity recorded, shells counted
May 2	3:30-6:15pm	nest activity continued, shells counted
May 8	12-4:20pm	new nests found, activity, egg shells counted
May 14	2:30-5pm	behavior, checked uncertain nests for activity
May 17	12:30-3:20pm	egg shells counted, activity recorded
May 23	4-5:45pm	activity
June 10	11-3pm	feeding behavior flight directions
June 25	9am-4:30pm	surveyors
June 26	10am-3pm	surveyors
June 27	3-5pm	final nest count, final activity count, number of fledged birds estimated

RECORD OF VISITS

FLORENCE

Mary Leitschuh

DATE	TIME	DESCRIPTION OF ACTIVITY
March 12	10am-6pm	trees tagged, initial count
April 11	12-5pm	observation area located, behavior observed, first visit by observer
April 16	12-4pm	second nest count, map started
April 23	5-7:30pm	new nest count, 94 nests in 41 trees
April 26	1:30-4:45pm	map finished, nest activity recorded, egg shells collected
April 30	1-5:20pm	nest activity recorded, egg shells collected
May 7	10:30-2:30pm	new trees tagged, activity recorded
May 18	10-12noon	blind construction, nest activity continued, egg shells collected
May 31	10-3:30pm	productivity count
June 2	11-4:15pm	productivity count finished, egg shells collected
June 29	1-4pm	blind finished, final activity recorded, final nest count, productivity attempted
July 10	10-6pm	surveyors
July 11	11-4pm	surveyors

RECORD OF VISITS

ELBOW LAKE

Ellen McMahon

DATE	TIME	DESCRIPTION OF ACTIVITY
June 2	10am-3pm	location of heronry by surveyors and located nests
June 10	9am-4:30pm	surveyors and biologists marked trees, count nests
June 18	11am-5pm	surveyors
June 19	10am-3pm	surveyors
June 20	10am-2pm	surveyors, trees taged

NORTH SPIT

Ellen McMahon

DATE	TIME	DESCRIPTION OF ACTIVITY
February 20	2-4pm	location of heronry, first visit
March 16	9am-4:30pm	first nest count, trees marked 76 nests in 48 trees
April 27	9am-1pm	continued nest count and map drawn
May 8	2-6pm	observation of behavior
June 8	10am-3pm	determine number of active nests
June 19	11am-4pm	productivity count
August 3	9am-3pm	surveying
August 4	10am-5pm	surveying
August 5	8am-1pm	surveying

RECORD OF VISITS

SOUTH SLOUGH

Ellen McMahon

DATE	TIME	DESCRIPTION OF ACTIVITY
March 7	10:30am-2:30pm	behavior
March 8	noon-3pm	first nest count, trees marked 81 nests in 33 trees
March 28	8-10am	first eggs seen in nests
April 2	9:10-11am	behavior (courting-copulation)
April 3	9:30-12am	behavior, diagram drawn of 15 nests visible from blind
April 7	2:30-4:15pm	attempt to break new trail to blind tree
April 16	8:30-9:40am	behavior
April 17	10:45am-1pm	overland route tried to heronry
April 19	1-3pm	first young heard
April 23	12-4:30pm	map of nest trees drawn
April 30	7:25-10am	egg shells collected
May 2	9:10-12am	behavior
May 2	9pm	behavior, egg shells collected over 13 hour time period
May 3	10:50am	egg shells collected
May 6	12:45-2pm	behavior
May 9	2-4:30pm	first movie attempted
May 11	4-5:45pm	behavior
May 13	6-9am	drifted slough to locate feeding areas
May 14	6-8am	behavior
May 15	6:30-8:30am	first movie film taken, egg shells collected

<u>SOUTH SLOUGH</u>

continued

DATE	TIME	DESCRIPTION OF ACTIVITY
May 17	9:30-11am	roll of movie film completed
May 18	10:30-12:30am	last nest count, 89 nests in 39 trees
May 21	12am-4pm	behavior
May 22	1-3:30pm	movies taken
May 24	5-6pm	old nest taken from below heronry
May 25	3-6pm	movies taken, egg shells collected
May 30	7-10:30am	movies taken, egg shells collected
June 2	11-3pm	behavior, slides taken
June 12	4-7pm	behavior
June 14	7-10pm	movies taken, egg shells collected
June 20	4-6pm	productivity
June 26	12-4pm	behavior, tapes made
June 30	10am-2pm	surveyors and biologists to observe behavior, egg shells collected
July 1	12-3:30pm	movies, still pictures of nests from below
July 3	1-3pm	behavior
July 5	2-5pm	behavior
July 10	3-5:30pm	behavior
July 15	9-12am	behavior
July 20	10am-4pm	surveyors
July 23	9-12am	surveyors

RECORD OF VISITS

BANDON

Ellen McMahon

DATE	TIME	DESCRIPTION OF ACTIVITY
February 14	12am-2pm	first visit to heronry, birds not seen in area
March 17	9am-2pm	trees marked, first nest count made, 79 nests in 53 trees, most nests contained pairs of birds
March 30	12am-2pm	10 egg shells collected, no young heard or seen
April 3	12am-4pm	first young were heard
April 6	10:45am-2pm	observation tree found, diagram of visible nests drawn
April 9	9:30-12am	behavior
April 16	1:30-3pm	behavior, egg shells collected
April 24	10am-2pm	second nest count, trees marked, 98 nests in 69 trees
April 29	11:30am-3pm	behavior
May 1	10am-2pm	movies taken of young, egg shells collected
May 7	10am-4pm	map drawn, trees renumbered and remarked
May 16	9-12am	last nest found, began productivity, egg shells collected improved tree marking system
May 24	10am-3pm	new observation tree found
June 1	9am-2pm	productivity, egg shells collected, pictures of one week old young
June 15	9am-3pm	continue productivity
June 21	10am-1pm	behavior

BANDON

continued

DATE	TIME	DESCRIPTION OF ACTIVITY
June 25	1am-4pm	visit with planners
July 7	10am-5pm	surveyors
July 10	11am-6pm	surveyors
August 5	12am-3pm	biologists and cartographers to locate heronry exactly on aerial photograph

ROGUE RIVER

Ellen McMahon

DATE	TIME	DESCRIPTION OF ACTIVITY
March 15	10am-6pm	nests counted and trees tagged
June 10	11:30am-4pm	observation of behavior
June 28	8:30am-1:30pm	surveyors

BIBLIOGRAPHY

Bain, F. 1885. A Great Blue Heron's Meal. Auk 10, 221.

Bent, A.C. 1963. Life Histories of North American Marsh Birds. Dover Publications.

Brockman, Frank C. 1968. Trees of North America. Golden Press.

Cottrille, P.W. and B.D. 1958. The Great Blue Heron; Behavior at the Nest. Miscellaneous publications, Museum of Zoology, University of Michigan. No. 102, 15pp.

Encyclopedia Britanica. 1969. Encyclopedia Britanica Inc., publisher.

Gabrielson, I.N. and S.C. Jewett. 1970. Birds of the Pacific Northwest. Dover Publications Inc.

Gilkey, Helen M., La Rea. 1968. Handbook of Northwestern Plants. Oregon State University Book Stores, Inc., Corvalis, Oregon.

Henny, C.J. and M.R. Bethers. 1971. Population Ecology of the Great Blue Heron with special reference to Western Oregon. Technical paper No. 2975, Oregon Agricultural Experiment Station, Corvallis, or printed in The Canadian Field Naturalist 83 (3): 205-209pp.

Henny, C.J. 1972. An Analysis of the Population Dynamics of Selected Avian Species. U.S. Dept. of the Interior Fish and Game Service.

Hudson, C.J. 1965. Bill-clappering display in the common Heron Ardea cinerea. Ibis 107: 400-465.

Ives, J.H. 1971. Indian Island Rookery Study, Humbolt State College, California Dept. of Fish and Game.

Ives, J.H. 1971-72. Common Egret and Great Blue Heron nest study Indian Island, Humbolt County, California. Wildlife branch, Administrative report. No. 72-9.

Kahl M.P. Jr. 1963. Mortality of Common Egrets and other herons. The Auk 80 July, 1963, 295-300pp.

Keniston, Robert F, Randall R. Warren. 1968. Manual of Oregon Trees and Shrubs. Oregon State University Bookstores, Inc., Corvallis, Oregon, 1968.

Kirkpatric, C.M. 1940. Some Food of the young Great Blue Heron. American Midland Naturalist 24:595-601pp.

Krebs, J.R. and B. Partridge. 1973. Significance of Heat Tilting in the Great Blue Heron. Nature, April 20, 1973. Volume 242, No. 5399.

Krebs, J.R., Colonial Nesting and Social Feeding as a Strategin for exploiting Food Resources in the Great Blue Heron. University of British Columbia, Vancouver 8, Canada.

LaRae, J. Dennis, Frank H. Smith. 1969. Plants of the Coastal Dunes. Oregon State University Book Stores Inc., Corvallis, Oregon.

Layton, W.E. 1963. Biology of Birds. The Natural History Press.

Lowe, F.A. 1954. The Heron, Willmer Brothers Company Ltd. Great Britian, available at University of Oregon Science Library.

Martin, A.C., H.S. Zim and A.L. Nelson. 1951. American Wildlife and Plants. McGraw Hill Book Company Inc. New York.

Meyerricks, A.J. 1960, Comparative breeding behavior of four species of North American Herons. Publ. Na.

Miller, F. 1943, The Great Blue Heron, The Breeding Birds of the Philedelphia Region (Part II) Proceedings of the Deleware Valley Ornithology Club, Cassinia No. XXXIII.

Mock, D., 1972. Social Behavior of the Great Blue Heron during pair formation. Thesis in partial fulfillment of requirement for the degree of Masters of Science, University of Minnesota, December 1972.

Morris, D. 1956. The feather postures of birds and the problems of the origin of social signals. Behavior 9. 75-113pp.

Moseley, E.L. 1963. Blue Heron Colonies in Northern Ohio. March 1963.

Moble, G.K. and A. Schmidt and Wurm, M. 1938. Social Behavior of the Black-Crowned Night Heron, Auk 55. 7-40pp.

Owen, D.F. 1954. The Food of the Heron _Ardea cinera_ in the Breeding Season. Ibis 97.

Owen, D.F. 1959 Mortality of the Great Blue Heron as shown by Banding Recoveries. Auk, Vol. 76, Oct.

Owen, D.F. 1959. Some aspects of the behavior of immature herons _Ardea cinera_ in the breeding season. Ardea 47. 187-191pp.

Page, P.J. 1971. San Joaquin River Rookery, Second progress report. Dept. of Fish and Game, Los Barros, Wildlife Management branch.

Page P.J. 1970 San Joaquin River rookery study. Special Wildlife Investigation. Cal. Dept of Fish and Game.

Palmer, R.S. 1962. Handbook of North American birds. Yale University Press, New Haven, Conn.

Pettingill, O.S. Jr. 1970. Ornithology in Laboratory and Field. Burgess Publishing Company.

Pratt, H.M. 1970. Breeding Biology of Great Blue Heron and Egrets in Central California. The Condor, 1972. 407-410pp.

Pratt, H.M. 1972. Nesting Sucess of Common Egrets and Great Blue Herons in the San Fransisco Bay region. The Condor,

Prestt, I. 1970. The Heron Ardea cinera and Pollution. Dois 112 (1). 147-148pp.

Selons, E. 1925. The Courting Habits of the Heron. Naturalist. 179-182pp.

Scott, M. 1974. Great Blue Heron Ardea herodias. Unpublished; obtained through the United States Forest Service, Corvallis, Oregon.

Townsend, C.W. 1931. The Post-breeding Northern Migration of North American Herons. Proc. International Ornithology Cong. 7. 366-369.

Tinbergen, N. 1963. On Aims and Methods of Ethology. Z-fur Tier Psychology 20: 410-433pp.

Vermeer, K. 1969 Great Blue Heron Colonies in Alberta, Canadian Field Naturalist 83 (3). 237-242pp.

Welty, C.J. 1962. The Life of Birds. W.B. Saunders Company. Philadelphia and London.

Wilburn, J. 1970-71. Lincoln Great Blue Heron Rookery Study. Special Wildlife Investigation. California Department of Fish and Game.

Wentmore, Alexander. 1965. Water, Prey and Game birds of North America. National Geographic, Washington, D.C.