

EXPANSION OF THE BREEDING RANGE OF THE HOODED MERGANSER WITHIN CALIFORNIA

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ABSTRACT: Published records and data from the California Waterfowl Association's program monitoring nest boxes show that the Hooded Merganser (*Lophodytes cucullatus*) has become a regular and widespread breeder in California. More than 100 recorded nestings between 1996 and 2004 were distributed over 20 counties and yielded more than 800 hatchlings. Nest-box data show a dramatic increase in successful nesting attempts by the Hooded Merganser over this period. Banding data show a high degree of nest-site fidelity among females. Christmas Bird Count data reveal a statistically significant increase in the winter abundance of the Hooded Merganser in California since the early 1980s. This expansion of the breeding range is probably due to some combination of increasing breeding habitat and nest boxes and an increase in the species' population in the western portion of its range.

Current field guides (Sibley 2003, Dunn et al. 2002) and species accounts (Dugger et al. 1994) show the breeding range of the Hooded Merganser extending along the Pacific coast of North America from southeastern Alaska and British Columbia south to Oregon. In Oregon the Hooded Merganser is a locally uncommon and sparsely distributed summer resident in all but the southeast corner of the state (Marshall et al. 2003). Historically, the Hooded Merganser was not known to breed in California (Dawson 1923, Grinnell and Miller 1944) despite nesting nearby in southern Oregon. Breeding in California was not confirmed until 1964, at Mountain Meadows Reservoir, Lassen County (DeBenedictis and Chase 1964). Since that time, only 11 records (included in Table 1) of attempts by Hooded Mergansers to breed in California have been published, with eight of those since 1998. Stallcup (2002) cited these and other unpublished records as evidence of expansion of the breeding range of the Hooded Merganser into California. To establish that California has become a part of the species' regular breeding range, we reviewed previously published records and supplemented them with extensive data from the California Waterfowl Association's (CWA) nest-box-monitoring program.

METHODS

Trained volunteer cooperators monitored use by the Wood Duck (*Aix sponsa*) of nest boxes throughout California from 1991 to 2004. These observations were part of a statewide cooperative program to monitor the resident Wood Duck population. The data collected allowed documentation of breeding of a variety of other cavity-nesting birds, including the Hooded Merganser. Cooperators monitored nest boxes at over 200 sites in 40 of California's 58 counties. Nest-box locations encompassed a range of habi-

Table 1 Records of the Hooded Merganser Breeding in California

Year	Breeding Attempts	Hatchlings	Location	Source
1964	1	9	Mountain Meadows (Lassen)	DeBenedictis and Chase 1964
1974	1	?	Lake Earle (Del Norte)	Stallcup and Greenberg 1974
1981	1	?	Sardine Lake (Sierra)	LeValley and Evans 1981
1981	1	8	Butt Creek (Plumas)	LeValley and Evans 1981
1996	1	12	Wild Goose Club–Butte Sink (Butte)	CWA ^a
1997	1	10	Greenhead Land–Butte Sink (Sutter)	CWA
1997	1	0	Crim-Sky–Butte Sink (Butte)	CWA
1997–2001	1	?	(Siskiyou)	cited in Stallcup 2002
1997–2001	1	?	(Modoc)	cited in Stallcup 2002
1997–2001	1	?	(Trinity)	cited in Stallcup 2002
1997–2001	1	?	(Mendocino)	cited in Stallcup 2002
1997–2001	1	?	(El Dorado)	cited in Stallcup 2002
1998	1	3	Blue Lake (Humboldt)	CWA
1998	1	6	Berry Patch–Butte Sink (Sutter)	CWA
1998	4	24	Wild Goose Club–Butte Sink (Butte)	CWA
1998	2	9	Doty Creek (Placer)	CWA
1998	1	7	MacArthur (Shasta)	Roberson et al. 1998
1999	1	0	Lake Earl (Del Norte)	CWA
1999	1	7	Lake Sonoma (Sonoma)	CWA
1999	1	13	Big Lagoon (Humboldt)	CWA
1999	1	8	Crim-Sky–Butte Sink (Butte)	CWA
1999	2	15	Wild Goose Club–Butte Sink (Butte)	CWA
2000	4	28	Wild Goose Club–Butte Sink (Butte)	CWA
2000	1	6	Crim-Sky–Butte Sink (Butte)	CWA
2000	2	20	Big Lagoon (Humboldt)	CWA
2000	1	1	UC Davis (Yolo)	Terrill et al. 2000 ^b
2001	8	42	Big Lagoon (Humboldt)	CWA, Roberson et al. 2001
2001	1	0	Eureka (Humboldt)	CWA
2001	1	12	Crim-Sky–Butte Sink (Butte)	CWA
2001	1	11	Berry Patch–Butte Sink (Sutter)	CWA
2001	3	24	Wild Goose Club–Butte Sink (Butte)	CWA
2001	1	?	UC Davis (Yolo)	CWA
2001	2	11	Grayson (Stanislaus)	CWA
2001	2	11	Antelope Lake (Plumas)	Singer et al. 2001, Stallcup 2002
2002	8	74	Big Lagoon (Humboldt)	CWA
2002	1	7	Clear Lake (Lake)	CWA, Glover et al. 2002
2002	6	36	Wild Goose Club–Butte Sink (Butte)	CWA
2002	10	19	Grayson (Stanislaus)	CWA
2003	8	194	Big Lagoon (Humboldt)	CWA
2003	1	10	Murdock Gun Club–Butte Sink (Colusa)	CWA
2003	7	42	Wild Goose Club–Butte Sink (Butte)	CWA
2003	5	54	Berry Patch–Butte Sink (Sutter)	CWA
2003	2	26	San Joaquin Wetlands Farms (Stanislaus)	CWA
2003	1	6	Sun City Lincoln (Placer)	Glover et al. 2003
2004	9	76	Simpson WDP (Humboldt)	CWA
2004	1	0	Crim-Sky–Butte Sink (Butte)	CWA
2004	1	0	Murdock Gun Club–Butte Sink (Colusa)	CWA
2004	6	76	Wild Goose Club–Butte Sink (Butte)	CWA
2004	3	22	San Joaquin Wetlands Farms (Stanislaus)	CWA
2004	1	8	Prado Basin (Riverside)	CWA, McCaskie and Garrett 2004

^aCWA, California Waterfowl Association.^bDoubts about the native origin of the female were raised (Roberson et al. 2000).

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tats including tidal marshes, sloughs, creeks, rivers, ponds, and lakes; these locations ranged in elevation from below sea level in the lower Sacramento Valley to 1585 m above sea level.

Monitoring of nest boxes began in mid to late February of each year and concluded in mid to late June, or until the fate of the last active nest was determined. Cooperators visited each nest box a minimum of three times over the course of a nesting season (following Allen et al. 1990, Henne and Hill 1990) and recorded occupancy and nesting information for all species of wildlife using the boxes. Data recorded included date of the visit, occupying species, number of eggs laid, number of eggs hatched, number of depredated or missing eggs, and number of hatchlings that did not exit the box. Cooperators determined the number of hatched eggs by counting the number of egg membranes left in a box after the chicks vacated it.

When possible, cooperators captured and banded nesting females during the second half of the incubation cycle (days 15–30) with standard U.S. Fish and Wildlife Service leg bands (master station permit #22063).

We considered a Hooded Merganser to have bred if we saw either unfledged young or at least one Hooded Merganser egg in a nest. A record of successful breeding required an observation of either unfledged young with an adult female Hooded Merganser or hatched eggs brooded by a Hooded Merganser. Hatched Hooded Merganser eggs brooded by a female Wood Duck were not considered evidence of successful breeding. From 1996 to 2004 the rate of Hooded Merganser parasitism of Wood Duck nests in the boxes monitored by CWA was 0.08% (21/25,668).

RESULTS AND DISCUSSION

The Hooded Merganser has been found nesting at least 119 times in California from 1964 to 2004 (Table 1). These birds produced more than 800 hatchlings distributed among 20 of California's 58 counties (Figure 1). Over 90% of those breeding attempts occurred between 1998 and 2004. With the single exception of a successful breeding in Riverside County in 2004, all have been in the northern half of the state.

Of these attempts, 64% were successful (76/119). To demonstrate that the apparent increase in reported successful breeding attempts represents a true increase and is not an artifact of an increasing number of nest-box reports, we normalized the number of successful breeding records from monitored nest boxes using the total number of nest-box reports. This analysis confirms that there has been a dramatic increase in breeding of the Hooded Merganser in California since 1996 (Figure 2).

Of the 231 sites throughout California where CWA monitors Wood Duck nest boxes, 16 (7%) reported the Hooded Merganser breeding. If a similar ratio applies to nest boxes other than those monitored by CWA, it is likely that breeding of the Hooded Merganser in California has become relatively common.

Studies in southeastern Missouri found that between 3.8 and 10.8% of female Hooded Mergansers return to their natal site to breed (Dugger et al. 1994). Strong fidelity to nest sites (29%) has been documented elsewhere in this species' range (Zicus 1990). Banding of female Hooded Mergansers

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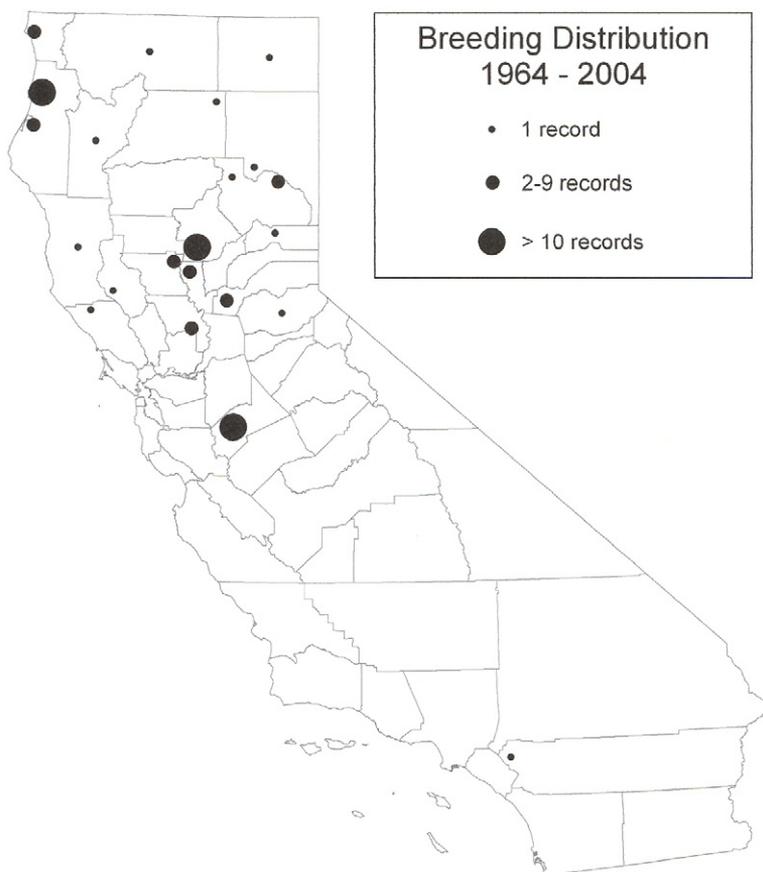


Figure 1. Locations of breeding attempts of the Hooded Merganser in California.

using CWA-monitored nest boxes showed a high degree of nest-site fidelity. Seven of the 19 females (37%) banded between 1997 and 2003 returned to nest in the same area in subsequent years, and two of those returned for five consecutive years. Strong nest-site fidelity combined with the likelihood of a significant degree of natal-site fidelity suggests that breeding of the Hooded Merganser in California may be sustainable into the future as long as suitable habitat is available.

Data from Christmas Bird Counts (CBCs) in California indicate that the winter abundance of the Hooded Merganser increased substantially over the last two decades (Figure 3), coinciding roughly with the increase in breeding records. The average number of Hooded Mergansers detected per party hour from 1982 to 2003 was significantly greater than that from 1960 to 1981

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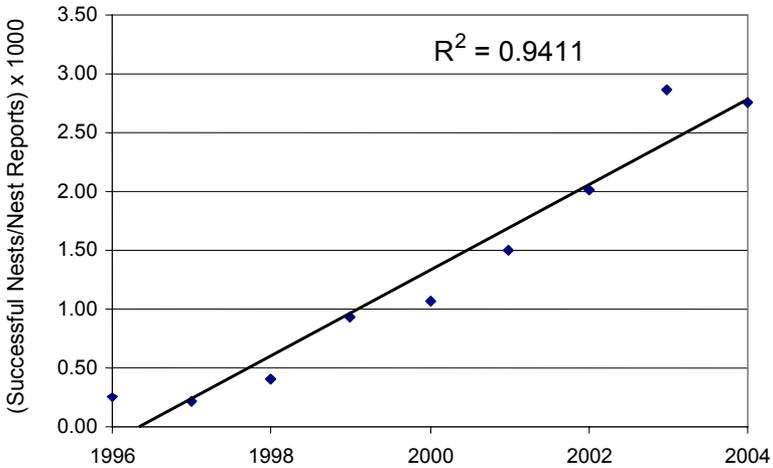


Figure 2. Scatter plot of the number of successful Hooded Merganser nests as a fraction of the total number of nest-box reports received by CWA, 1996–2004. The trend line is based on linear regression.

(*t* test; $p < 0.0001$). Moreover, two banded female Hooded Mergansers harvested during the hunting season were shot within 1 km of their banding site. Thus it appears that some of the breeding females winter near their nesting sites and that some of California’s breeding Hooded Mergansers are now year-round residents.

Figure 2 shows that the increase in Hooded Merganser breeding began after 1998, while CBC data (Figure 3) suggest that the wintering population was increasing by the early 1990s. Therefore, it is possible that this increase in wintering Hooded Mergansers, combined with the increasing availability of nest boxes, provided females the opportunity to discover new nesting sites and helped drive the increase in breeding.

Range expansion and increased observations of the Hooded Merganser have been reported elsewhere in North America. Davis and Capobianco (2006) used CBC data to show an increase in the number of wintering Hooded Mergansers throughout the United States. An apparent population increase and range expansion has been reported in the northwestern portion of the range (Palmer 1976), around Yellowknife, Northwest Territories (Fournier and Hines 1996). Both nesting data and winter counts indicate an increasing population of the Hooded Merganser in Massachusetts (Heusmann et al. 2000). The latter authors noted that this trend in Massachusetts is supported in part by an increased number of Hooded Mergansers hatched in nest boxes. Dugger et al. (1994) noted breeding in the western United States outside the species’ historic range in Oklahoma, Nebraska, and as far south as New Mexico. These have all been isolated occurrences, however, and do not seem to represent a true expansion of the normal breeding range.

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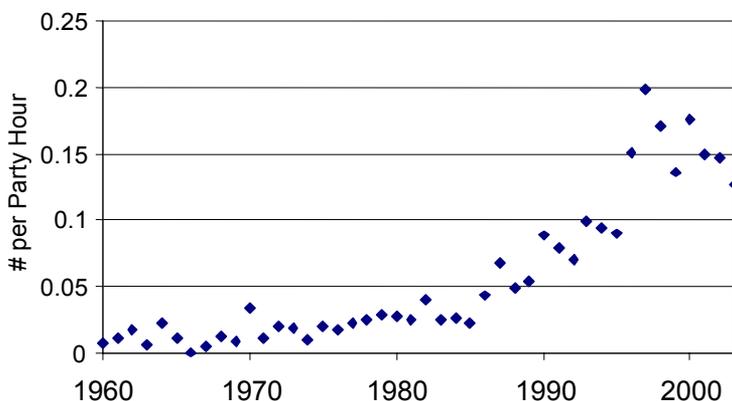


Figure 3. Scatter plot of the number of Hooded Mergansers found per party hour on California Christmas Bird Counts, 1960–2003.

Given the steady increase in records of successful breeding in California, their geographical dispersion, and the breeding-site and natal-site fidelity of female Hooded Mergansers, we conclude that the Hooded Merganser is now well established as a breeding species within California.

The possible implications of this range expansion for other species are unknown. It seems unlikely that the Hooded Merganser's breeding population would affect other species significantly. The number of Hooded Mergansers is very small in relation to the number of Wood Ducks. Hooded Mergansers could compete with other cavity-nesting ducks like the Bufflehead (*Bucephala albeola*) and Common Merganser (*Mergus merganser*), but these species breed primarily at elevations higher than the bulk of the Hooded Merganser's breeding sites in California.

We considered a number of factors that, singly or in combination, could account for the expansion of the Hooded Merganser's breeding range. These factors include

- changes in the rangewide or regional population
- an increase in suitable nesting habitat in California
- increased availability of nest cavities
- climate change

The overall population of the Hooded Merganser is believed to be stable or increasing (Dugger et al. 1994) and, as noted above, populations in the northwestern portion of the species' range appear to be increasing. Therefore, it is possible that this range expansion is due to female Hooded Mergansers being forced to explore beyond their historic range to find unoccupied breeding sites.

It is widely believed that, after many decades of decline, the forested wetlands used by breeding Hooded Mergansers in California have increased in recent years (L. Naylor pers. comm.). However, we could find no quantitative

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data to confirm this. Programs like the U.S. Fish and Wildlife Service's Partners for Fish and Wildlife Program and the Natural Resources Conservation Service's Wetland Reserve Program have restored many acres of this habitat in the last 15 years, which may be a contributing factor to the increase of Hooded Merganser breeding.

Suitable nest cavities in California wetlands have increased with the installation of nest boxes for the Wood Duck over the past 50 years (Naylor 1960, Bellrose and Holm 1994), with more extensive and coordinated increases of nest boxes over the past 15 years (Kwolek 2004). While it seems likely that this is an important factor, it is not possible to speculate on the importance of nest boxes separate from other factors, because nearly all the data we cite come from nest boxes. Management practices that preserve snags and decadent trees cannot be overlooked as sources of increased nest sites for this species (Riparian Habitat Joint Venture 2004: <http://www.prbo.org/calpif/riparian.v-2.pdf>).

As noted by Richardson (2004) regarding the expansion of the breeding range of the Bufflehead in California, a southward range expansion is the reverse of the northward trend in breeding range noted by Thomas and Lennon (1999) and Root et al. (2003) for many other avian species. Richardson suggested that for the Bufflehead earlier spring thaws could be making more habitat available for this species in the Sierra Nevada. However, most of the breeding records for the Hooded Merganser are at lower elevations where this would not be a factor. Thus, climate change seems unlikely to be the cause of range expansion for the Hooded Merganser.

The expansion of the breeding range of the Hooded Merganser in California is likely due to some combination of the increase in suitable breeding habitat and nest boxes and the growth of the species' population in the western portions of its range. Richardson (2004) concluded that a similar combination of increase in habitat and nest cavities may have enabled the expansion of the breeding range of the Bufflehead within California.

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Family of Hooded Mergansers near Lincoln, Placer County, California.

Photo by Jack Ferrante