INTRODUCTION

Nothing in the whole system makes sense until the natural history of its component species becomes known.—E. O. Wilson (1984).

Studies of the life histories of North American birds are no longer the vogue. The completion of A. C Bent's compilations removed much of the impetus for continuing such work on a systematic basis, except for rare, imperiled, or taxonomically puzzling species; descriptive ornithology began to give way to the formulation of hypotheses. To be sure, the *breeding* biology of North American birds is well documented, but data for other phases of the annual cycle are often inadequate either for the development of theory or for practical application. Additional research will surely reveal aspects of the life histories of common species that are extraordinary or unpredictable.

Two such species are the Eared Grebe (*Podiceps nigricollis*) and Wilson's Phalarope (*Phalaropus tricolor*), the most halophilic members of the North American avifauna. Each spends a large part of its nonbreeding season at highly saline lakes. Throughout the world, these lakes with their simple ecosystems are commonly regarded as having little importance for wildlife. And even though they are preferred habitats for a few bird species, North American ornithologists have mostly ignored them, Behle (1958) being an important exception.

The studies reported in this paper are based largely on research at Mono Lake, California, where hundreds of thousands of Eared Grebes and tens of thousands of Wilson's Phalaropes occur in summer and fall. My major goals were to document the biology of these species in the nonbreeding season, clarify the degree to which they rely on Mono Lake and other highly saline lakes, and study how they are able to thrive in habitats that are shunned by most species.

Mono Lake is a massive and ancient salt lake at the western edge of the Great Basin in central California. Located at the eastern scarp of the Sierra Nevada, Mono Lake and its environs were designated as a National Scenic Area in 1985. A remnant of Pleistocene Lake Russell, Mono Lake is currently (1986) 178 km^2 in extent, with a mean depth of 17 m, maximum depth of 46 m, and a pH of 10. It may once have contained fish; if so, they were eliminated by increasing salinity or vulcanism and none has been present at least since the Tahoe stage of glaciation (~100,000 yr B.P.; Hubbs and Miller 1948). The absence of fish makes it possible for the halophilic invertebrates that inhabit the lake—brine shrimp (*Artemia monica*) and brine flies (*Ephydra hians*)—to attain great abundance. These comprise the major attraction for the grebes and phalaropes and the few other bird species that are able to cope with the lake's unique chemical environment and high salinity (see Mahoney and Jehl 1985b).

Some streams that feed Mono Lake are diverted into the Los Angeles Aqueduct; between 1941 and 1982 the surface elevation of the lake dropped by 13 m and salinity increased from 40‰ to 90‰. Runoff from heavy snowpack in the early 1980s interrupted these trends, so that by 1986 the lake stood 2.7 m higher than its 1982 low and surface salinity had declined to 72‰. These rapidly changing ecological conditions and the anticipated resumption of long-term declines in the lake's size stimulated much interest in the ecosystem (summarized by the National Research Council 1987) and provided the major impetus for this report.

In this report, as elsewhere (Jehl and Mahoney 1983, Jehl 1987a), I emphasize that biases in obtaining field data may be far greater than is often acknowledged (see also Balph and Balph 1983). Even such routine techniques as collecting and banding birds or salvaging carcasses can provide highly misleading results, owing to differences in the distribution, foraging behavior, or mortality of the various age groups, daily or seasonal movements, changes in prey populations, and other factors noted in the text. As my understanding increased I attempted to minimize sampling bias, but that was not always possible nor in accordance with my need to gather specific information. In hindsight, bias was especially obvious in data derived from banding phalaropes, which if applied naively to testing hypotheses of population composition would have provided statistically overwhelming but biologically nonsensical answers. Because many sources of error cannot be suspected until a species' biology is appreciated—the "Catch-22" of study design—informed judgment must always take precedence over interpretations based on statistical correlations.

EARED GREBE

The Eared Grebe breeds circumpolarly in the Northern Hemisphere and also maintains small populations in Africa and South America. In most of the Palearctic it is uncommon or rare, although it is evidently common in the drier regions of eastern Europe and southwest Asia (Cramp and Simmons 1977). In the Nearctic the center of its breeding range is in the northern