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AN ASSESSMENT OF MIGRATORY BIRD HABITAT  
OF THE COMOX HARBOUR-BAYNES SOUND AREA,  
VANCOUVER ISLAND

NOVEMBER, 1979

D.E.C. TRETHEWEY



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CANADIAN WILDLIFE SERVICE  
PACIFIC AND YUKON REGION



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D.E.C. Trethewey

Canadian Wildlife Service  
Pacific and Yukon Region

13731

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## SUMMARY

The report assesses the importance of the Comox Harbour-Baynes Sound area as migratory bird habitat. Whenever possible, the assessment was based on observed bird use. However, when such data were lacking, characteristics of the habitat were determined and compared to similar habitat of known bird use elsewhere. Habitat characteristics used were: foreshore vegetation; locations of herring spawning areas; salmon spawning streams; and water depth up to 6-8 fathoms (11-15 meters). Bird use data were available mainly for the late fall, winter and early spring periods, but it is believed that these are the periods when estuarine habitats are most important to migratory waterbirds. Based mainly on observed bird use, Comox Harbour (Courtenay River estuary) was found to provide important wintering habitat to migratory waterbirds. At least 112 species of birds were observed to spend some part of the winter at the estuary. A conservative estimate, based on the sum of one-day maximum numbers of each species observed, place the numbers of wintering birds dependent on the estuary at 12,000.

Large numbers of trumpeter swans, recently removed from the list of endangered species, are among the wintering waterfowl at the estuary. During the winter of 1978-79, 271 trumpeters wintered there. This number represents more than one-quarter of the trumpeters known to winter on Vancouver Island and approximately 5% of the known world population of this species.

On a scale of one to four (prime=1, high=2, medium=3, and low=4) based on observed bird use, the entire estuary was found to be important migratory bird

habitat. Only a relatively small area, in the vicinity of Royston, rated lower than two on this scale.

At least 80 species of birds were identified as using the intertidal portions of Baynes Sound for some part of the winter. Based on the sum of one-day maximum numbers of each species observed, it was conservatively estimated that at least 8000 and 9900 birds were dependent for part of the winter on the Deep Bay and Rosewall Creek-Mud Bay areas respectively. About 1500 birds winter at Base Flat (estuary of the Tsable River) and flocks of up to 4,800 western grebes have been observed in the sound. Up to 840 wintering ducks per shoreline mile (522 per km) have been observed in aerial surveys of southern Baynes Sound.

Baynes Sound cannot be rated in its entirety on the same four-point scale as Comox Harbour because of insufficient bird-use data. However, based on available bird-use data, the intertidal and adjacent subtidal areas from Base Flat south to Mapleguard Point on the east coast of Vancouver Island is rated as prime to high importance for waterbirds. Based on the four habitat parameters of foreshore vegetation, herring spawning areas, salmon spawning streams and water depths, much of Baynes Sound rates as potentially good waterbird habitat. The only area of the sound that at this time appears to have low sensitivity as bird habitat is a short strip of the east coast of Vancouver Island between Union Bay and Hindoo Creek. However, it is cautioned that because of the inadequate bird-use data base for much of the study area, those areas tentatively identified as being less sensitive, in fact may also be classed as important as more is learned about them. Therefore, it is recommended that each potential development be assessed individually for its potential impacts on migratory birds well in advance of the proposed commencement date.

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W. Campbell, of the B.C. Provincial Museum, Victoria, provided access to museum records, which were searched and analysed by K. Fry and M. Ward. R. Rogers, of the B.C. Fish and Wildlife Branch, Courtenay, provided migratory bird data from their files.

Maps of vegetation, salmon spawning streams, and herring spawning areas in the study area were provided by J. Morrison, Department of Fisheries and Oceans.

Many others contributed information and services to the data sources noted above.

Editorial assistance was provided by N. Dawe and L. Retfalvi, Canadian Wildlife Service.

## INTRODUCTION

Canada has an international obligation to preserve migratory birds. The Migratory Birds Treaty of 1916 and the Migratory Birds Convention Act enacted in 1917 provide the basis for that obligation. The provision of migratory bird habitat, the environs essential for birds to carry out their life functions, however, is not part of that legislation. The maintenance of suitable and adequate habitat is attempted in numerous ways, one of which is the incorporation of migratory bird concerns into various land use schemes and development proposals. Inasmuch as migratory bird habitat requirements readily mesh with the requirements of other renewable resources, notably fish, and in general with land uses based on ecological principles, the conservation of good quality migratory bird habitat is an involved but not impossible task.

Estuarine and intertidal land uses having greatest detrimental impact on migratory birds are those which alienate or degrade important habitat. Because birds are dependent upon habitat and use it to its carrying capacity (i.e. the maximum number of individuals of a given kind that a given unit of habitat can support), a reduction in amount or quality of available suitable habitat will result in a reduction in the numbers of birds.

Detrimental impacts on intertidal habitat may be brought about by its total destruction (alienation) such as that from dredging and filling, or from degradation, often more subtle and less easily detected, such as alterations to freshwater flow, salinity or water quality. In addition, activities adjacent to but actually not encroaching onto important habitat may create disturbances that influence the birds' behaviour so they make less efficient use of the area.

The purpose of this report is to provide an assessment, based on presently - existing information, of migratory bird habitat in the vicinity of Comox Harbour and Baynes Sound on the east coast of Vancouver Island.

#### METHODS AND LIMITATIONS

Data for this assessment were limited to those available in the published literature, in the files of government agencies, and from private individuals such as members of the Comox-Strathcona Natural History Society.

Observations of habitat use by birds was used in this assessment to the extent available. When such information was lacking, characteristics of the habitat were determined and compared to similar habitat of known bird use.

The boundaries of the study area for this assessment include the intertidal and subtidal portions of Comox Harbour and Baynes Sound (Figure 1). The terms Comox Harbour and Courtenay River estuary are used synonymously in this report.

#### RESULTS AND DISCUSSION

The Comox Harbour-Baynes Sound area is a regionally-important migratory bird habitat in the Strait of Georgia, a major wintering and staging area used by migratory birds from at least three continents (North America, South America and Asia).

Data are most complete for the Comox Harbour and Mud Bay-Deep Bay areas. Data for the rest of the study area are relatively incomplete, being based on only a few observations or on more numerous observations on limited areas. Therefore, the Comox Harbour and Baynes Sound portions of the study area will be discussed separately.

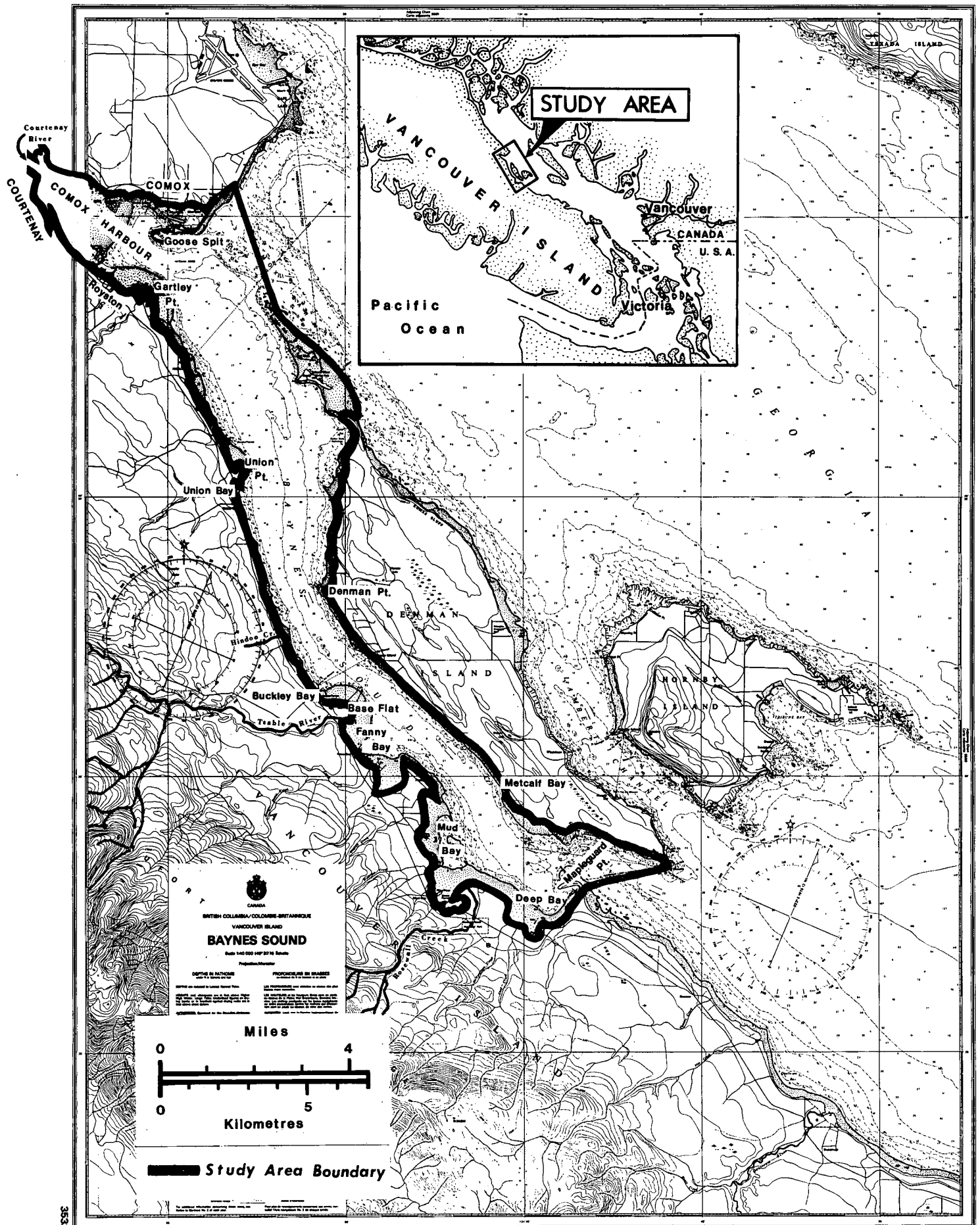


Figure 1. Map of Comox Harbour - Baynes Sound, B.C., study area for migratory birds habitat assessment, showing locations of places named in the text

## 1. Comox Harbour

Comox Harbour is one of the largest low-gradient estuaries (for a definition of low-gradient estuaries see Bauer 1977) on the east coast of Vancouver Island.

Studies by the Canadian Wildlife Service have demonstrated that many B.C. estuaries are important to migratory birds, particularly waterfowl, gulls, and other water-related birds (Harris and Taylor 1972, Land and Vaudry 1973, Trethewey 1974, Blood 1975, 1976). The value of estuaries lies in their ability to provide migratory and wintering habitat to many species which breed inland or in the Arctic. Of special importance during the winter is the use made of estuaries by waterfowl during periods of crisis such as prolonged periods of cold weather when freshwater habitat becomes covered with ice and snow. Generally, B.C.'s estuaries are not noted as production (nesting) areas. Investigations to date indicate that Comox Harbour is typical of other low-gradient estuaries. Adjacent upland freshwater ponds apparently provide locally-important nesting habitat for waterbirds in the Comox-Courtenay area, but are not within the study area.

Studies of wintering birds at the estuary during the winters of 1972-75, have shown that of 204 species of birds reported from the general vicinity of Comox and Courtenay (Morris et al. 1979), 112 species used the Courtenay River estuary during winter and early spring (CWS unpublished). If the data were expanded to cover the rest of the year, one might logically expect an even greater number of species to use the estuary.

Because the turnover of birds during the migratory period is not known, it is not possible to determine the actual numbers of birds dependent on the area. However, by summing one-day maximum numbers of each species observed, it is possible to calculate a "best estimate" of minimum numbers of birds dependent on the area. Based on this methodology, it is estimated that a minimum of

approximately 12,000 birds were dependent on the estuary during the winters of 1972-75 (Table 1).

This estimate is conservative because it does not account for the daily turnover of migrating birds and it reflects bird use only at one season. It is the author's opinion that far greater numbers of birds depend on the estuary throughout the year.

Daily counts of birds wintering at the estuary ranged between 3500 and 6000 birds, although aerial counts in January of 1976 recorded up to 11,000 waterbirds (CWS unpublished). Waterbirds, herons and shorebirds made up 54% of the species and 77% of the birds dependent on the estuary (Table 1).

One of the more spectacular species regularly observed at the estuary each winter is the trumpeter swan. This large bird, only recently removed from the endangered species list, has, in recent years, been steadily increasing its wintering numbers at Comox Harbour. The maximum number observed at the estuary over the winter of 1978-79 was 271 (McKelvey, pers. comm.). This number represents more than one-quarter of the trumpeters known to winter on Vancouver Island and approximately 5% of the known world population of this species.

On a scale of one to four (prime-1, high-2, medium-3 and low-4) based on observed bird use, the entire estuary of Comox Harbour was found to be important habitat for at least one main group. Only a relatively small area, in the vicinity of Royston, rated lower than two on this scale (Figure 2).

## 2. Baynes Sound

Available data indicate that much of Baynes Sound also is important habitat for migratory birds. This is not unexpected because much of the sound exhibits many characteristics typical of low-gradient estuaries. For example, tidal currents channel much of the fresh water flow from the Courtenay River south

Table 1. Estimated minimum numbers of wintering migratory birds dependent on Comox Harbour based on observations during the winters of 1972-75

Species of Waterbirds	Numbers of Birds
Loons (3)*	76
Grebes (5)	245
Cormorants (2)	49
Swans (1)	108**
Geese (3)	584
Ducks	
Dabblers (6)	1961
Divers (17)	<u>3186</u>
Total Ducks (23)	5150
Gulls (8)	1597
Alcids (3)	266
Coots (1)	9
Total Waterbirds (49)	8084
Hérons (1)	15
Shorebirds (9)	993
Raptors (10)	23
Songbirds (34)	2852
Others (9)	44
 TOTAL BIRDS (112)	 <u>12,011</u>

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\* Numbers in parentheses represent numbers of species of each group seen

\*\* 271 max. seen winter of 1978-79

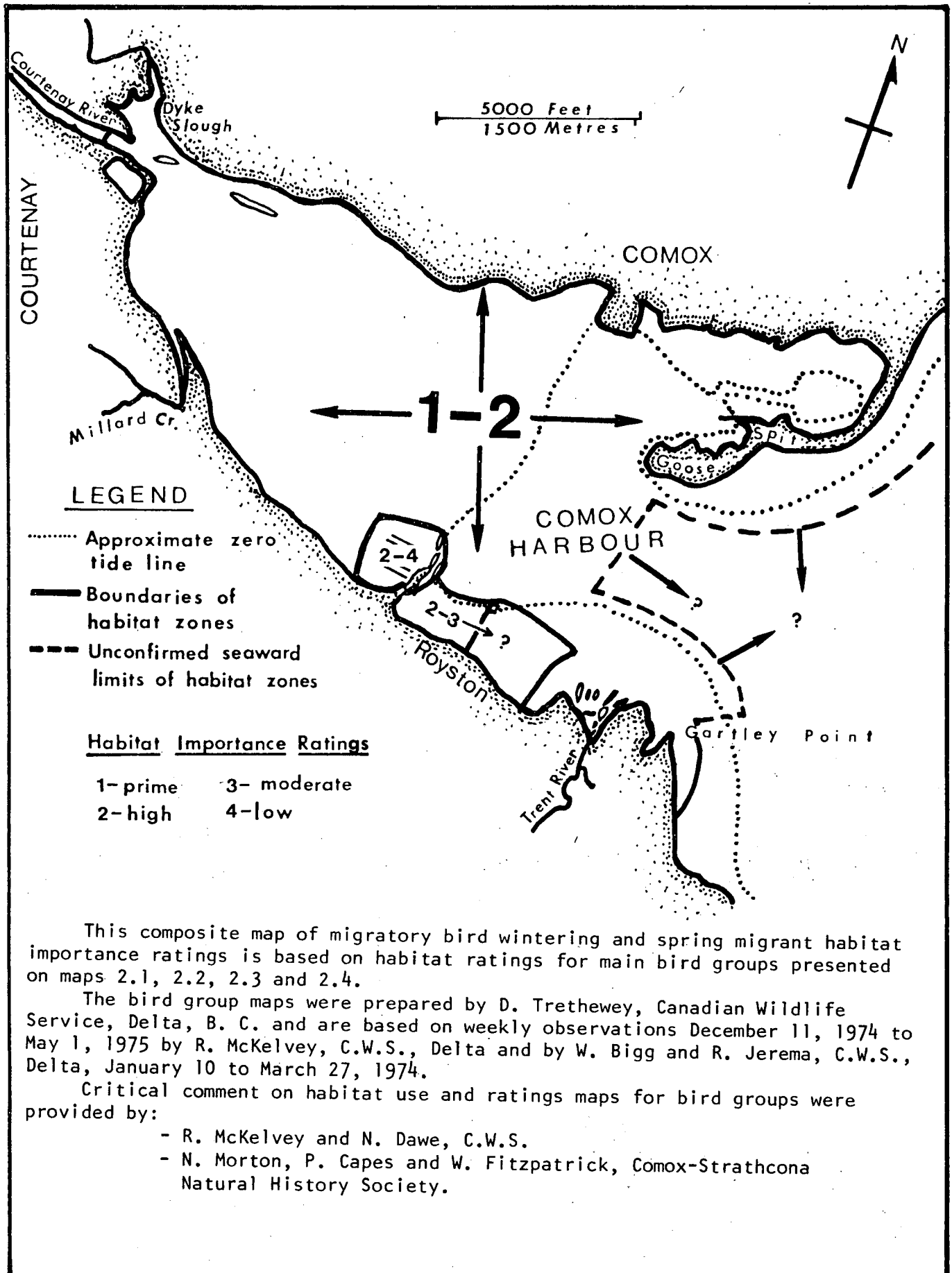


Fig. 2. Composite map of habitat importance ratings for wintering migratory birds and spring migrants, Comox Harbour, B. C., based on observed bird use.

through Baynes Sound. Also, along the approximately 39 km shoreline length of Vancouver Island from Gartley Point in the north to Mapleguard Point in the south, at least 18 streams of varying sizes enter the Sound. The southernmost 23 km of shoreline from Buckley Bay to Mapleguard Point have at least 12 of the 18 streams which have built up large flat intertidal areas well out into the Sound.

a. Bird Use

Information available from miscellaneous records on file in the Provincial Museum, in the files of the Canadian Wildlife Service and from the Comox-Strathcona Natural History Society indicate that at least 80 species of birds use the intertidal portion of Baynes Sound. Quantitative data are available for some parts of this area.

Based on maximum numbers of miscellaneous sightings of each species, it is estimated that at least 8000 birds (waterbirds, herons and shorebirds) are dependent on Deep Bay.

Data for Mud Bay - Rosewall Creek are more comprehensive. Canadian Wildlife Service inventories of bird use of this area from January through March 1973 and October 1975 through August 1977, supplemented by miscellaneous records from the Provincial Museum and local naturalists, gave basis to an estimate of 9900 birds (mostly waterbirds, herons and shorebirds) dependent on the area. In addition, a colony of 12 to 15 pairs of Brewers blackbirds annually nest on the spit just outside the lagoon at Rosewall creek (N. Dawe, pers. comm.).

Investigations by the Canadian Wildlife Service during February and March 1973 indicated that about 1500 birds (mostly waterbirds and herons) use Base Flat, the estuary of Tsable River.

Additional point-source data obtained from museum files showed that 19 species were observed at Fanny, Buckley and Union bays. However, because these

figures are based on fragmentary observations made during warmer months when bird use is less intense, no significance should be attached to them.

Davies (unpublished) observed an average of 840 ducks per shoreline mile (522 per km) for the Mud Bay - Rosewall Creek - Deep Bay area and an average of 290 ducks per shoreline mile (180 per km) for the area north from Mud Bay to Gartley Point during an aerial survey of Baynes Sound conducted in January 1977. In addition, large numbers of black brant (Davies et al. unpublished) and one flock of 4,800 western grebes (N. Dawe pers. comm.) were seen.

#### b. Habitat Quality

Baynes Sound cannot be rated on the same scale as Comox Harbour because of lack of bird-use data. Based on data at hand, the intertidal and adjacent subtidal areas from Base Flat south to Mapleguard Point could be rated as prime to high importance for wintering waterbirds. This assessment is corroborated by the Canada Land Inventory (1967) which classified this general area as 3 M, an area important to wintering and migrating waterfowl. The Union Point area also is shown as 3 M by the CLI map.

In the absence of adequate bird-use data, areas of potentially important habitat may be identified by investigating characteristics of available habitat and assessing its importance according to known bird-use of similar habitat elsewhere. Such an assessment of Baynes Sound habitat can be based on four readily-available parameters: foreshore vegetation; herring spawning areas; salmon spawning streams; and water depths.

(i) Areas of foreshore which are vegetated by marsh, algae or eelgrass are usually important as migratory bird habitat. For example, dabbling ducks, geese and swans may eat parts of marsh plants or eelgrass (Zostera sp.), or certain of the green algae such as Ulva sp. (sea lettuce). Black brant rely almost exclusively on eelgrass as a food source and to a certain extent on Ulva sp.



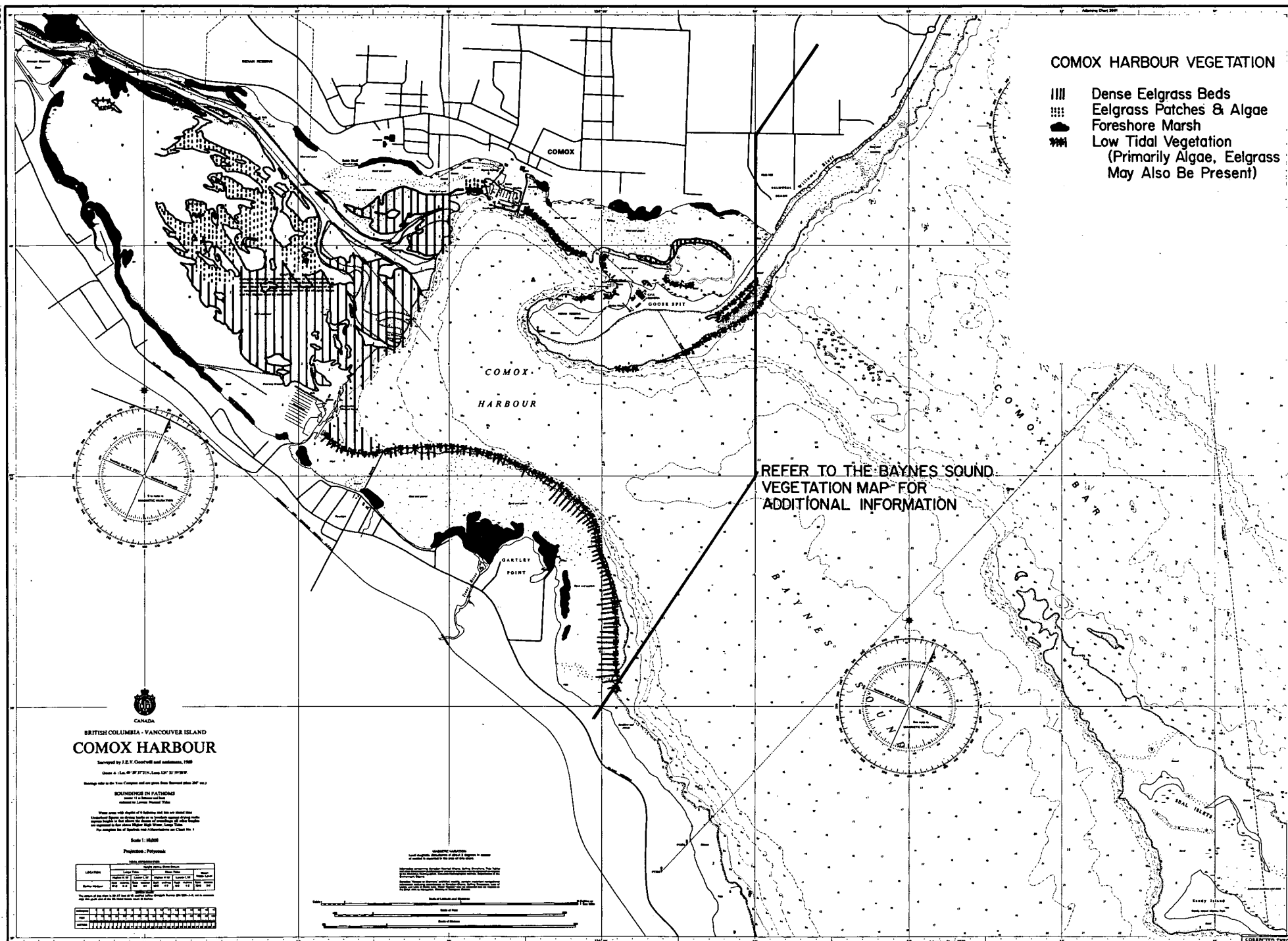


Figure 4. Comox Harbour Vegetation. Courtesy Dept. of Fisheries and Oceans.

Vegetation not eaten directly by birds may contribute to their food supply indirectly through the detrital food chain. In this situation, when the vegetation dies it decomposes and provides food for small intertidal invertebrates which then are either eaten by birds or are eaten by larger organisms which are eaten by birds. Generally, this latter route is the means by which most diving birds obtain much of their food, but some dabbling birds also forage for invertebrates on the intertidal areas at low tide. In addition, the marine algae and eelgrass beds provide food and cover for many of the prey species of diving birds.

It is significant to note that the most heavily-vegetated portions of the study area, Comox Harbour and southern Baynes Sound from Base Flat to Mapleguard Point (Figures 3 and 4) are the areas which also receive the heaviest known use by birds.

(ii) Areas of foreshore which are important as herring spawning habitat are also important to migratory birds because many birds eat either the herring spawn or the fish themselves, which, when spawning, are relatively easy prey. During a major herring spawn, most of the gulls and other diving birds for a considerable radius in the Strait of Georgia may be attracted to that area. For example, one such heavy spawn at Qualicum in the spring of 1976, attracted approximately 70,000 waterbirds, 53,000 of which were gulls. An aerial survey of the east coast of Vancouver Island by CWS between Nanaimo and Campbell River about two weeks after the spawn reported 49,000 gulls (N. Dawe, pers. comm.), so the importance of such events is readily apparent.

Within the study area, herring spawning areas considered most important to migratory birds are: inside Comox Harbour, north around Goose Spit onto Comox Bar; south around Gartley Point about three km; and a five km stretch of the

north-central portion of Baynes Sound from Union Bay south to Hindoo Creek (Figures 5 and 6).

(iii) A number of species of migratory birds depend for a part of the year on salmon eggs and decomposing spawned-out salmon along the lower portions of streams having salmon runs. Gulls, eagles, and diving ducks are typically associated with such situations, but some dabbling ducks and even trumpeter swans are also known to feed on salmon carcasses (Butler 1973).

Of special note are the bald eagles which gather at the mouths of salmon streams to scavenge the salmon carcasses. The only data in this regard available for the study area are from Rosewall Creek, where a maximum of 30 eagles were observed. However, counts of eagles are available for some of the streams to the south: 123 at Little Qualicum River; 132 at Big Qualicum River; and 32 at Nanoose Harbour (N. Dawe, pers. comm.). Such concentrations of bald eagles are among the highest in North America.

At least 15 known and 3 suspected salmonid spawning streams flow into Baynes Sound from the eastern slopes of Vancouver Island (Figure 7).

(iv) Although wintering diving ducks may eat some marine vegetation, they mainly rely on marine invertebrates as food. Some species such as oldsquaw may dive to several hundred feet for food, but most species apparently prefer to feed in water up to 6-8 fathoms (11-15 metres) (Mitchell 1952). Thus, all intertidal areas between the high tide line and subtidal areas out to the 8-fathom elevation are potentially important feeding areas for diving ducks.

In addition, many dabbling ducks follow the tide line in and out across the intertidal areas feeding on marine plants and invertebrates. Thus, the generalization might be made that the greater the area of the intertidal zone and the

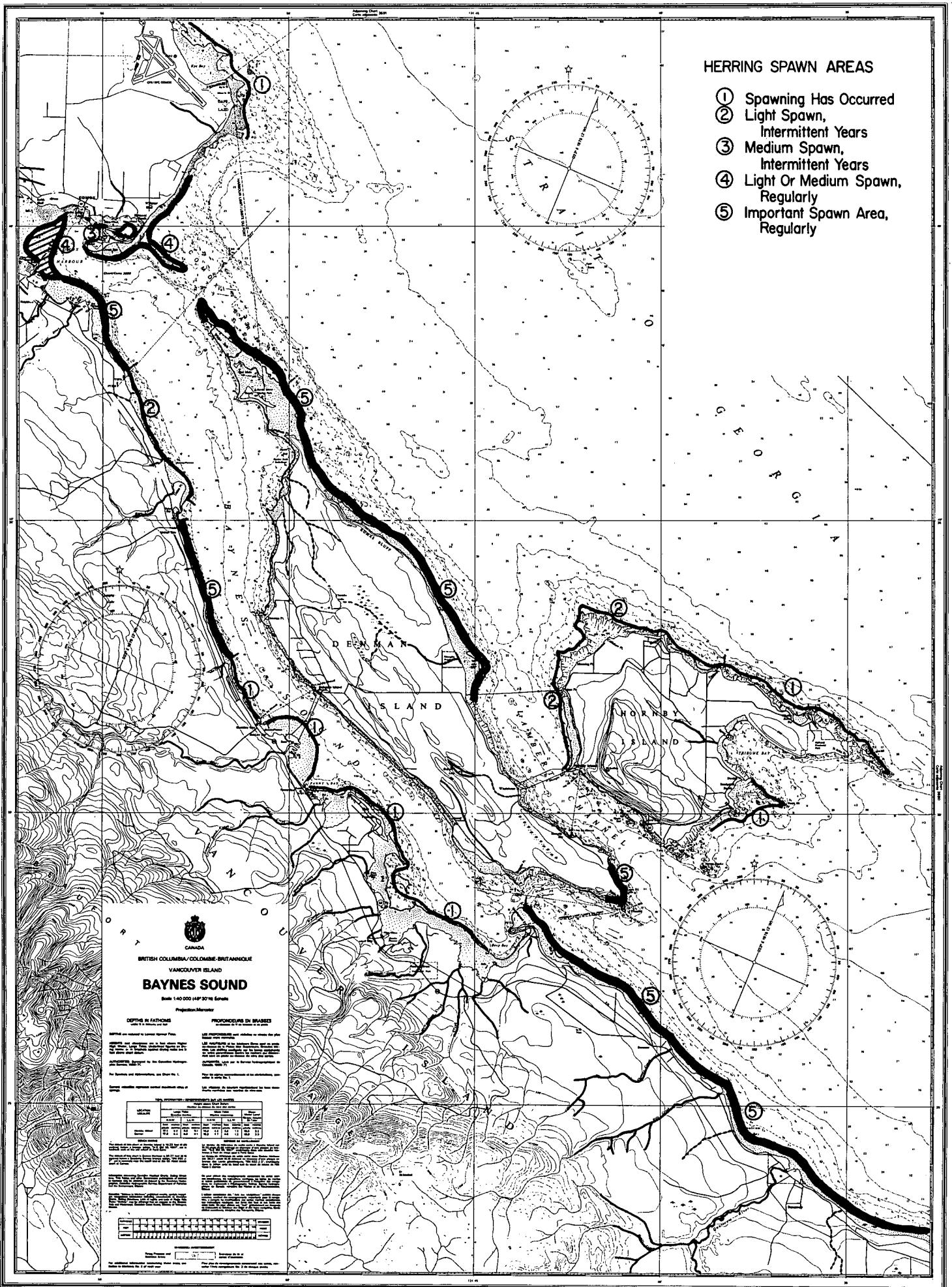
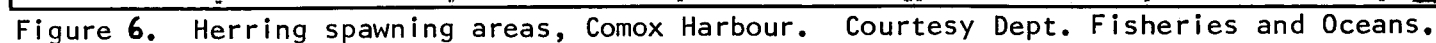


Figure 5. Herring spawning areas, Baynes Sound area. Courtesy Dept. of Fisheries and Oceans.



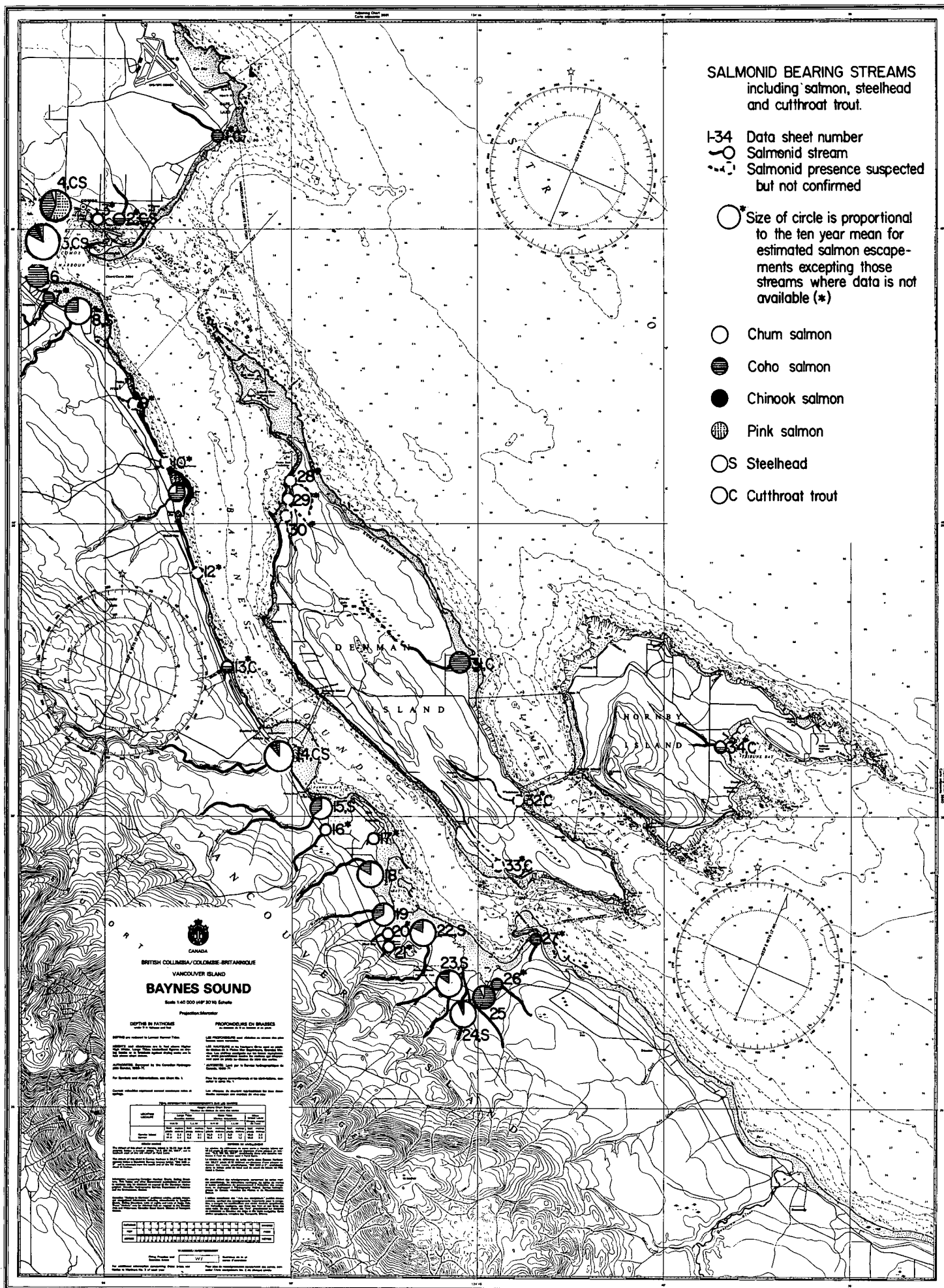


Figure 7. Salmonid-bearing streams, Comox Harbour - Baynes Sound area. Courtesy Dept. of Fisheries and Oceans

adjacent subtidal zone out to the 8-fathom elevation, the potentially better the habitat for waterbirds (unless certain extreme conditions make it unfavourable habitat for prey species).

Because the 8-fathom elevation is not shown on available nautical charts, the next deepest elevation, 10 fathoms (18.3 m), is indicated on Figure 8. Although this obviously does not account for all the diving bird feeding habitat, it probably accounts for most of it. Most of the study area contains large amounts of this potentially important habitat. Exceptions are two short strips between Union Bay and Buckley Bay on the east coast of Vancouver Island and another between Denman Point and Metcalf Bay on the west coast of Denman Island.

## CONCLUSIONS

Migratory bird habitat should be given prime consideration in the assessment of all potential developments within the Comox Harbour-Baynes Sound study area.

Despite a lack of quantitative data regarding migratory birds and their habitat in the study area, some areas, such as most of Comox Harbour and the southern portion of Baynes Sound, can be identified as especially important habitat. A more accurate assessment of other areas can be achieved as more field data are collected.

This assessment also has identified several small areas which appear to have a lower habitat potential for migratory birds than most of the study area (for example, the Royston area and a few short strips of central Baynes Sound). However, because of the inadequacy of the data base on which this assessment was based, areas which presently appear to be less sensitive as bird habitat may, as more is learned about them, also be classed as important. Conversely, further investigations may confirm their present apparent lower rating. Therefore, such areas must not automatically be considered of no value to the resource and thus



Figure 8. Migratory bird habitat between the high water and 10 fathom (18.3m) elevations, Comox Harbour - Baynes Sound area.

prime targets for all forms of development. Some forms of developments at these locations may be compatible with migratory birds, while others may not be. Therefore it is essential that each potential development be assessed for its potential impacts on migratory birds well in advance of its proposed commencement date.

Until more detailed quantitative information becomes available, this assessment will, hopefully, enable resource managers and potential developers to divert potentially harmful developments away from areas of sensitive migratory bird habitat.

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APPENDIX

Figures 2.1 - 2.4

Habitat used by dabbling ducks, swans, geese, diving ducks, gulls, loons, grebes, herons and shorebirds January through March, 1974 and December, 1974 through April, 1975.

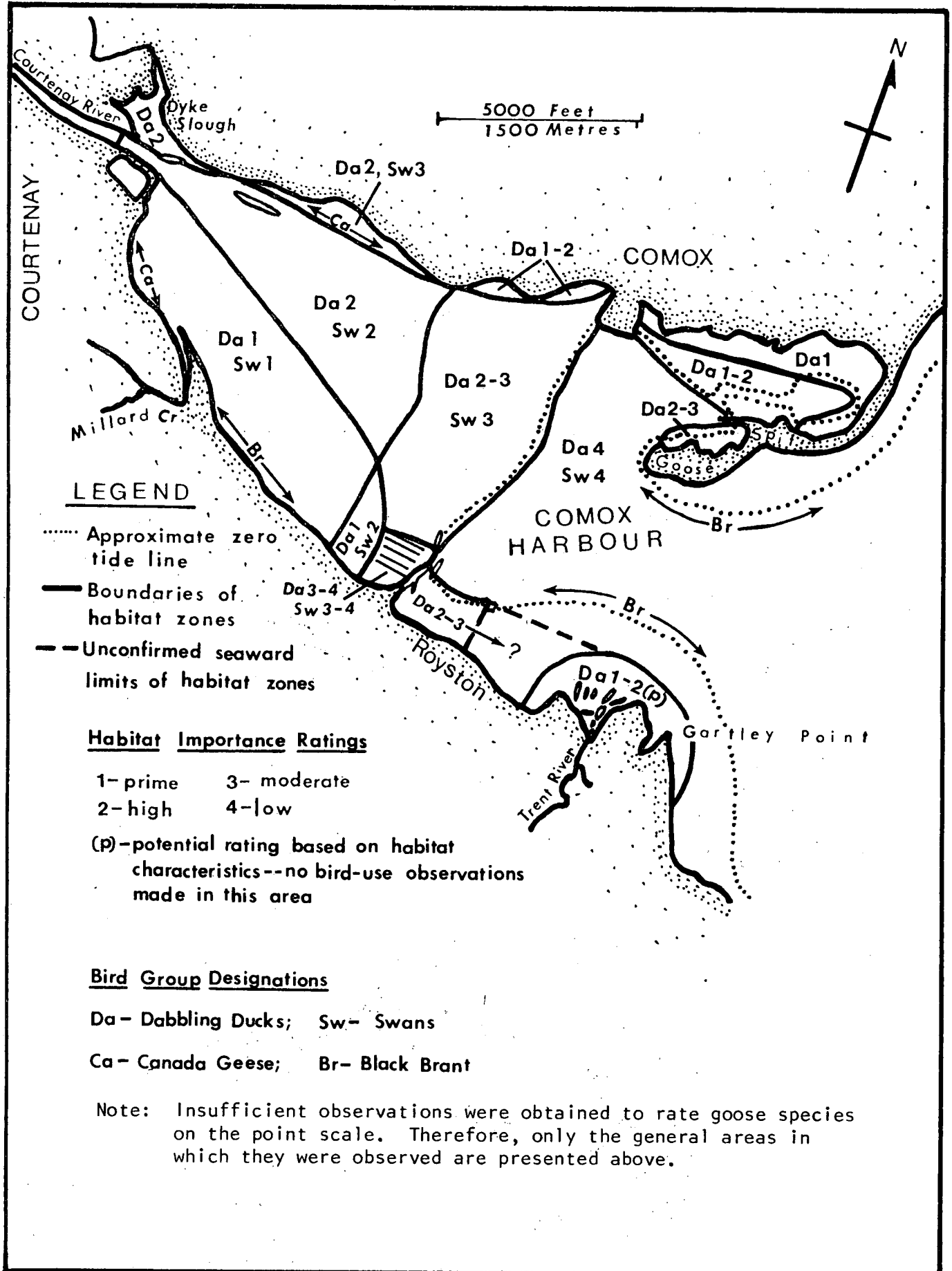


Fig. 2.1. Habitat ratings for dabbling ducks and swans, and habitat used by geese, Comox Harbour, B. C., based on observed bird use January through March, 1974 and December, 1974 through April, 1975.

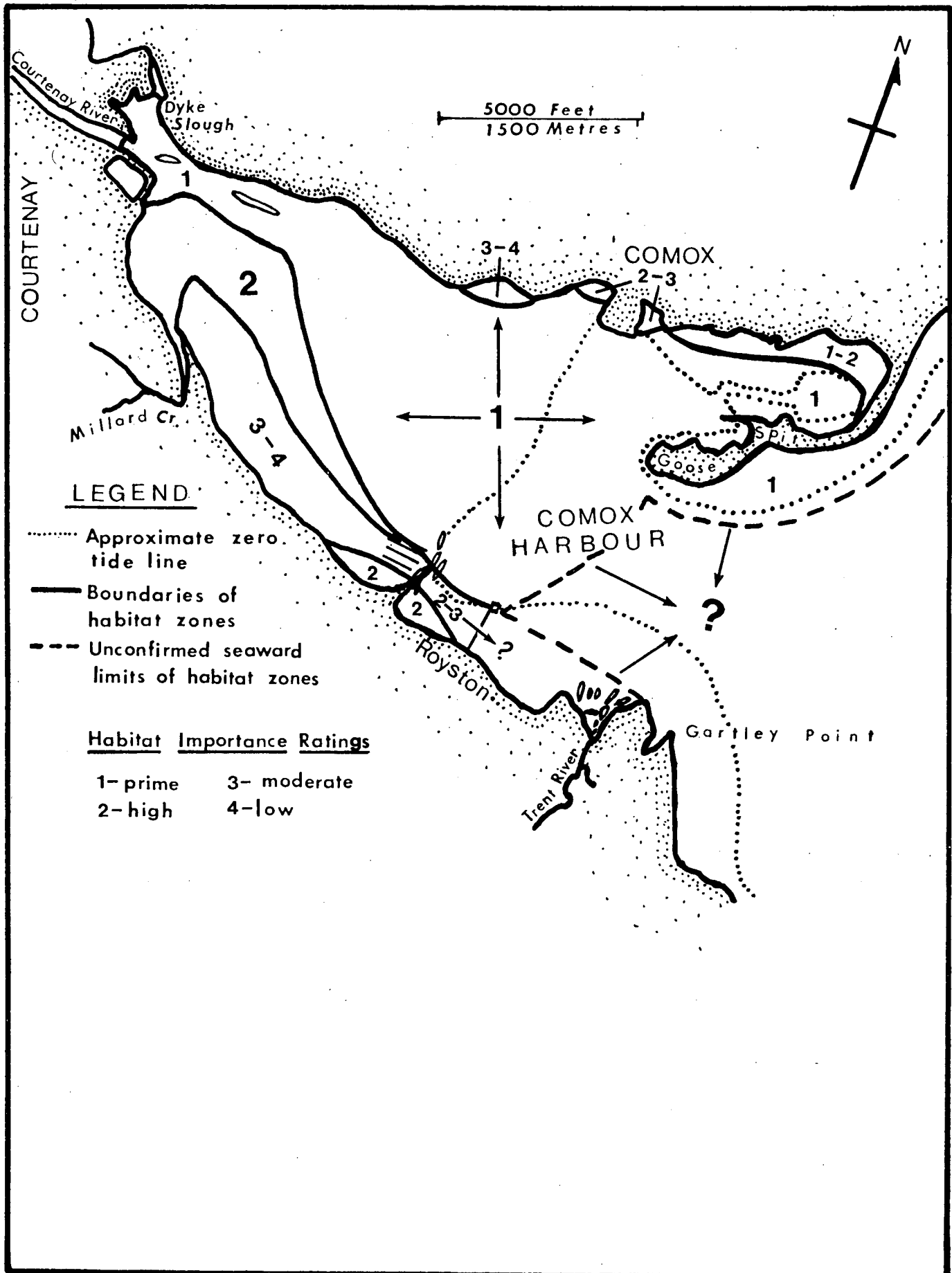


Fig. 2.2. Habitat ratings for diving ducks, Comox Harbour, B. C., based on observed bird use January through March, 1974 and December, 1974 through April, 1975.

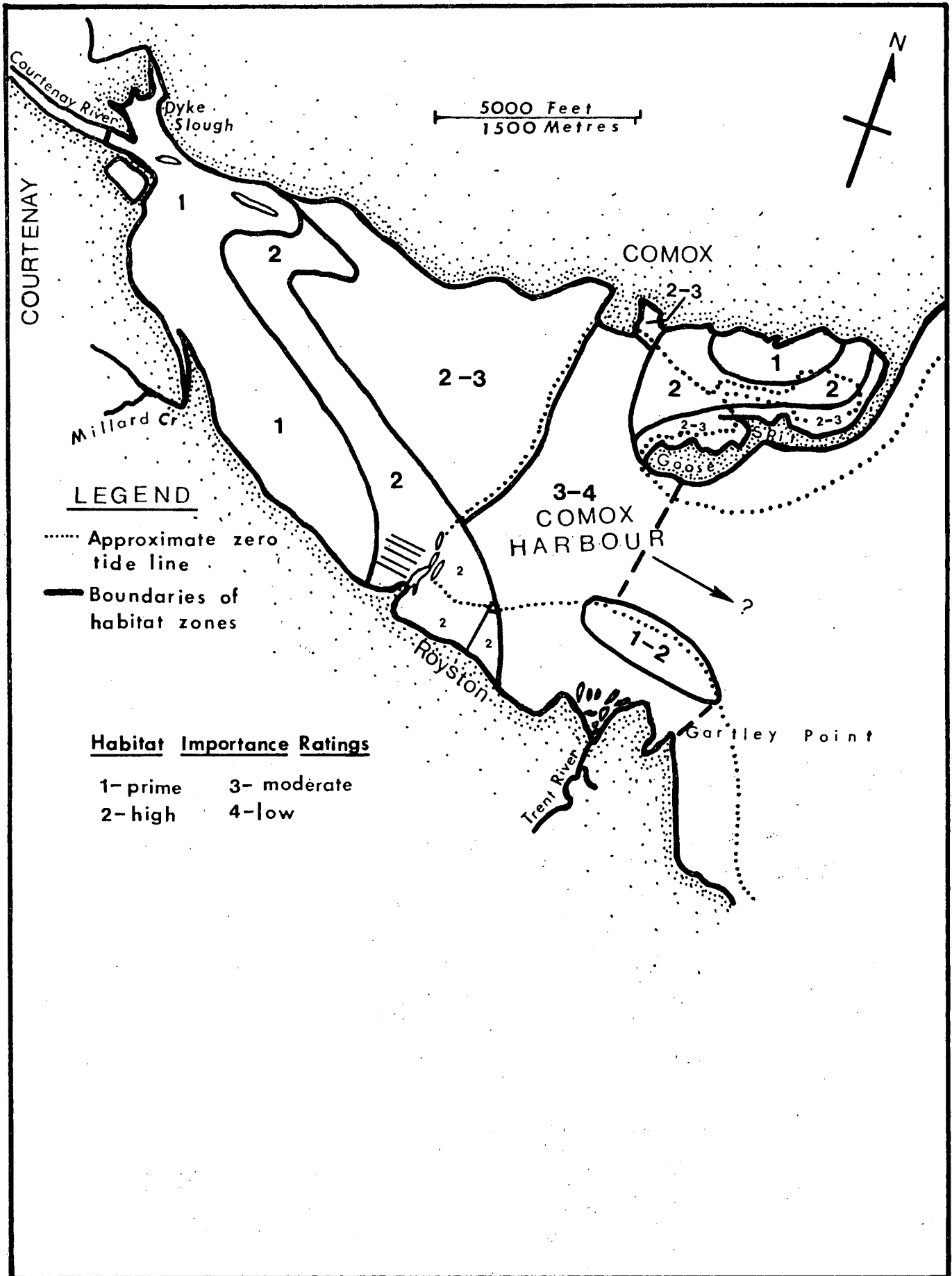


Fig. 2.3. Habitat ratings for gulls, Comox Harbour, B. C., based on observed bird use January through March, 1974 and December, 1974 through April, 1975.

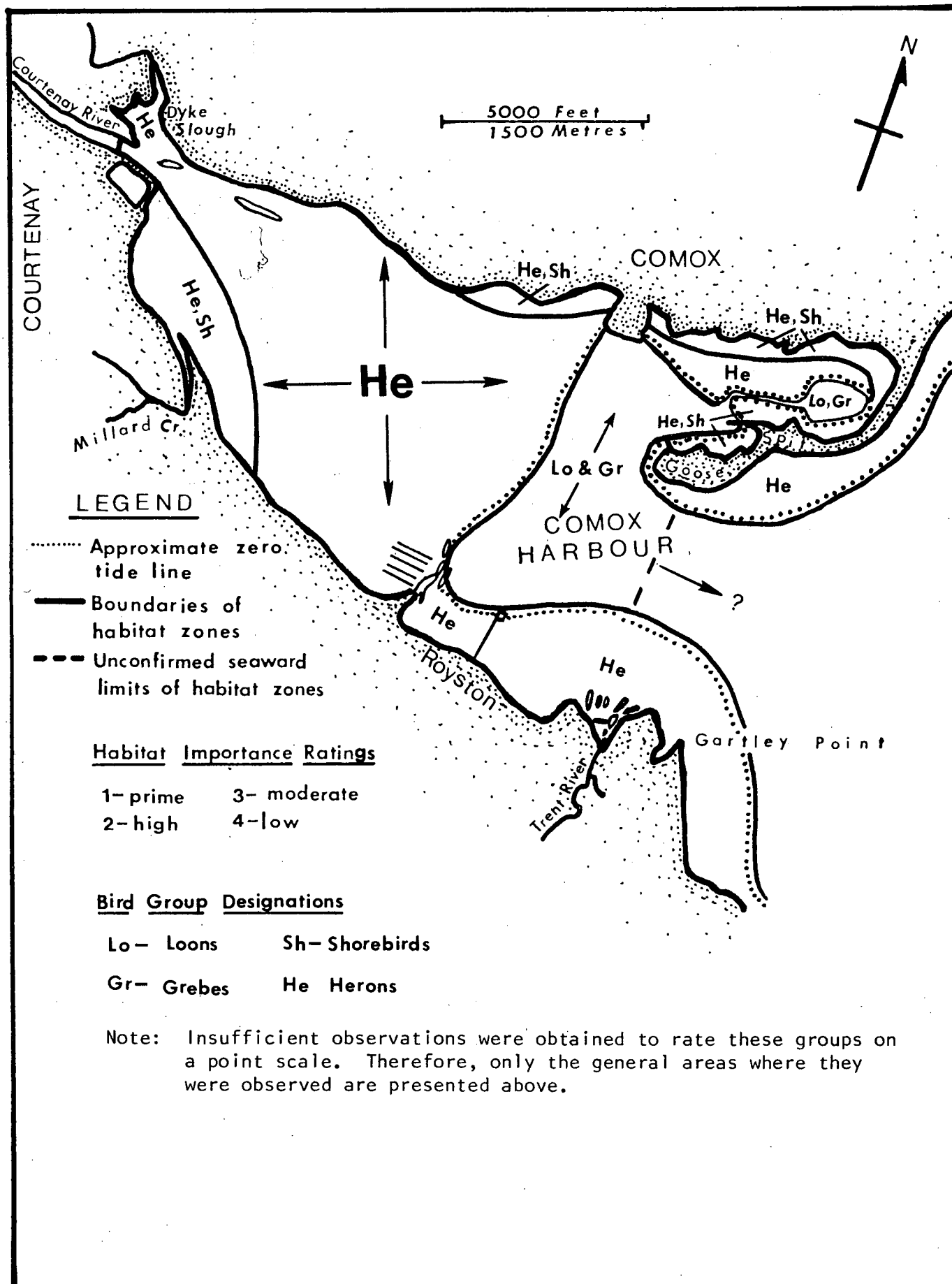


Fig. 2.4 Winter and spring habitat used by loons, grebes, herons and shorebirds, Comox Harbour, B. C., based on observed bird use January through March, 1974 and December, 1974 through April, 1975.