

THE BREEDING BIOLOGY OF A BRITISH COLUMBIA AMERICAN AVOCET COLONY

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Abstract -- Breeding biology data were collected in 1997 at the first documented American Avocet colony in British Columbia. At least 39 adult avocets were observed at the site, with 19 nests found. The nests were clustered on or near small islands. As elsewhere, the most frequent clutch size was four eggs, but five-egg clutches were more frequent than usual, and there were two "superclutches." Nest sites, egg measurements, nesting chronology and post-hatching behaviour were similar to those reported at other breeding sites. Hatching success was about 77%.

Key Words: American Avocet, breeding biology, British Columbia, *Recurvirostra americana*, superclutches.

American Avocets (*Recurvirostra americana*) were unknown as breeding birds in British Columbia, prior to 1968, when one pair nested at Creston (Campbell 1972). Although no other avocets have been reported nesting there, reports of avocet occurrences in British Columbia increased substantially (Cooper 1983; Campbell *et al.* 1990). In 1987, three pairs nested in the province. One pair nested at Beresford Lake south of Kamloops (Campbell *et al.* 1990). Both other pairs nested at what I call Avocet Marsh (also known as Alki Lake and Schleppe's Slough), Kelowna (Weir 1997). No nest was found, but two broods with three young each were observed on 25 June (Cannings *et al.* 1987:415). Breeding by avocets has been suspected in subsequent years, but poorly documented. The only nest found in the vicinity was one with four eggs found at Roberts Lake, 2 km. south of Avocet Marsh on 24 May 1992 (Chris Siddle personal communication 22 August 1977), but juvenile avocets have also been seen in the area on a few other occasions. In 1988, two pairs of avocets nested at Serpentine Fen, Surrey and one pair also bred the following year (Wilson 1989). However, the site at Avocet Marsh remains the only site apparently used consistently.

In 1997, I visited Avocet Marsh on 30 occasions to obtain data on the breeding biology of avocets in British Columbia.

STUDY AREA

Avocet Marsh is located at the south end of the Glenmore Landfill Site off Glenmore Road in Kelowna. The site is an alkaline slough that can be considered a lake during wet years with resulting high water levels, such as 1997. About 70 small islands dot the marsh, which covers approximately 40 ha. Most of the islands are low in elevation and flat. Four larger islands are at the north-eastern end of the marsh. Vegetation height on the islands was low during most of the nesting season, but by early July, Foxtail Barley (*Hordeum jubatum*) covered most of the islands. Water levels were no deeper than 1.4 m., with average water depth about 0.8 m.

STUDY METHODS

Data collected at Avocet Marsh included population size, nest site locations, nest measurements, notes on nest structure, egg measurements, clutch sizes, laying and hatching dates, and notes on 1997 breeding success. Unless otherwise stated, data were collected from 19 nests. Rising water levels that submerged three nests after hatching and the flattening of a few nests by rain reduced this sample size for some measurements. Minimum, maximum and mean values are given for measurements.

POPULATION SIZE AND NEST INITIATION

Twenty avocets on 18 April were the first observed at the site in 1997, although a couple had been seen a couple of days earlier along Okanagan Lake, also in the Kelowna area. This exceeded the previous British Columbia high of 19 in Fort St. John in 1988 (Campbell *et al.* 1990), but by 27 April 37 avocets were at Avocet Marsh. The highest number of adult birds counted there was a minimum of 39 on 16 May 1997. The size of the colony in 1997 was at least 19 pairs. As previously documented British Columbia nestings consisted of one to two pairs, this constituted the first documented avocet colony in the province.

The first four avocet nests were found on 6 May, when eggs were already present in two. By 13 May, 15 nests were active. The last four of the 19 nests were discovered by 10 June, by which time eggs of some clutches had hatched.

NEST SITES

All 19 avocet nests were on islands, and situated 21 m. to 140 m. (mean 86 m.) from shore. Of the 19 nests, ten were on flat clay islands close (within 12 cm.) to water level (Figure 1).



Figure 1. American Avocet nest on island in Avocet Marsh, Kelowna, B.C. 30 May 1997. Photo by Jason Weir.

Three nests were built on wet, grass-covered islands in water several centimeters deep. One nest was built up over the water (Figure 2). Five nests were on islands with higher elevations ranging from 30 cm. to 60 cm. above the water surface. The mean elevation of 17 nests above water level was 17.5 cm.

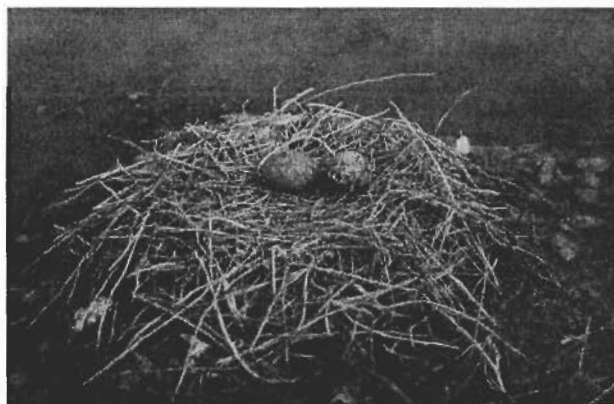


Figure 2. American Avocet nest built up over water in Avocet Marsh, Kelowna, B.C. 3 June 1997. Note hatching egg. Photo by Jason Weir.

Nests were absent from the larger islands. Although four large flat islands (up to 25 m. x 200 m.) at the north-east end of the lake appeared ideal for nesting, no avocets bred there. None were even observed wandering there during the incubation period. However, after hatching the avocets spread out into this area and frequented it during the last half of June to mid-July in keeping with their tendency to form moving territories centred on the young (Gibson 1971; Johnsgard 1981; Robinson *et al.* 1997). As opposed to large islands, tiny islands were favoured for nest sites in this area. Island sizes ranged from 0.8 m. x 0.8 m. to 12 m. x 31 m., with a mean for 16 sites of 5.7 m. x 9.7 m. Nests were located in the water to 5.0 m. from the water's edge. Mean distance to water of 15 nests was 1.8 m. In comparison, nine nests studied at the Salton Sea, California averaged 22.2 m. (range 0.4-61.0 m.)

from water (Grant 1982), 103 nests in North Dakota ranged from water's edge to 10.4 m. inland (Sidle and Arnold 1982), and 23 nests in Oklahoma averaged 60.4 m. (range 3.0-300.0 m) from water (Grover and Knopf 1982).

Avocets are semi-colonial breeders (Giroux 1985; Sordahl 1996; Robinson *et al.* 1997) and often nest quite close together. Nests on the same island were as close as 3.5 m. apart. However, of 19 nests only six pairs shared islands, with two pairs on each of three islands.

NEST STRUCTURE AND COMPOSITION

All nests were composed of either grass leaves and stalks, the stalks of other leaves, or a combination of the two. A few traces of styrofoam were in one nest. Nests varied widely in the amount of material used. A few nests had almost no material, and consisted of mere depressions in dirt several centimetres deep, lined by a few twigs. Other nests were piled high with vegetation. Nests with an elevation of 30 cm. or more above water level tended to have sparse nesting material, while those close to or in the water had substantial nesting material generally piled higher than those at higher elevation. The height from the top of the nest to its base was 0 cm. on each of five nests at elevations above 30 cm. Mean nest height of nine nests close to water level was 3.2 cm. Thus, there appears to be a relationship between the height of a nest and its elevation above water. The greatest nest height among 14 nests was 8 cm. (mean 2.4 cm.). Grant (1982) found nest heights of 3.0-5.0 cm. (mean 3.7 cm.) at the Salton Sea, California. Sidle and Arnold (1982) also found that the "tallest" nests were at water's edge or in wet sites and avocets are well known for building up nests in response to rising water (Hamilton 1975; Robinson *et al.* 1997).

Cup depths, measured from the cup rim to the bottom of the cup on eight nests, ranged from 0.5 to 3.0 cm. (mean 1.8 cm.). Cup diameters were relatively constant, averaging 12 cm. across. However, nest widths (outside diameters of nests) varied considerably, with 12 nests ranging from 18 cm. to 30 cm. across (mean 23 cm.).

CLUTCH SIZE

I observed complete clutches in 14 nests (Table 1). According to Harrison (1979), avocet clutch sizes are usually four, often three and sometimes five. 1997 Avocet Marsh data agree in that four-egg clutches were the most frequent (57%) (Figure 3), but differed in that the population included no three-egg clutches and a higher proportion (29%) of five-egg clutches (Table 1). The two larger clutches of seven (Figure 4) and eight eggs would not have been laid by one female (Godfrey 1986). They may have been "dump" clutches, laid by several females (R. J. Cannings personal communication May 1997) or the work of two females, as found in Alberta,

TABLE 1

CLUTCH SIZES OF AMERICAN AVOCET NESTS
AT "AVOCET MARSH," KELOWNA, B.C., 1997

CLUTCH SIZE	NO. OF NESTS
4 eggs	8
5 eggs	4
7 eggs	1
8 eggs	1



Figure 3. Most avocet nests at Avocet Marsh contained four eggs.
Photo by Jason Weir.



Figure 4. "Superclutch" of seven eggs at Avocet Marsh, 1997.
Photo by Jason Weir.

Manitoba and Utah, as shown by egg colouration and by the presence of four adults (presumably two pairs) in the vicinity of at least some nests with supernormal clutches (Giroux 1985; Koonz 1985; Sordahl 1996). Both of the "superclutches" at Avocet Marsh were highly successful, with all but one egg from the larger of the two hatching, indicating that both were incubated. This finding supports the hypothesis of Kondla and Pinel (1978) that most "superclutches" result from the laying by two females in one nest, rather than

"dump" nests of eggs of several females. Clutches of six or more eggs are more common in dense colonies on islands and at the northern and western edges of their breeding range (Kondla and Pinel 1978; Giroux 1985; Robinson *et al.* 1997). Mean clutch size of 14 nests at Avocet Marsh was calculated as 4.94 eggs per nest, but a mean of 4.38 determined by excluding the two superclutches is probably more accurate. Similarly, clutch size in a western Great Basin study was different when single-egg and super clutches were included (3.59) than when such clutches were excluded (3.81) (Robinson *et al.* 1997). Although the mean clutch size at Avocet Marsh was larger, the median of four eggs at Avocet Marsh (Table 1) matched that of the western Great Basin study (Robinson *et al.* 1997).

Augmenting clutch size to five by adding eggs in one study resulted in an increased average productivity per nest (Shiple 1984), a propensity that might select for larger clutch sizes in areas of high nest mortality.

EGG DATA

Of 69 eggs observed at Avocet Marsh, I was able to measure 47 with calipers. Egg lengths ranged between 47.6 mm. and 53.0 mm.; egg widths between 33.1 and 37.3 mm. Mean egg size was 50.2 x 35.0 mm. These data agree with the average egg size of 49.8 x 34.0 mm. reported by Harrison (1979).

All eggs at Avocet Marsh were dull dusty beige without gloss. They were wreathed or spotted with irregular brown and black markings, and ranged in shape from oval to pyriform.

NESTING CHRONOLOGY

As noted above, the first four nests in 1997 had been constructed by 6 May, when at least two contained eggs, and by 13 May adults were incubating eggs in 15 nests. My estimated dates of laying of the first egg in each nest ranged from 1 to 15 May, well within the first laying dates of 14 April to 22 May recorded at other nesting sites (Table 2).

TABLE 2

FIRST-LAYING DATES OF AMERICAN
AVOCET NESTS

FIRST DATE	LOCATION	SOURCE
22 May	Salton Sea, California	Grant 1982
24 April	Summer Lake, Oregon	Gibson 1971
14 April	Cache County, Utah	Sordahl 1981

Hatching dates of 48 eggs at Avocet Marsh ranged from 26 May to about 1 July, averaging about 9 June. The earliest known hatching was in a nest with a five-egg clutch, at which a parent was seen incubating on 6 May. No chicks had hatched on 25 May, but all five had hatched by 28 May. The eggs of the seven-egg clutch hatched some time between 3 and 8 June. On 3 June, one egg known to have been laid by 12 May in a four-egg clutch was seen with a 0.4 cm.-diameter hole in its broad end [the "pip" stage of hatching (McNicholl 1983)]. In American Avocets, holes of 0.4-1.5 cm. appear in the egg one to two days before hatching (Robinson *et al.* 1997). On 10 June, I discovered a previously unknown nest in the process of hatching. Two eggs were in the "early pip" (McNicholl 1983) stage of small cracks in the shell, while the other two had progressed to the "pip" stage, with the chicks occasionally poking the egg teeth on the tips of their upper mandibles through the holes. These chicks uttered squeaking calls as they hatched.

The nest with the eight-egg clutch was later in hatching. Four of its eggs had hatched by 26 June, and three others hatched during the next few days. Another clutch of four eggs also hatched late, some time between 26 June and 4 July. Four tiny chicks (no more than one week old) with an adult on 17 July must have been from an even later-hatching clutch (about 10 July) of a nest that I had not discovered. Late hatching dates in other locales range from 4 July at Salton Sea, California (Grant 1982) and 18 July in Utah (Sordahl 1981) to 25 July in Lassen County, California (Robinson *et al.* 1997).

Since I did not have daily records for each egg, I could not determine incubation periods precisely. However, approximate incubation periods of 27 eggs ranged from about 22 to 31 days (mean about 25.4 days), closely matching incubation periods of 22 to 29 days (mean 24.4 days) in an avocet population studied in Oregon (Gibson 1971).

POST HATCHING

Avocet chicks left the nest within a short time after hatching. The chicks seemed considerably independent. On 30 May, chicks estimated to be four days old were observed wandering as far as 100 m. from their parents. Chicks were observed pecking around and apparently feeding themselves. Nonetheless, each family stayed together as a group. The adults were very protective of the young and were observed chasing Blue-winged Teal (*Anas discors*) and Killdeer (*Charadrius vociferus*) from their vicinity.

Several family groups were seen to remain together as the young grew larger. On 16 June, I observed one family group with four approximately half-grown juveniles and another with two more juveniles of that age. Young birds of various sizes were observed until mid-July.

After hatching, chicks became difficult to locate. When they were still small, I was unable to see any at the marsh for more than a week, but I began seeing them again by the time they had reached about half size. The apparent temporary absence of young may be explained by the tendency of adults to lead broods to a nursery area in shallow water with vegetation taller than the chicks, but shorter than the adults (Robinson *et al.* 1997).

By 17 July, the avocet population had declined to 25-30 birds, suggesting that adults and larger young had dispersed from the site. About nine avocets remained on my last visit of the year on 22 August, all but two of which were young of the year.

BREEDING SUCCESS

Of an estimated 87 eggs, I believe that all but 20 hatched (about 77% hatching success). Of 69 documented eggs, 50 almost certainly hatched. Fifteen eggs were abandoned, including two complete clutches (one of four eggs, the other of five eggs). One egg was found broken beside a nest. The outcome of three eggs was uncertain.

It is nearly impossible to estimate how many individuals survived to fledging. However, I believe that the colony was generally successful in 1997.

DISCUSSION

American Avocets established a breeding colony at Avocet Marsh in Kelowna in 1997. The marsh offered apparently ideal breeding conditions by providing numerous tiny islands which the avocets used for nesting. Plentiful insect larvae provided a ready food source. Habitat at this site appeared suitable for expansion of this colony.

Campbell *et al.* (1990) considered avocets to be *rare* spring and summer visitants to the southern interior of the province, as of 1989. If avocets continue to nest in Kelowna, I suggest that their status be revised to *uncommon* spring and summer breeders in the southern interior. British Columbia breeding was overlooked in the range descriptions in two recent reviews of the biology of this species (Johnsgard 1981; Robinson *et al.* 1997), an omission made more significant by this 1997 nesting colony.

Unfortunately, plans to expand a landfill site at the north end of the marsh threaten to eliminate this site for potential future nestings (Weir 1997). As this species moves nesting areas in response to changing water levels (Sidle and Arnold 1982; Page and Gill 1994; Robinson *et al.* 1997), and widespread loss of wetlands in western North America may be resulting in an overall decline in avocet populations (Page and Gill 1994), retaining suitable marsh habitat for them in Kelowna may be essential if nesting is to continue in this province.

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