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CANADA GOOSE NESTING PERFORMANCE ALONG THE HANFORD REACH OF THE COLUMBIA RIVER, 1971-1980

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INTRODUCTION

The Hanford nesting population of the Canada Goose has been studied since 1950. Hanson and Eberhardt (1971) have discussed the 1953-1970 period in great detail. This report examines data collected from 1971 to 1980 and continues a record of an important nesting population of the Great Basin Canada Goose (*Branta canadensis moffitti*). One of the initial purposes of these studies was to document the reproductive performance of the goose population and this has continued to determine whether or not nesting performance would demonstrate a delayed response to reactor operations. Radionuclide content of Canada goose eggs measured after the closure of the production reactors indicated that the radionuclide content of goose eggs taken from deserted nests along the Hanford Reach was very low and primarily of worldwide fallout origin (Rickard and Sweany, 1977).

Continuous documentation of nesting performance also provides a way to evaluate the impacts of future industrial uses of Columbia River water and any habitat changes induced by hydroelectric dams and the turbine additions to them up and downstream from the Hanford reach. The proposed establishment of a commercial nuclear power reactor "park" at the Hanford Site to produce electricity for export to the regional power network could also produce a number of environmental changes that could effect the nesting goose population as well as other wildlife populations. A hydroelectric dam across the Hanford reach would inundate the islands upon which the nesting goose population depends. The recent opening of the entire length of the Hanford reach to public recreational use is another feature which could have a deleterious impact on the nesting geese. Sequentially collected data can serve as a way to evaluate the effects of past environmental changes and perhaps to recommend future mitigation practices to help maintain a diminishing wildlife resource in southcentral Washington.

Study Area

The Hanford reach (Fig. 1) contains the only free-flowing portion of the Columbia River in the United States upstream from Bonneville Dam. The riparian and aquatic habitats represent relatively unmanaged ecological resources.

Twenty islands provide almost all of the goose nesting habitats along the Hanford reach (Hanson and Eberhardt, 1971). Some of these islands have vegetatively changed since 1970, particularly islands 18, 19 and 20, as a result of pool elevations of Lake Wallula, the impoundment created by McNary Dam in 1955. Here the establishment of tree and shrub willows (*Salix* spp.) and rank herbaceous species rooted in soil and mud substrates, e.g., reed canary grass (*Phalaris arundinacea*), have replaced the sparse, short-statured plant communities rooted in cobble stones and gravels which were adapted to the historical seasonal flooding regime and the rapid flows of the free-flowing Columbia River (Fickeisen et al., 1980). Locke Island (#6, Fig. 1) has also been grazed by a small resident herd of feral cattle and Island 13 was burned by human carelessness.

Methods

Nesting surveys during 1971-1980 were conducted bi-weekly and usually began during the first week of April, as described by Hanson and Eberhardt (1971). Prior to 1971, nesting surveys were conducted weekly, thus not all parameters measured in the earlier surveys can be compared to the post-1970 data base. We feel, however, that the nest performance parameters we have selected are generally comparable to those of earlier investigations and

serves to extend the period of observation an additional 10 years. Certain parameters, such as nesting success and fates of eggs, are sensitive to the frequency of observation periods and may differ slightly from pre-1970 data.

Results and Discussion

The number of goose nests established on the Hanford reach islands has fluctuated from year to year, but a general decline in overall numbers is evident. More than 300 goose nests were present in 1958 but in 1975 only 108 nests were counted (Fig. 2). This observed decline in the number of nesting attempts we believe is due to a combination of factors, with the common coyote (*Canis latrans*) assigned an important role in the decline. The displacement of a resident human population from the Hanford reach of the Columbia in 1943 was initially beneficial to the goose population, by reducing human visitations to the islands. This kind of site management also benefited the coyote population by providing a release from control measures. The most dramatic impact of the coyote on the goose population is illustrated for Locke Island (Island #6) the largest of all the islands, 106 acres (Fig. 3). In 1957, Locke Island supported at least 129 goose nests (Hanson and Eberhardt 1971). The first evidence of coyote invasion of the island was recorded in 1959 when 42 nests were destroyed (Hanson and Eberhardt 1971). The second coyote incident occurred in 1965 when a single coyote killed seven geese, destroyed eleven nests, and was probably responsible for the desertion of 28 nests. In the fall of 1966, two coyotes took residence on the island, resulting in the failure of all nests but one during the 1967 nesting season. In February of 1968, two coyotes were shot and the number of goose nests slightly increased that same year. Since 1970, coyotes have been more or less permanent residents on Locke Island and coyote removal was not practiced again until 1978. By 1980 the Game Department had

killed 159 coyotes along the Hanford Reach (D. Flohr, personal communication). Nesting geese are still absent from Locke Island and coyotes continue to persist. In fact, a family of coyotes has taken up residence on the island and have been able to avoid falling to any suppression techniques. Clearly, this shows that "general" coyote control is ineffective and that the Locke Island situation emphasizes the importance of individual animals as predators. Hanson and Eberhardt (1971) noted the same predator situation in their study and pointed out that an indiscriminate coyote suppression program conducted during their study provided no enhancement to the nesting Canada Goose population. Locke Island has also undergone some changes in plant community composition in the past decade due to the grazing impact of feral cattle. Cheatgrass (*Bromus tectorum*) now dominates much of the island formerly occupied by native dryland perennial forbs and grasses. These vegetative changes may have had some effect on goose nesting, but the overriding factor has clearly been the presence of coyotes on the island during the nesting season.

The annual number of goose nests on each island is an effective measure of the changing status of the population. However, other parameters such as nest success, number of eggs laid in successful nests and average clutch sizes also provide useful information (Table 1). The parameter "nesting success" as we use it, means that a nest was successful if it contained the shells and membranes of hatched eggs, filoplumes from natal down, pipped eggs or goslings (Hanson and Eberhardt 1971). Average clutch size is the average of clutches from all successful nests. In comparing the data in Table 1 with Hanson and Eberhardt's (1971) figures for the same parameters, we observe the same ranges in clutch sizes and nesting successes. The average clutch observed in 2,688 hatched nests from 1953-1970 was 5.5 while the average clutch size we observed in 1,322 hatched nests from

1971-1980 was 5.6. The average percent of successful nests reported by Hanson and Eberhardt was 71% while our value was 81%. The generally higher values we report for success may be due to the biweekly frequency of nest checks. The potential for the goose population to reach the 1958 level is apparently still present. However, more human encroachment, industrialization, nesting habitat alterations and predation pressures are indicated for the future. The goose population will probably continue to respond in a way depending on its ability to adjust to these anticipated environmental changes.

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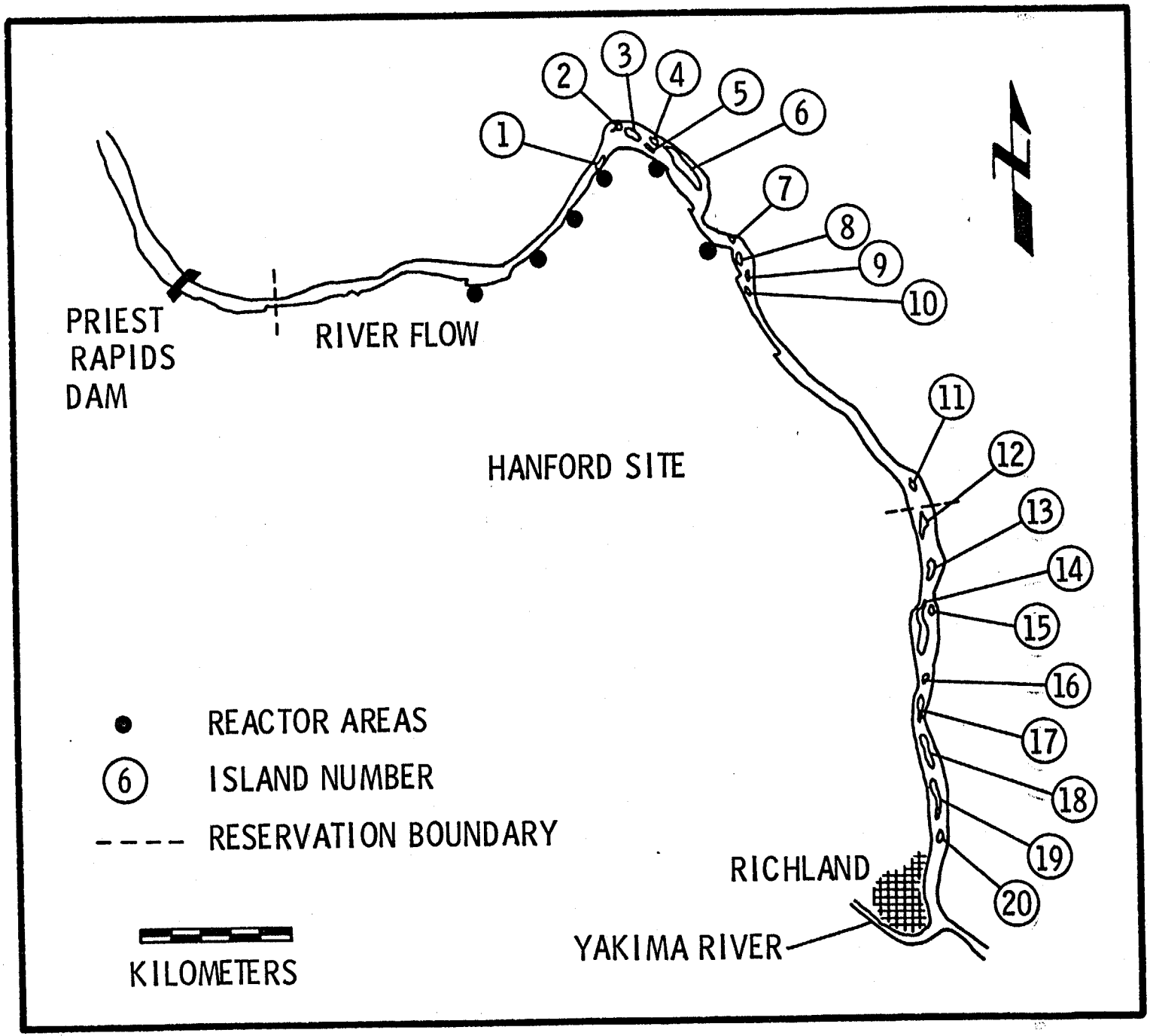
Table 1. Productivity of Canada Goose Nests on the Hanford Reach of the Columbia River 1971 to 1980

Year	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	Avg.
Total Nests	112	160	127	146	108	111	125	141	136	156	132
Number of Successful Nests	99	133	116	111	98	100	78	112	113	111	107
Percent Successful Nests	88	83	91	76	91	90	62	79	83	71	81
No. Eggs in Successful Nests	566	741	643	582	528	536	445	644	649	607	594
Average Clutch Size	5.7	5.6	5.5	5.2	5.4	5.4	5.8	5.8	5.7	5.5	5.6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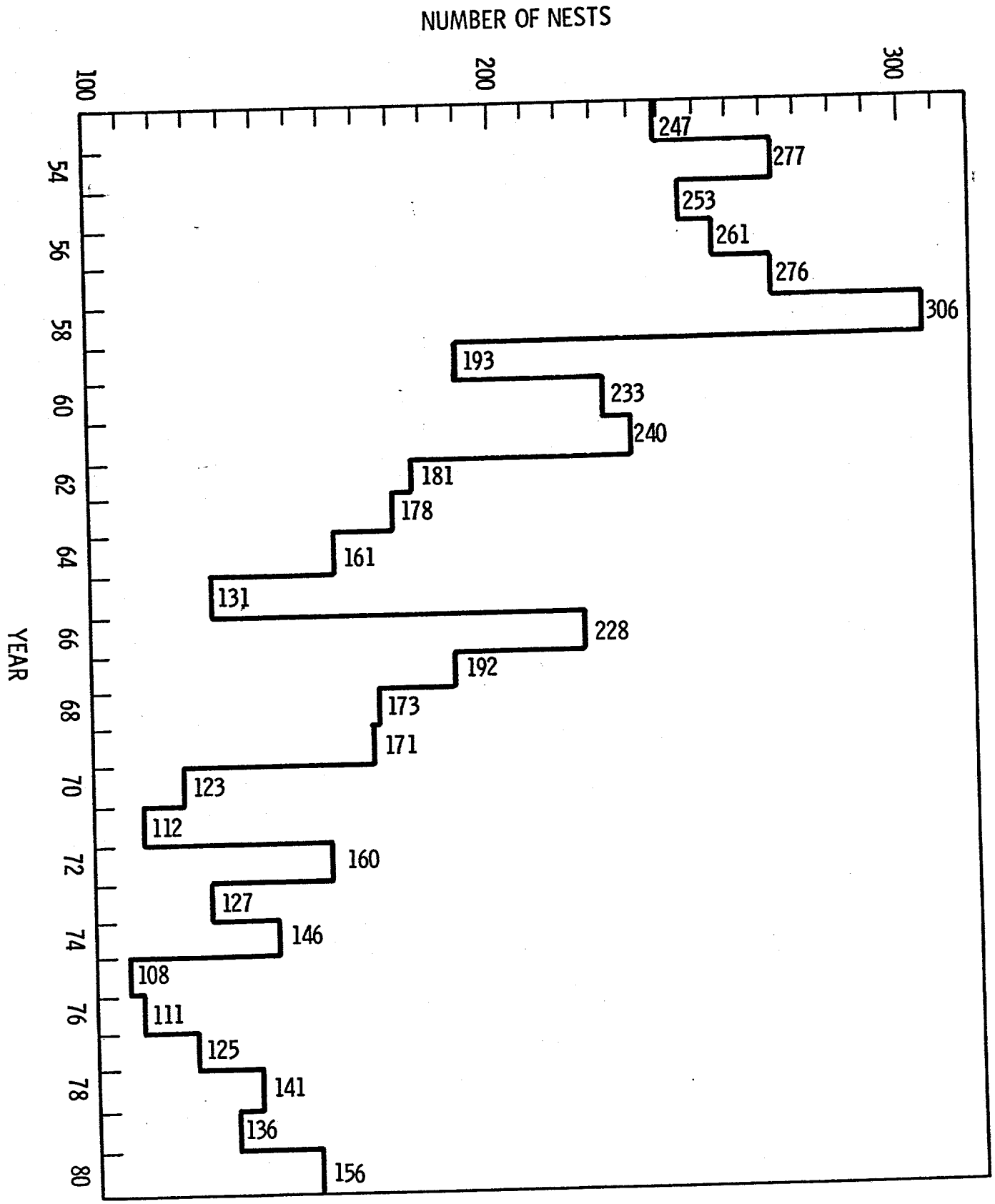
N
PRIEST RAPIDS DAM
RIVER FLOW
HANFORD SITE
RICHLAND
YAKIMA RIVER
REACTOR AREAS
6 ISLAND NUMBER
RESERVATION BOUNDARY
KILOMETERS


NUMBER OF NESTS
100
200
300
YEAR
54
56
58
60
62
64
66
68
70
72
74
76
78
80
247
277
253
261
276
306
193
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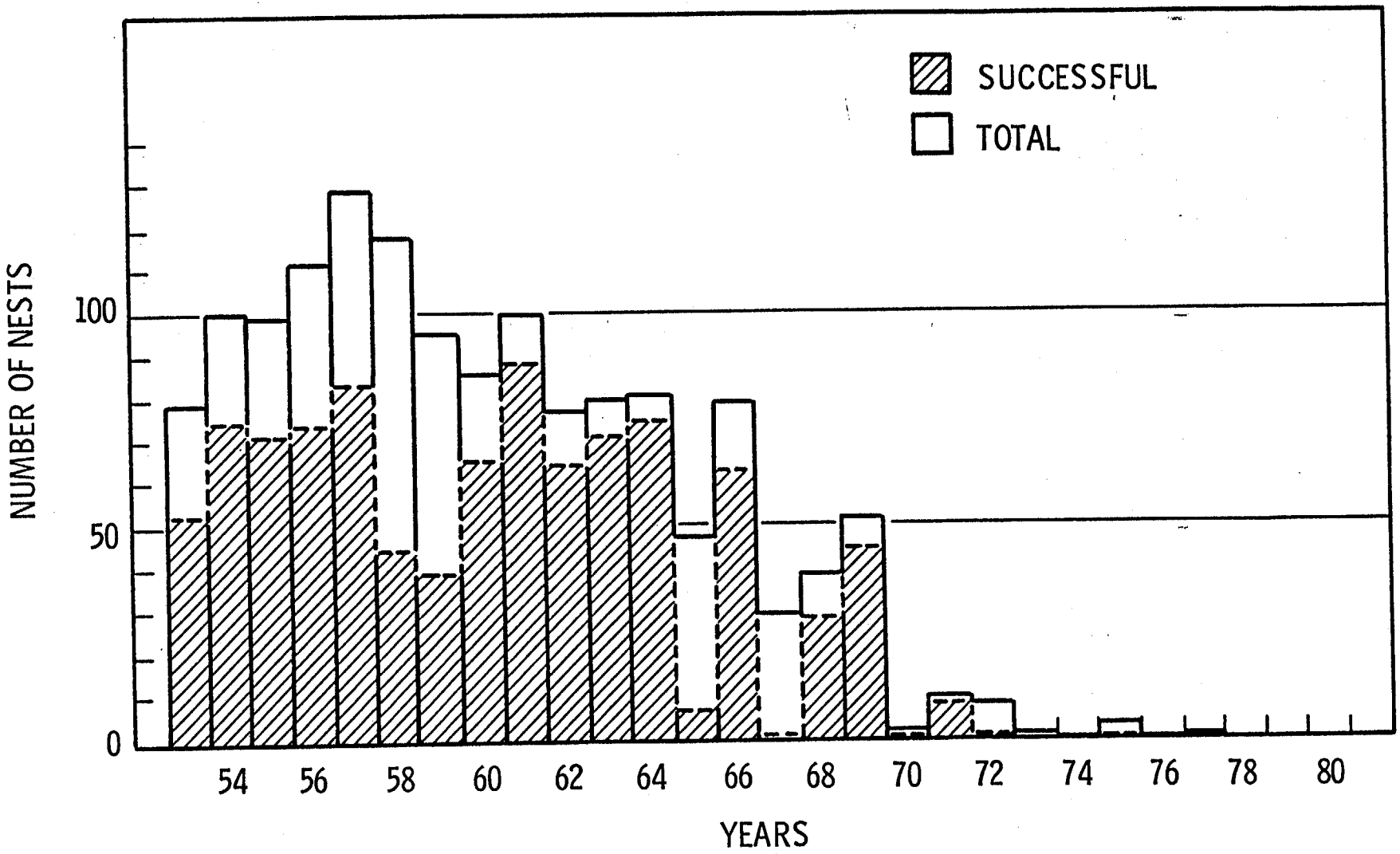
SUCCESSFUL
TOTAL
NUMBER OF NESTS
100
50
0
54
56
58
60
62
64
66
68
70
72
74
76
78
80
YEARS