The Budgerigar in Florida:

Rise and Fall of an Exotic Psittacid

A typical Florida suburban scene, with a Budgerigar, native to Australia, perched in an Oleander (*Nerium oleander*), a plant native to the Mediterranean. This image was taken at one of the species's last strongholds in Florida, at Hernando Beach, Hernando County, on 5 April 2000. *Photograph by Peter S. Weber.*

Bill Pranty
Audubon of Florida
410 Ware Boulevard, Suite 702
Tampa, Florida 33619
(billpranty@hotmail.com)

Abstract

Since the 1950s, a population of Budgerigars (*Melopsittacus undulatus*) has been present along the Gulf coast of central Florida, established primarily from intentional releases of thousands of individuals. By the late 1970s, the number of Budgerigars in the region may have exceeded 20,000, and breeding was widespread in specially-built nest boxes. But within a few years, the population "crashed" and has not recovered. Since 1994, fewer than 100 Budgerigars have been reported on Christmas Bird Counts, and probably no more than 150-200 remain in Florida. Eventual extirpation seems likely. The causes of the population decline are unknown, but nesting competition with House Sparrows (*Passer domesticus*) may have been the primary influence. The sizes of Budgerigar populations formerly present along the Atlantic coast of Florida seem to have been exaggerated.

Introduction

Budgerigars (*Melopsittacus undulatus*) are small psittacids native to open habitats of the Australian interior (Forshaw 1977, Long 1981, del Hoyo et al. 1997, A.O.U. 1998, Juniper and Parr 1998). They are believed to be the most popular cagebird in the world, and have been bred in captivity in Europe since the 1840s (Forshaw 1977). Between 1925 and 1940, 240,000 Budgerigars were brought into the United States, with most of these "consigned" to California and Florida (Cooke and Knappen 1941). It is not clear whether these were wild-caught individuals imported from Australia, or were of captive-bred stock obtained from Europe. In the early 1960s, a "massive cottage industry" of private aviculturists producing Budgerigars had developed in the United States (Clubb 1992). Many of these aviculturists were located in west-central Florida, where the sub-tropical climate allowed large numbers of Budgerigars to be raised in screened porches and other outdoor enclosures. Not surprisingly, some Budgerigars escaped accidentally, while many others were released deliberately. Wholesale releases began in the 1950s (Lipp 1963, Edscorn 1977) and continued for an unknown number of years. Up to 3000 Budgerigars at a time reported-

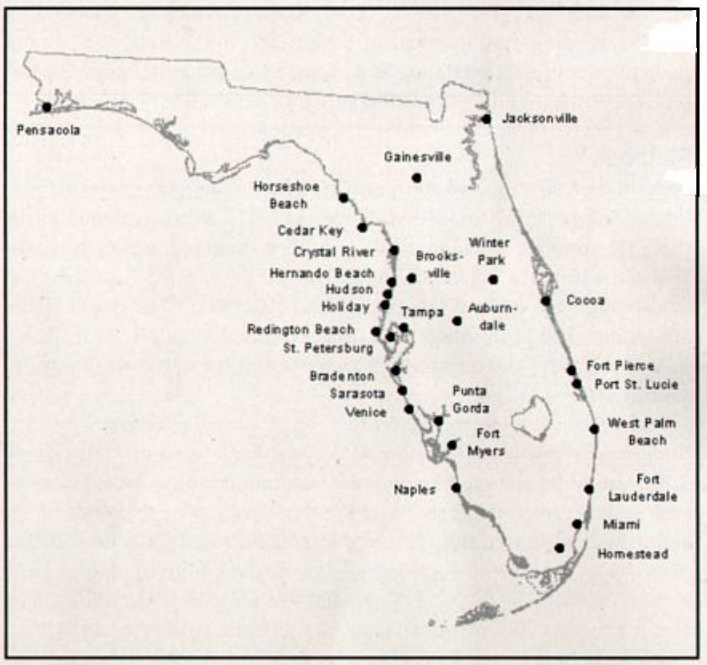

Figure 1. Map of Florida, showing most locales mentioned in the text that contain or contained Budgerigars. Of those sites not mapped, Shired Island is just east of Horseshoe Beach, Spring Hill is just east of Hernando Beach, New Port Richey is just north of Holiday, and Port Charlotte is just northwest of Punta Gorda. Zellwood is 35 km northwest of Winter Park. At their maximum established range in the late 1970s, Budgerigars were found in coastal areas from Hudson to Venice. They were not found in any substantial numbers more than 10 km inland, and in most areas were within 5 km of the Gulf of Mexico. Local escapees or releases were found widely elsewhere in Florida, and, except at Fort Lauderdale, these populations died out quickly. Today, Budgerigars are limited to Hernando Beach, and from Hudson to Holiday, and all individuals occur within 5 km of the Gulf coast.

ly were released (Shapiro 1979, Wenner and Hirth 1984), especially into the St. Petersburg area (Pinellas County), where they were considered a tourist attraction (Lipp 1963, Owre 1973, Shapiro 1979)! Once liberated, Budgerigars bred initially in natural and artificial cavities, but as the population grew, so did its popularity. Eventually, human residents (primarily retirees) provided Budgerigars with wooden nest boxes, which were used readily and nearly exclusively.

By the early 1970s, Budgerigars ranged along the Gulf coast of Florida from Hudson (Pasco County) to Venice (Sarasota County), a distance of 160 km (Fig. 1). Established populations were limited to residential developments directly along the coast (Shapiro 1979, 1980, Stevenson and Anderson 1994, pers. obs.) to five to 10 km inland (pers. obs.). Between the 1974-1975 and 1984-1985 Christmas Bird Count (C.B.C.) periods, over 1000 Budgerigars were reported annually in the region, peaking at 6895 individuals during the 1977-1978 count period (Table 1) But by the early 1980s, numbers of Budgerigars had declined drastically, and fewer than 100 individuals have been reported on C.B.C.s since the 1994-1995 count period (Table 1, Fig. 2). Furthermore, their range has contracted to about 30 km of coastline between Hernando Beach (Hernando County) and Holiday (Pasco County). Except for frequent reports of usually single individuals that probably represent recent escapees, Budgerigars now are extirpated from all other areas in Florida.

Despite their popularity, little is known about Budgerigars outside of captivity. Only a single, short-term study of their distribution and breeding biology has been undertaken in Florida (Shapiro 1979, 1980, 1981, Wenner and Hirth 1984). Here, C.B.C. and other data are analyzed to reassess the range and numbers of Budgerigars in the state, and to estimate the size of the population at its peak. Some potential causes for the severe reduction of the population also are discussed.

Methods

Prior to the 1960s, published information on Budgerigars in Florida was limited to a paper by Cooke and Knappen (1941), who mentioned solely that "[a] number" of individuals had been observed. Since the early 1960s, the primary sources of Budgerigar occurrence are C.B.C. data, a study conducted in 1978 (Shapiro 1979, 1980, 1981, Wenner and Hirth 1984), the Florida Breeding Bird Atlas Project, 1986-1991 (F. B. B. A.; Kale et al. 1992), and observations published in standard ornithological sources.

I searched all published Florida C.B.C.s since December 1960 for Budgerigar reports. In the online C.B.C. database (version 5.09) posted to the Audubon website <http://www.audubon.org/bird/cbc>, I discovered several errors, most seriously the transposition of the totals of 83 and 0 Budgerigars on the 1971 New Port Richey and Orlando C.B.C.s, respectively. Therefore, I copied all C.B.C. data from *Audubon Field Notes*, *American Birds*, *Field Notes*, and *Florida Field Naturalist* (1985 North Pinellas C.B.C.; Woolfenden et al. 1994). Except for the 1998 West Pasco C.B.C., on which 13 Budgerigars were found, rather than the "3" that were listed in *American Birds* (pers. obs.), all data were copied as published. I question the "705" Budgerigars reported on the 1974 Sarasota C.B.C., which is more than five times greater than the next-highest total for that C.B.C. (Table 1). Results of the 1976 New Port Richey C.B.C. were not published in *American Birds* and now are lost, and this affects Fig. 2. The New Port Richey C.B.C. was renamed in 1989 as the "West Pasco (New Port Richey)" C.B.C.; to avoid confusion, the name West Pasco C.B.C. will be used exclusively in this paper. C.B.C. compilers in Florida routinely suppress reports of certain exotics (e.g., Muscovy Duck, *Cairina moschata*; pers. obs.), but I have presumed that all Budgerigars seen on C.B.C.s were reported to count compilers and were published.

For her Master's degree, Anne Shapiro (Wenner) studied the

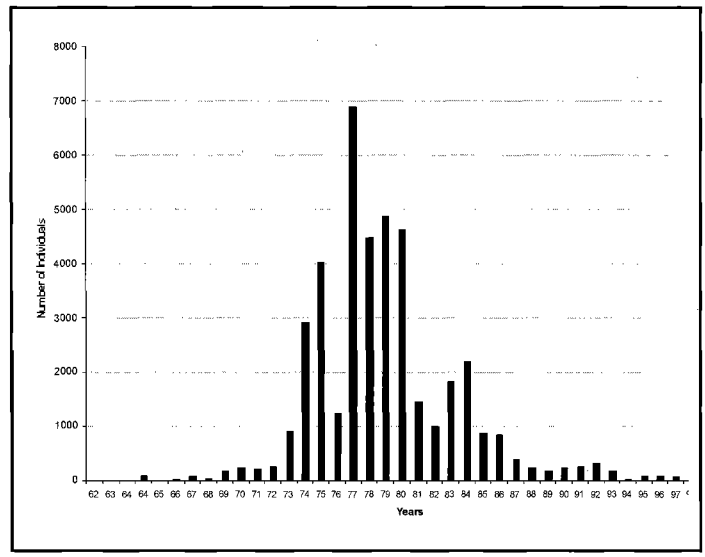

Figure 2. Budgerigars on Florida Christmas Bird Counts, 1962-2000. These data have not been adjusted by party hour or for any other factor. Results from the 1976 West Pasco C.B.C. were not published and now are lost. Sources: all Florida C.B.C.s published since 1961 in *American Birds*, *Audubon Field Notes*, *Field Notes*, and *Florida Field Naturalist*.

Budgerigar population at Holiday and New Port Richey for nine months in 1978. Two elements of her thesis were a mail survey and newsletter request to determine the range of Budgerigars in Florida, and a study of breeding individuals at Holiday. Shapiro never published her demography data outside of her thesis (Shapiro 1979), but her distribution data were published in a popular article (Shapiro 1980) and a formal paper (Wenner and Hirth 1984); a photo "essay" also was published (Shapiro 1981) In most cases, Shapiro used vague terms such as "common" and "abundant" when describing sizes of Budgerigar populations, rather than providing specific counts or estimates, and she did not reference C.B.C. data Shapiro received information on the location and numbers of Budgerigars from more than 50 observers, and the sizes of some populations reported to her, especially those along the Atlantic coast, seem to have been exaggerated.

Other references searched for observations of Budgerigars were *Audubon Field Notes* and its successors through *North American Birds* (greatly assisted by Loftin et al. 1991), *Florida Field Naturalist*, the database of the unpublished Florida Breeding Bird Atlas Project (Kale et al 1992), and two recent state bird books (Robertson and Woolfenden 1992, Stevenson and Anderson 1994). Several other books and book chapters published in the past 15 years contain information on Budgerigars in Florida, but these simply referenced (and occasionally misinterpreted) data published in Wenner and Hirth (1984). Recent observations of Budgerigars also were taken from three Internet lists: "Birdbrains" <http://birdbrains.listbot.com> (obsolete in July 2001), BIRDCHAT <birdchat@listserv.arizona.edu>, and "FLORIDABIRDS-L" <floridabirds-l@lists.ufl.edu>. A request for information posted to the Parrot Data E-mail Club <parrotdata@post4.tele.dk> maintained by Peter Them was forwarded to the Birding-Aus list <http://www.cse.unsw.edu.au/birding-aus>, which brought in several responses about Budgerigars in Australia. Participants of a survey of Monk Parakeets (*Myiopsitta monachus*) throughout Peninsular Florida and the Keys in 1999-2000 (Pranty in prep.) were asked to record all other psittacids seen, and the lack of Budgerigar observations was taken into account here.

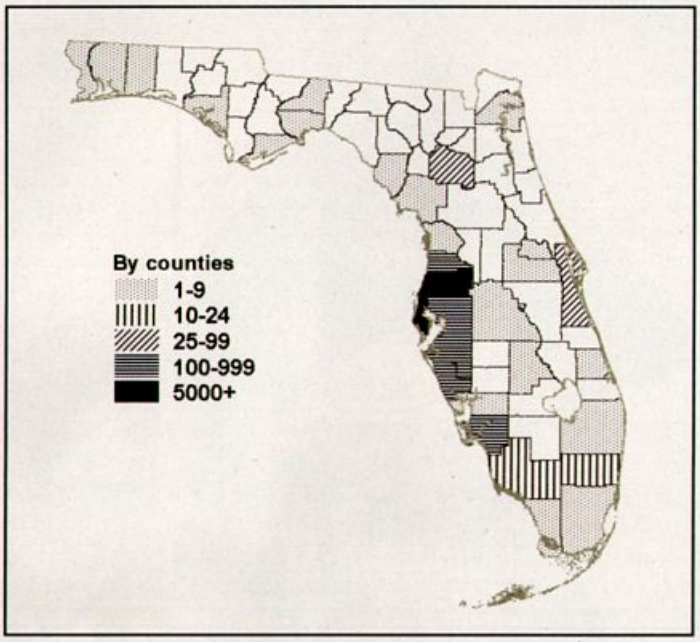

Figure 3. Distribution of Budgerigars in Florida, 1962-2001. Each of the 31 counties in which Budgerigars have been reported to occur are shaded according to the highest single count known, mostly obtained from C.B.C.s. For 20 (64%) of these counties, this total is less than 10 individuals. Four other counties each contained fewer than 100 birds. In only seven counties—all along the central Gulf coast, and with six of these adjacent—were more than 100 Budgerigars reported to occur. Pasco and Pinellas each contained more than 5000 Budgerigars; Robertson and Woolfenden (1992) referred to these counties as the species's "heartland." For counties along the southern Atlantic coast, I have used C.B.C. data to determine the highest totals, rather than the apparent anecdotal evidence published by Shapiro (1979, 1980) and Wenner and Hirth (1984).

Distribution

Cooke and Knappen (1941) were the first to mention Budgerigars in Florida, but they presented no data for locations, numbers of individuals, or years of occurrence. Since the 1960s, Budgerigars have been reported in 31 of the state's 67 counties (Fig. 3), but it was only along the Gulf coast of central Florida that populations exceeded 50 individuals and persisted for more than 15 years. Because the various populations have different histories, they are discussed separately.

Peninsular Gulf Coast

Budgerigars were first reported breeding at Redington Beach and elsewhere in Pinellas County in the 1950s (Lipp 1963, Stevenson 1963, Edscorn 1977, Robertson and Woolfenden 1992), and were considered locally common from Port Richey to Holiday (Pasco County) by 1963 (Dill 1981). They were first listed on a C.B.C. at St. Petersburg in December 1962, when six were reported, but the compiler noted that there were "hundreds now feral, nesting in tree cavities" (Woolfenden 1963). Shapiro (1979) suggested that Budgerigars may have first appeared at Fort Myers (Lee County) in the mid-1950s. Other Florida cities later colonized, through either population expansion or from independent releases, were Bradenton (Manatee County) by 1966, Sarasota and Venice (Sarasota County) by 1973, Tampa (Hillsborough County) in 1975, Bayonet Point/Hudson (Pasco County) by 1977, and Hernando Beach by 1991 (Table 1, pers. obs.).

C.B.C. data indicate that Budgerigars occurred regularly south to Venice, but during the 1970s, individuals were reported south of this locale, at Port Charlotte and Punta Gorda (Charlotte County; Edscorn 1977), Fort Myers and Sanibel Island (Lee County; Shapiro 1979, Wenner and Hirth 1984), and Naples (Collier County; Shapiro 1979, Wenner and Hirth 1984). However, none of these populations persisted into the 1980s. Shapiro (1979) stated that the Budgerigars seen at Fort Myers were captive individuals and free to "come and go at will" from open aviaries, and she made only vague reference to their breeding outside of captivity at that locale. Budgerigars were reported on only four Fort Myers C.B.C.s between 1973 and 1982, with the highest total of 37 individuals in December 1979 (Table 1). They were never reported on the Naples C.B.C., the Peace River C.B.C. (which includes all of Punta Gorda and some of Port Charlotte), or the Sanibel-Captiva C.B.C. (Table 1). Based on these data, it seems that Venice marked the southern limit of the Budgerigar's established range along the Gulf coast.

A few Budgerigars were reported north of Hudson, which in the 1960s and 1970s marked the northern limit of their established range. There are reports of one and two Budgerigars at Bayport (Hernando County) in the 1960s (Stevenson 1964, Pantelidis and Stevenson 1969), and four or fewer individuals at Shired Island and Horseshoe Beach (Dixie County; Ogden 1973, Robertson and Woolfenden 1992) and Cedar Key (Levy County; Edscorn 1976, Atherton and Atherton 1982, Table 1) in the 1970s and early 1980s. The F.B.B.A. documented "possible" breeding—presumably a single individual seen once—at Crystal River (Citrus County) in 1990 (Kale et al. 1992). With such low numbers and no evidence of population persistence,

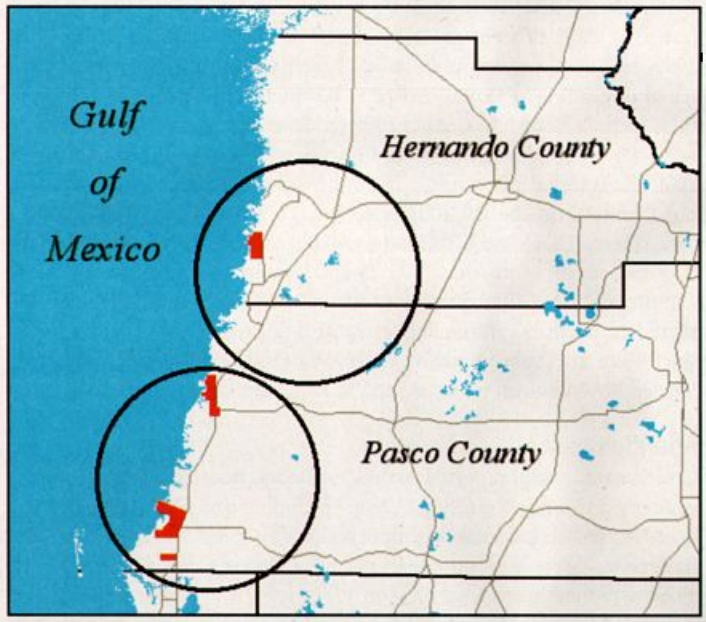

Figure 4. Current range (red areas) of the Budgerigar in Florida. Since the mid-1990s, Budgerigars have been restricted to small isolated "colonies" on or near the Gulf of Mexico in Hernando and Pasco counties. Circles for the Aripeka-Bayport (north) and West Pasco (south) C.B.C.s are shown; all known Budgerigars remaining in Florida occur within these two C.B.C. circles.

The two most reliable locations for Budgerigars are Hernando Beach and Bayonet Point. Hernando Beach is located along the Hernando County coast between County Roads 550 and 595. Budgerigars may be seen anywhere west of Shoal Line Boulevard between Eagle Nest Drive and Companero Entra, but recently they have been found most reliably along Gulfwinds Circle, accessed by heading west on Gulfview Drive and turning south at the "T," then angling back north. At Bayonet Point in Pasco County, Budgerigars roost with icterids and House Sparrows in trees at the junction of U.S. Highway 19 and State Road 52.

it seems likely that these Budgerigars were local escapees rather than individuals from established populations farther south. Shapiro (1979, 1980) and Wenner and Hirth (1984) reported "flocks" of Budgerigars at Spring Hill (Hernando County) apparently in the 1970s, and the F.B.B.A. documented "probable" and "confirmed" breeding at two sites there in 1988, including one site at least 20 km inland. However, the Spring Hill population never was again mentioned in print.

By the early 1980s, a decline in the range and numbers of Budgerigars along the Gulf coast was evident (Table 1, Fig. 2). During the F.B.B.A. (1986-1991), Budgerigars were "confirmed" to breed in the region in only Hernando, Hillsborough, Pasco, Pinellas, and Sarasota counties (Kale et al. 1992). They were not found at all by F.B.B.A. surveyors in Manatee County, although they persisted at Bradenton through December 1991 (Table 1). Budgerigars had colonized Hernando Beach by 1991 (Table 1), and these individuals also had been overlooked by F.B.B.A. surveyors.

Budgerigars were extirpated from Florida by the mid-1990s, except for coastal portions of Hernando and Pasco counties, where small numbers have persisted (Table 1, Fig. 4). A "colony" is present at Hernando Beach, and other individuals occur spottily from Hudson to Holiday. Both areas of current distribution are within C.B.C. circles, and C.B.C. data have been used to monitor these remnant populations. Since its inception in 1991, the Aripeka-Bayport C.B.C. has recorded a mean of 45 Budgerigars (range 8-137) at Hernando Beach, with counts of 30, 39, and 53 individuals in 1998, 1999, and 2000 respectively (Table 1). The Hernando Beach habitat occupied recently is less than 200 ha (pers. obs., B. Hansen pers. comm.). On the West Pasco C.B.C. since December 1990, a mean of 43 Budgerigars (range 11-60) has been seen, with counts of 13, 53, and 33 birds in 1998, 1999, and 2000 respectively (Table 1). Perhaps most of the Budgerigars remaining in Pasco County roost at Bayonet Point; recent counts from there include 52 on 5 December 1999 (K. Tracey *in* Pranty 2000), 92 on the fall 2000 North American Migration Count (N.A.M.C.) 16 September 2000 (K. Tracey pers. comm.), 25 on the C.B.C. 29 December 2000 (pers. obs.), and 45 on the fall 2001 N.A.M.C. 15 September 2001 (K. Tracey pers. comm.). Based on C.B.C. data and other recent observations, it seems that somewhat more than 100 Budgerigars remain in western Pasco County, and 50 or more exist in southwestern Hernando County. Outside these two counties, presumably escaped Budgerigars have been reported since 1999 in Hillsborough, Manatee, and Pinellas counties (J. Fisher, L. Snyder, M. Wilkinson in litt., A. and R. Paul pers. comm.).

Atlantic Coast

Cruickshank (1980) reported "scores" of Budgerigars "at scattered points" in Brevard County beginning in 1963, including one pair that apparently bred in an abandoned woodpecker cavity near Sharpes in 1968. Budgerigars were seen on five consecutive Cocoa C.B.C.s from 1971 to 1975, with the highest total of 11 in 1972 (Table 1). However, the Brevard individuals were not reported after 1975. There were reports that Budgerigars may have bred at Jacksonville (Duval County) in 1977 and previous years (Kale 1977), but these were never again mentioned (e.g., Jacksonville C.B.C.; Table 1), except for a single bird seen once in 1989 (Kale et al. 1992). Apparently from anecdotal information, Shapiro (1979) and Wenner and Hirth (1984) reported that Budgerigars were breeding at Fort Pierce and Port St. Lucie (St. Lucie County) and Fort Lauderdale (Broward County), and that flocks were "common" from north of Fort Pierce south to West Palm Beach (Palm Beach County) and at Miami (Miami-Dade County, formerly Dade County). Shapiro (1980) called the Budgerigar "abundant" at Fort Pierce and Fort Lauderdale.

C.B.C. data offer a different view of the sizes of Budgerigar populations along the lower Atlantic coast. For instance, since the 1960s only *two* Budgerigars have been found on Dade County C.B.C.s (singles in 1975 and 1994) and they have *never* been reported on the Fort Pierce C.B.C. or the West Palm Beach C.B.C. (Table 1). (Port St. Lucie mostly is outside the Fort Pierce C.B.C. circle). No subsequent reports of Budgerigars have been published for Fort Pierce, Port St. Lucie, or West Palm Beach. Budgerigars were reported on 10 Fort Lauderdale C.B.C.s from 1973 to 1988 inclusive, with the highest total of 11 individuals in December 1977 (Table 1).

During the F.B.B.A. (1986-1991), Budgerigars were found along the Atlantic coast only in Miami-Dade and Duval counties, where "possible" breeding was documented at Jacksonville and four sites from Miami Beach to Homestead (Kale et al. 1992); the individuals that persisted at Fort Lauderdale to at least December 1988 (Table 1) had been overlooked. Subsequent to the F.B.B.A., only single Budgerigars have been reported along the Atlantic coast: in the Fort Lauderdale area, at Pembroke Pines (Broward County), and in the Miami area (Table 1, Pranty and Epps in review, J. Boyd in litt.); most of these individuals were seen only once. The seven or eight Broward County individuals seen since 1998 were blue or yellow morphs, which suggests strongly that they were escapees (Pranty and Epps in review). Given the low numbers of Budgerigars seen on a few C.B.C.s in the region 10-25 years ago (Table 1), it seems that the previous assessments of "common" or "abundant" Budgerigar populations along the Atlantic coast were exaggerated. Whether Budgerigars ever bred in southeastern Florida is uncertain, although persistent reports on the Fort Lauderdale C.B.C.s (Table 1) suggest that breeding perhaps did occur.

Figure 5. A Budgerigar inspects a nest box at Hernando Beach, Hernando County, Florida, 5 April 2000. This paper suggests that competition with House Sparrows over such artificial cavities for nesting was a primary cause of the sharp decline of the Budgerigar in Florida. *Photograph by Peter S. Weber.*

Table 1. Numbers of Budgerigars listed on all published C.B.C.s in Florida

YEAR	C.B.C.s	Totals	AB	BD	CK	CR	FM	GC	NA	NP	PR	SA	SC	SP	TA	VE	WP	CO	DC	FL	FP	JA	WB	BC	BK	GA	LK	LP	LW	OR	PE
1962	1	6	nc	0	nc	nc	0	nc	nc	nc	nc	0	0	6	nc	nc	nc	0	nc	0	0	0	0	nc	nc	0	nc	nc	nc	nc	0
1963	1	10	nc	0	nc	nc	0	nc	0	nc	nc	0	0	10	nc	nc	nc	0	nc	0	0	0	0	nc	nc	0	nc	nc	nc	nc	0
1964	1	100	nc	0	nc	nc	0	nc	0	nc	nc	0	0	100	nc	nc	nc	0	nc	0	0	0	0	0	nc	0	nc	nc	nc	nc	0
1965	1	11	nc	0	nc	nc	0	nc	0	nc	nc	0	0	11	nc	nc	nc	0	nc	0	0	0	0	0	nc	0	0	nc	nc	nc	0
1966	2	32	nc	12	nc	nc	0	nc	0	nc	nc	0	0	20	nc	nc	nc	0	nc	0	0	0	0	0	nc	0	0	nc	nc	nc	0
1967	2	87	nc	7	nc	nc	0	nc	0	nc	nc	0	0	80	nc	nc	nc	0	nc	0	0	0	0	0	nc	0	0	nc	nc	0	0
1968	2	56	nc	28	nc	nc	0	nc	0	nc	nc	0	nc	28	nc	nc	nc	0	nc	0	0	0	0	0	nc	0	0	nc	nc	0	0
1969	2	184	nc	34	nc	nc	0	nc	0	nc	nc	0	0	150	nc	nc	nc	0	0	0	0	0	0	0	nc	0	0	nc	0	0	0
1970	3	237	nc	175	nc	nc	0	nc	0	nc	nc	0	0	50	nc	nc	12	0	0	0	0	0	0	0	nc	0	0	nc	0	0	0
1971	4	214	nc	80	nc	nc	0	nc	0	nc	nc	0	0	50	0	nc	83	1	0	0	0	0	0	0	nc	0	0	nc	0	0	0
1972	4	269	nc	152	nc	nc	0	nc	0	nc	nc	0	0	90	0	nc	16	11	0	0	nc	0	0	0	nc	0	0	nc	0	0	0
1973	9	912	nc	371	nc	nc	2	nc	0	nc	nc	20	0	100	0	64	345	6	0	3	0	0	0	0	nc	0	1	nc	0	0	0
1974	7	2910	nc	301	nc	nc	0	nc	0	nc	nc	705	0	1800	0	18	81	3	0	2	0	0	0	0	nc	0	0	nc	0	0	0
1975	8	4026	nc	470	nc	nc	0	nc	0	nc	nc	41	0	3000	cw	303	208	2	1	0	0	0	0	0	nc	0	0	nc	0	0	0
1976	6	1254	nc	360	nc	nc	0	nc	0	25	nc	84	0	250	10	521	nc	0	0	4	0	0	0	0	nc	0	0	nc	0	0	0
1977	7	6895	nc	nc	nc	nc	0	nc	0	700	nc	24	0	5400	115	174	470	0	0	11	0	0	0	0	nc	0	0	nc	0	1	0
1978	6	4478	nc	nc	nc	nc	0	nc	0	740	nc	13	0	3000	13	14	698	0	0	0	0	0	0	0	nc	0	0	nc	0	0	0
1979	7	4878	nc	nc	3	nc	37	nc	0	525	nc	40	0	3800	65	0	408	0	0	0	0	0	0	0	0	0	0	nc	0	0	0
1980	8	4632	nc	nc	0	nc	9	nc	0	150	nc	24	0	3100	2	2	1341	0	0	4	0	0	0	0	0	0	0	nc	0	0	0
1981	9	1460	nc	nc	0	nc	0	nc	0	160	nc	104	0	900	16	23	253	0	0	1	0	0	0	2	0	0	cw	nc	0	0	0
1982	9	1006	nc	3	0	nc	2	20	0	100	nc	2	0	750	4	28	97	0	0	0	0	0	0	0	0	0	0	nc	0	0	0
1983	11	1832	nc	12	0	nc	0	57	0	390	nc	36	0	570	40	104	600	0	0	5	0	0	0	0	17	0	0	nc	1	nc	0
1984	9	2191	nc	49	0	nc	0	25	0	122	nc	121	0	1700	47	23	102	0	0	2	0	0	0	0	0	0	0	nc	0	nc	0
1985	6	884	nc	0	0	nc	0	4	0	100	nc	0	0	610	1	44	125	0	0	0	0	0	0	0	0	0	0	nc	0	nc	0
1986	8	862	nc	19	0	nc	0	0	0	170	nc	3	0	310	6	133	220	0	0	1	0	0	0	0	0	0	0	nc	0	nc	0
1987	5	385	nc	0	0	0	0	0	0	3	0	0	0	135	5	52	190	0	0	0	0	0	0	0	0	0	0	0	0	nc	0
1988	9	241	nc	1	0	0	0	0	0	4	0	0	0	190	5	16	18	0	0	5	0	0	0	0	0	0	1	1	0	nc	0
1989	4	167	nc	12	0	0	0	0	0	12	0	0	0	127	0	0	16	0	0	0	0	0	0	0	0	0	0	0	0	nc	0
1990	6	238	nc	0	0	0	0	4	0	16	0	0	0	135	0	22	60	0	0	0	0	0	0	1	0	0	0	0	0	nc	0
1991	7	255	39	1	0	0	0	0	0	60	0	0	0	100	2	7	46	0	0	0	0	0	0	0	0	0	0	0	0	nc	0
1992	5	329	137	0	0	0	0	0	0	50	0	0	0	70	0	20	52	0	0	0	nc	0	0	0	0	0	0	0	0	nc	0
1993	4	177	44	0	0	0	0	0	0	60	0	0	0	13	0	0	60	0	0	0	nc	0	0	0	0	0	0	0	0	nc	0
1994	5	23	8	0	0	0	0	cw	0	0	0	0	0	2	0	0	11	0	1	0	0	0	0	0	0	0	0	0	0	nc	0
1995	2	90	36	0	0	0	0	0	0	0	0	0	0	0	0	0	54	0	0	0	0	0	0	0	0	0	0	0	0	nc	0
1996	3	85	29	0	0	0	0	0	0	11	0	0	nc	0	0	0	45	0	0	0	0	0	0	0	0	0	0	0	0	nc	0
1997	2	85	35	0	0	0	0	0	0	0	0	0	0	0	0	0	50	0	0	0	0	0	0	0	0	0	0	0	0	nc	0
1998	2	43	30	0	0	0	0	0	0	0	0	0	0	0	0	0	13	0	0	0	0	0	0	0	0	0	0	0	0	nc	0
1999	2	92	39	0	0	0	0	0	0	0	0	0	0	0	0	0	53	0	0	0	0	0	0	0	0	0	0	0	0	nc	0
2000	3	87	53	0	0	0	0	0	0	0	0	0	0	0	0	0	33	0	0	0	0	0	0	0	0	0	1	0	0	nc	0
		# Years	**10**	**18**	**1**	**0**	**4**	**6**	**0**	**19**	**0**	**13**	**0**	**33**	**15**	**18**	**30**	**5**	**2**	**10**	**0**	**0**	**0**	**2**	**1**	**0**	**4**	**1**	**1**	**1**	**0**

Some counts on which Budgerigars were never reported are included if they are mentioned in the text, or are located in a county in which Budgerigars were observed. Twenty C.B.C. circles listed Budgerigars at least once, beginning with St. Petersburg in December 1962. C.B.C.s are arranged by region, beginning with the Peninsular Gulf coast, then the Atlantic coast, and concluding with all other regions combined. Sources: C.B.C. issues of *Audubon Field Notes*, *American Birds*, and *Field Notes*, and Woolfenden et al. (1994) for the 1985 North Pinellas C.B.C. Counts are abbreviated and include the county or counties in which they occur (in italics): AB=Aripeka-Bayport (*Hernando* and *Pasco*; all Budgerigars in *Hernando*), BC=Bay County (*Bay*), BD=Bradenton (*Manatee*), BK=Brooksville (*Hernando*), CK=Cedar Key (*Levy*), CO=Cocoa (*Brevard*), CR=Crystal River (*Citrus*), DC=Dade County (*Miami-Dade*), FL=Fort Lauderdale (*Broward*), FM=Fort Myers (*Lee*), FP=Fort Pierce (*St. Lucie*), GA=Gainesville (*Alachua*), GC=Gulf Coast Manatee County (*Manatee*), JA=Jacksonville (*Duval*), LK=Lakeland (*Polk*), LP=Lake Placid (*Highlands*), LW=Lake Wales (*Polk*), NA=Naples (*Collier*), NP=North Pinellas (*Pinellas*), OR=Orlando (*Orange*), PE=Pensacola (*Escambia* and *Santa Rosa*), PR=Peace River (*Charlotte*), SA=Sarasota (*Sarasota*), SC=Sanibel-Captiva (*Lee*), SP=St. Petersburg (*Pinellas*), TA=Tampa (*Hillsborough*), VE=Venice-Englewood (mostly *Sarasota* but some *Charlotte*), WB=West Palm Beach (*Palm Beach*), and WP=West Pasco (known as the New Port Richey C.B.C. until 1989; *Pasco*). A "0" (zero) indicates that no Budgerigars were seen; "nc" indicates that no count was published for that year. For birds reported during count week (cw), one individual is counted in the yearly totals. The report of "705" Budgerigars on the 1974 Sarasota C.B.C. is considered questionable here.

Elsewhere in Florida

Away from the Peninsular coasts, Budgerigars have been observed widely in Florida, usually in very low numbers (Fig. 3), beginning in 1971 (Robertson 1972). Counties in which only one to four non-breeding individuals have been reported will not be discussed further. The largest number of Budgerigars found inland was at Gainesville (Alachua County), where "30 or more" were reported in the late 1970s (Shapiro 1979, Wenner and Hirth 1984). However, this population apparently disappeared quickly; Budgerigars were never listed on Gainesville C.B.C.s (Table 1), nor were they mentioned by Rowan and Manetz (1995). Rowan (in prep.) added only one other Alachua County occurrence: a single individual seen once in 1996. The "small colonies" of Budgerigars present at Winter Park (Orange County) presumably in the 1970s (Shapiro 1979, Wenner and Hirth 1984) also apparently vanished quickly; the Orlando C B C., which contained this area, listed only a single bird in 1977 (Table 1) The five individuals at Zellwood (Orange County) in 1972 (Ogden 1972) never were again mentioned. An anomalous report of 13 Budgerigars was listed on the 1983 Brooksville C.B.C. (Hernando County), the center of which is 32 km from the Gulf coast. This report, the highest inland C.B.C. total in Florida, and the only one for the Brooksville C.B.C. (Table 1), seems perhaps equally likely as referring to birds at Spring Hill (a small portion occurs within the circle), locally escaped or released individuals seen elsewhere, or even a data entry error. The F.B.B.A. "confirmed" Budgerigars breeding at Auburndale (Polk County) in 1987 (Kale et al. 1992), but high counts on nearby C.B.C.s at Lakeland and Lake Wales are one individual each (Table 1). Fewer than 20 Budgerigars have been found in Polk County since the 1960s (C. Geanangel in litt.). Perhaps no more than one pair of Budgerigars bred in a nest box at Pensacola (Escambia County) around 1991 (D. Ware *in* Stevenson and Anderson 1994, D. Ware in litt.); these were neither reported on Pensacola C.B.C.s (Table 1) nor mentioned by Duncan and Duncan (2000).

Natural History

Despite their abundance in Australia and (formerly) Florida, little is known about the life history of Budgerigars outside of captivity. The Budgerigars in west-central Florida represent the only exotic population that has become established, even though individuals have been liberated in many regions of the world. From deliberate releases and accidental escapes, Budgerigars have been reported in Brazil, Canada, Colombia, Hong Kong, Japan, New Zealand, Oman, Puerto Rico, the Society Islands, South Africa, Switzerland, Tasmania, the United Kingdom, and several U S states including California, Hawaii, and New York (Long 1981, A O U. 1998, Juniper and Parr 1998, e.g., Bannon et al. 2001).

Demography.—Shapiro's (1979) study of breeding Budgerigars at Holiday is the sole source of demography data for Florida. She monitored 31 nest boxes daily from 16 April to 15 December 1978, and added 22 boxes to the study in June to replace those abandoned by Budgerigars or usurped by House Sparrows (*Passer domesticus*). Monitoring of seven boxes was discontinued at the request of property owners. Budgerigar pairs were believed to be monogamous and often defended nest boxes for "several" months before and after the breeding season. The first nesting attempt commenced in mid-March, and the last eggs were laid in mid-November. Nesting was initiated mostly in June and August. Eighty monitored pairs of Budgerigars produced 947 eggs in 168 clutches, including 46 eggs from the seven boxes later eliminated from the study. Of the 901 eggs with known fates, 384 (42%) failed to hatch, 142 (15%) hatched but the nestlings died before fledging, and 375 (41%) produced fledglings. Clutch size ranged from one egg to 12 eggs, with a mean of 5.8 eggs. Ninety-five (65%) of 145 clutches monitored through the nesting cycle produced at least one fledgling. Causes of clutch failure included infertility, embryo death, lack of incubation, desertion, parental destruction, destruction of one clutch by a Red-bellied Woodpecker (*Melanerpes carolinus*), and destruction of several clutches by House Sparrows. Average time from egg laying to fledging for successful nests was 52.5 days, and the next clutch often was initiated up to 10 days before the final nestling of the previous brood had fledged. Twelve banded females monitored for the duration of the study produced between two and six clutches each, with a mean of 3.7 clutches. Most nestling mortality was attributed to starvation or illness, but some nestlings were "pecked to death;" it was not known whether these were killed by their parents, other Budgerigars, or other species. Only two instances of predation of adults or juveniles were observed: one by a house cat (*Felis domesticus*) and the other by a Red-shouldered Hawk (*Buteo lineatus*).

Unrelated to Shapiro's study, a Sharp-shinned Hawk (*Accipiter striatus*) captured a Budgerigar from a feeder at Bayonet Point ca. 1979 (pers obs.), and another Sharp-shinned Hawk at Bayonet Point attacked a flock of 6 Budgerigars 15 Sep 2001 (K. Tracey in litt.). Since that time, Tracey (in litt.) has observed Merlins (*Falco columbarius*) attempt to capture Budgerigars on several occasions.

Movements.—In Australia, Budgerigars are well-known for their nomadic behavior, moving from site to site, often in large flocks, in response to changing environmental conditions (Forshaw 1977, Long 1981, del Hoyo et al. 1997, Juniper and Parr 1998). Several authors (Shapiro 1979, 1980, Wenner and Hirth 1984, Juniper and Parr 1998) have stated that the Budgerigars in Florida exhibited similar nomadic tendencies, but supporting data seem to be lacking. Indeed, the absence of large numbers of Budgerigars in Florida except along the immediate Gulf coast (e.g., Fig. 3) suggests that the low numbers seen elsewhere were local escapees, and may further suggest that populations along the central Gulf coast largely were sedentary. In sharp contrast to Budgerigars occupying often arid regions of Australia, their counterparts in suburban west-central Florida had essentially limitless, dependable, and year-round water and food resources at their disposal (Shapiro 1979, 1980, 1981, Wenner and Hirth 1984). Combined with abundant nesting sites provided nearby (often in the same yards), dozens of bird feeders and bird baths present in residential neighborhoods may have eliminated the need for Budgerigars in Florida to travel widely in search of food and water. Nevertheless, limited movements (ca. 5 km) were known to occur during the winter, as some birds left breeding areas to join communal roosts nearby (Shapiro 1979).

Food.—In Australia, Budgerigars feed primarily on grass seeds, with 39 species identified in one study (del Hoyo et al. 1997); commercial grain crops occasionally are depredated (del Hoyo et al. 1997, Juniper and Parr 1998). Feeding habits of Budgerigars in Florida have never been studied, but observations suggest that commercial bird seed is their primary food (Shapiro 1979, 1980, Wenner and Hirth 1984). Stevenson and Anderson (1994) added "weed and grass seeds" taken from "upper beaches and sandy lots," and thought that sown lawn grass seeds probably were eaten. Wenner and Hirth (1984) noted that Budgerigars fed on seeds of bahiagrass (*Paspalum*), but these were "rare events."

Population Size

Shapiro (1979, 1980) and Wenner and Hirth (1984) monitored a Budgerigar roost in a residential development at Holiday from April through December 1978. They estimated that 6000 to 8000 birds used this roost "consistently" during that period, which may strengthen the hypothesis that Budgerigars in Florida mostly were sedentary. Shapiro's estimate of up to 8000 Budgerigars at the Holiday roost is the largest total reported in Florida, surpassing even all multi-party C.B.C. totals (Table

1) The Holiday roost, which apparently no longer is active, was within the West Pasco C.B.C. circle, in which only 698 Budgerigars were found in December 1978 (Table 1)—no more than 11% of the numbers Shapiro estimated from the Holiday roost! Despite this apparently severe undercount, C.B.C. data offer the only means of determining the size of the overall Budgerigar population in Florida. To the figure of up to 8000 Budgerigars found within the West Pasco C.B.C. circle are added high counts from other regional C.B.C.s. Maximum counts for the two Pinellas County C.B.C.s (North Pinellas and St. Petersburg) were 740 and 5400, respectively. The highest count from the Tampa C.B.C. was 115 individuals, while Manatee County C.B.C.s (Bradenton and Gulf Circle Manatee County) peaked at 470 and 57 Budgerigars, respectively. If the report of "705" Budgerigars on the 1974 Sarasota C.B.C. is discounted, then Sarasota County C.B.C.s (Sarasota and Venice-Englewood) contained up to 121 and 521 individuals, respectively. These totals add up to nearly 15,500 Budgerigars within eight coastal C.B.C. circles in a five-county area (Table 1). High totals on these C.B.C.s were obtained between 1975 and 1984, with most occurring during the 1976-1977 and 1978-1979 count periods. The highest cumulative C.B.C. total (6895 individuals) was obtained during the 1977-1978 count period (Table 1).

Nearly all areas along the central Gulf coast of Florida occupied by Budgerigars were within C.B.C. circles, except for a substantial portion of mid-Pinellas County. This area, especially barrier island communities between Clearwater Beach and Redington Beach, contained many Budgerigars that never were counted on C.B.C.s. Lipp (1963) claimed that "thousands" of Budgerigars were present in one mobile home development at Redington Beach. While this estimate likely is an exaggeration, the presence of large numbers of Budgerigars on the barrier islands have been confirmed by others (Dill 1981, L. Atherton in litt., W. Biggs pers. comm.). When these individuals are added to the nearly 15,500 Budgerigars accounted for within C.B.C. circles, and further considering that large numbers may have been overlooked during C.B.C.s (e.g., see above), it seems reasonable to conclude that 20,000 or more Budgerigars may have occupied the central Gulf coast of Florida at the height of their abundance in the late 1970s.

Currently, Budgerigars are restricted to small portions of Hernando and Pasco counties (Fig. 4), and cumulative totals on C.B.C.s have numbered fewer than 100 individuals since the 1994-1995 count period (Table 1) All habitat at Hernando Beach is surveyed on the Aripeka-Bayport C B C , and it is thought that nearly all Budgerigars are counted (pers. obs) A few small "colonies" may be overlooked on West Pasco C.B.C.s because of their more extensive range within that count circle; the non-C B C total of 92 Budgerigars on the fall 2000 N.A.M.C. was mentioned previously. Probably no more than 150-200 Budgerigars remain in Hernando and Pasco counties, a figure that represents a greater than 99% decline in their rangewide numbers since the late 1970s. The extirpation of Budgerigars from Pinellas County is especially noteworthy because several thousand individuals occurred there previously (Table 1). Populations in Pasco County, while still extant, have declined severely in the past 15 to 20 years. Curiously, the number of Budgerigars reported on Florida C.B.C.s has remained relatively stable since the 1995-1996 count period, with a mean of 80 individuals (range 43-92; Table 1, Fig. 2). Nevertheless, the eventual extirpation of Budgerigars from Florida seems likely

Population Fluctuation

C B C data show a huge population increase during the mid-1970s, and a similarly dramatic decline through the 1980s (Fig. 2). Determining the causes of these fluctuations probably is impossible because the population was not under study during these periods, and published data (i.e., those on C.B.C.s) are limited to the non-breeding season. Cumulative totals for all C.B.C.s increased more than 1000% in two years, rising from 269 birds during 1972-1973 to 2910 individuals during 1974-1975 (Table 1) Most of this increase occurred at St. Petersburg, where numbers exploded from 90 to 1800 birds (Table 1). This huge increase over a short period suggests that releases of large numbers of Budgerigars may have continued into the mid-1970s.

Perhaps even less certain than the causes of the population increase are the causes of its decline. Cumulative totals on C.B.C.s plummeted from 6895 Budgerigars during 1977-1978 to 385 birds ten years later (Table 1, Fig. 2). Potential causes of this decline include severely cold weather, nest box usurpation by House Sparrows, nest cavity usurpation by European Starlings (*Sturnus vulgaris*), a reduction in the number of nest boxes provided, disease or epizootic (Hoffman 1995), a "boom-and-bust" cycle characteristic of populations of several other exotic birds, and perhaps several other "unaccountable" factors (Robertson and Woolfenden 1992). C.B.C. data show that Budgerigar populations built up steadily through the late 1960s and early 1970s, peaked in the late 1970s, then rapidly declined through the 1980s to (in most cases) extirpation by the early or mid-1990s (Table 1, Fig. 2). *Every* C.B.C. circle active during that period shows this trend, which suggests that the population decline was rangewide and synchronous. The following section discusses five potential causes of the Budgerigar's decline in Florida

Winter freezes.—A popular theory of the Budgerigar's disappearance from most of its Florida range relates to the freezes that affected the central Peninsula during the period of the population decline. Between 1970 and 1999, four "extremely severe freezes" were recorded in the region: in January 1977, December 1983, January 1985, and December 1989 (Henry et al. 1994, R. Paul pers. comm.). Temperatures at Tampa dropped as low as -4° C during December 1989 (Henry et al 1994) However, C.B.C. data show no Budgerigar declines in the years following three of these freezes; in fact, the highest cumulative C.B.C. total was obtained 11-12 months *after* the January 1977 freeze (Table 1, Fig 2) Only following the January 1985 freeze do subsequent C.B.C. totals reflect a noticeable decline in Budgerigar numbers (Fig. 2). But the apparent lack of effects of the three other freezes, coupled with the downward trend already obvious in the population by the mid-1980s (Fig. 2), suggests that any link between the January 1985 freeze and declining Budgerigar numbers is only a coincidence.

Several other points seem to rule out freezing temperatures as a cause of the Budgerigar's decline. The first is that cold temperatures rarely cause direct mortality of birds; a lack of food—often caused by extreme weather events (e.g., sudden freezes or heavy snow cover)—is more often the culprit. Second, Budgerigars routinely experience near-freezing or freezing temperatures at night in Australia (R. Jack, L. Joseph, A. Burton, A. Overs in litt.), so they can tolerate cold temperatures to some degree Third, given their high rate of reproduction in Florida (Shapiro 1979, 1980), it seems likely that the Budgerigar population would have rebounded in the 1990s following the freeze in December 1989. A similar weather-related cyclic pattern is shown by Carolina Wrens (*Thryothorus ludovicianus*) in the northern limits of their range (Haggerty 1995). And fourth, all Budgerigars remaining in Florida are found in the two northernmost counties of their previous range, where temperatures are a few degrees lower than areas to the south (e g , Hudson vs. Sarasota areas; Henry et al. 1994). If freezing temperatures caused the decline of Budgerigars, then one might have expected the northernmost population to have disappeared first, when in fact, it is the only one that has persisted.

Cavity competition.—Budgerigars in Florida have nested in natural and artificial cavities such as snags (Woolfenden 1963, Shapiro 1979,

1981, Cruickshank 1980, L. Atherton in litt., W. Biggs pers. comm.), davits (cranes used to lower and raise boats; Shapiro 1979, 1981, D. Freeman in litt., M. Wilkinson in litt.), street lamps (Shapiro 1979, 1981), and axils of Cabbage Palms (*Sabal palmetto*; G.E. Woolfenden *in* Stevenson 1963), but the majority of the population used custom-built "Budgie boxes." The small cavity entrance of these boxes kept out European Starlings, but House Sparrows could enter easily (cf. Fig. 5). Wenner and Hirth (1984) noted that Budgerigars at Holiday were "heavily dependent" on nest boxes, and that House Sparrows were their only competitor for this resource. Shapiro (1979) observed "many instances" when House Sparrows entered nest boxes occupied by Budgerigars, punctured and removed the eggs, and usurped the box. House Sparrows continue to compete with Budgerigars over nest boxes, and some residents at Holiday have reported local extirpations of Budgerigars due to House Sparrows as recently as 1999 (*fide* K. Tracey). The percentage of Budgerigars that bred in natural cavities in Florida is unknown, but probably it was a small fraction of those that nested in boxes. Budgerigars that nested in natural cavities apparently could not compete successfully with European Starlings (L. Atherton in litt., W. Biggs pers. comm.), which increased as a breeding species in Florida between 1969 and 1983 (Cox 1987). All published observations of Budgerigars nesting in natural cavities were in the 1960s and 1970s.

Reduction of nest boxes.—Probably every breeding population of Budgerigars in Florida was sustained by human residents who derived great satisfaction in having the birds nest and feed in their yards (Shapiro 1979, 1980, Wenner and Hirth 1984). Many residents provided multiple "apartment" nest boxes where a dozen or more pairs could breed simultaneously (photographs *in* Shapiro 1981). At least one Budgerigar population, at Madeira Beach on the barrier island in mid-Pinellas County, was impacted by a reduction in the number of residents who provided nest boxes. Redevelopment of this area from a retirement community to tourist-oriented motels and condominiums drove away the elderly residents who lived there, and this caused extirpation of the local Budgerigar population (L. Atherton in litt.). At Holiday and New Port Richey today, few yards still contain Budgerigar nest boxes (pers. obs), undoubtedly because the birds largely have vanished from those areas.

Disease or epizootic.—Price (1980 *in* Friend et al. 2001) claimed that, " parasites affect the life and death of practically every other organism." Nolan et al. (1998) estimated that *tens of millions* (emphasis added) of House Finches (*Carpodacus mexicanus*) were killed in the eastern United States by an outbreak of mycoplasmal conjunctivitis between 1994 and 1996. Friend et al. (2001) summarized 31 examples of diseases causing mortality of birds and other wildlife around the world. Budgerigars are known vectors of numerous diseases such as chlamydiosis ("parrot fever"), salmonellosis, and Newcastle disease (references *in* Shapiro 1979). In Florida, Budgerigars roosted in large flocks, often with other species such as Mourning Doves (*Zenaida macroura*), American Robins (*Turdus migratorius*), European Starlings, and icterids (Shapiro 1979, 1981, Dill 1981, Wenner and Hirth 1984, pers. obs.), so the potential for widespread transmission of diseases or parasites was great. Hoffman (1995) believed that disease played a role in the Budgerigar's decline in Florida, but there seems to be no direct evidence to support this theory. One might have expected that numbers of "sick" or dead Budgerigars would have been noticed by the human residents in whose neighborhoods the birds roosted, bred, and fed. For example, a die-off of 100 Eurasian Collared-Doves (*Streptopelia decaocto*) at St. Petersburg in June 2001, attributed to a pathogen, was publicized in the press (e.g., Hollingsworth 2001). No similar report of Budgerigar deaths in Florida is known to have been published (e.g., Stevenson and Anderson 1994).

"Boom and bust."—Populations of several exotic birds in North America have shown a rapid increase followed by a decline to, in some cases, extirpation. In southeastern Florida, populations of the Canary-winged [now White-winged] Parakeet (*Brotogeris versicolurus*) and Spot-breasted Oriole (*Icterus pectoralis*) declined in the late 1970s and early 1980s (Robertson and Woolfenden 1992, Smith and Smith 1993, Brightsmith 1999), which corresponds with the period of the Budgerigar's decline in west-central Florida. The decline of the oriole was attributed to freeze-related damage to fruiting plants on which the orioles fed (Robertson and Woolfenden 1992), but no clear cause was evident for the decline of White-winged Parakeets (Robertson and Woolfenden 1992, Smith and Smith 1993, Brightsmith 1999). Garrett (1993) noted a similar decline of White-winged Parakeets in southern California during the same period. Crested Mynas (*Acridotheres cristatellus*) at Vancouver, British Columbia declined from many thousands of individuals in the 1920s and 1930s to fewer than 100 by the mid-1990s (Johnson and Campbell 1995). The causes of the myna's decline were thought to be increased competition with European Starlings for nesting sites, loss of agricultural foraging areas from development, maladaptation to the local climate, and a reduction of nesting sites due to changes in building structures (Johnson and Campbell 1995).

Conclusion

Because the size of the Budgerigar population has remained severely depressed since the freeze in December 1989, some factor other than weather probably caused the decline and continues to keep numbers low. This factor could be competition for resources. Availability of food was probably never a limiting factor for Budgerigars, as they and other granivorous species of heavily suburbanized areas (primarily doves, icterids, and House Sparrows) were provided with a virtually limitless supply of commercial bird seed at many feeders (Shapiro 1979, 1980, 1981, Wenner and Hirth 1984). Competition over nesting sites may have been the primary cause of the Budgerigar's decline and may be the factor that has prevented the population from recovering. Competition with House Sparrows over nest boxes is the only potential cause of the Budgerigar's population decline that is supported by Shapiro's (1979) demographic study.

Acknowledgments

Numerous individuals responded to my requests for information on Budgerigar occurrences in Australia or Florida, and I thank them here Lyn Atherton, Wes Biggs, Allison Bishop, John Boyd, Andy Burton, Judy Caughley, Judy Fisher, Frank Frazier (deceased), Dot Freeman, Chuck Geanangel, Bev Hansen, Rhetta Jack, Leo Joseph, Katrina Knight, Anthony Overs, Ann and Rich Paul, Hugo Phillipps, Don Robinson, Roland Seitre, Lee Snyder, Don Ware, Margie Wilkinson, Stewart Williamson, and especially Ken Tracey. Those who provided other assistance or comments were Enrique Bucher, Sally Conyne, Karen Mabb, John O'Neill, Rich Paul, and Peter Them. Bruce Anderson, Wes Biggs, Ann Bruce, Todd Engstrom, Doug McNair, Sally Treat, Annamaria Van Doorn, and George Wallace provided copies of important references I am most grateful to Ned Brinkley, Kimball Garrett, Stephanie Johnson, Paul Lehman, Doug McNair, Michael Patten, George Wallace, and especially P. William Smith for improving drafts of the manuscript. I thank Dave Goodwin, Al and Bev Hansen, Don Robinson, Don Woodard, and Paul Young for their long-term participation in the Aripeka-Bayport and West Pasco C.B.C.s, which has helped to document changes in the Budgerigar population. Finally, I am grateful to my parents, Holly Lovell for support, and to Glen Woolfenden and the late Herb Kale for improving my writing.

Literature cited

AOU [American Ornithologists' Union]. 1998. *Check-list of North American Birds.* Seventh edition. American Ornithologists' Union, Washington, D.C.

Atherton, L.S., and B.H. Atherton. 1982. Florida region [Fall 1981 report]. *American Birds* 36: 168-171.

Bannon, P., S. Denault, Y. Aubrey, and N. David. 2001. Quebec [Fall 2000 report]. *North American Birds* 55: 23-25.

Brightsmith, D. 1999. White-winged Parakeet (*Brotogeris versicolurus*) and Yellow-chevroned Parakeet (*Brotogeris chiriri*). *In* The Birds of North America, No. 386-387 (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia.

Clubb, S.L. 1992. The role of private aviculture in the conservation of Neotropical psittacines. Pages 117-131 in *New World Parrots in Crisis: Solutions from Conservation Biology* (S.R. Beissinger and N.F.R. Snyder, eds.). Smithsonian Institution Press, Washington, D.C.

Cooke, M.T., and P. Knappen. 1941. Some birds naturalized in North America. Transactions of the fifth North American Wildlife Conference 5: 176-183.

Cox, J 1987. The Breeding Bird Survey in Florida: 1969-1983. *Florida Field Naturalist* 15: 29-44.

Cruickshank, A.D. 1980. *The Birds of Brevard County.* Florida Press, Orlando.

del Hoyo, J., A. Elliott, and J. Sargatal, eds. 1997. *Handbook of Birds of the World, Vol. 4, Sandgrouse to Cuckoos.* Lynx Edicions, Barcelona.

Dill, G. 1981. Tracing the roots of the Suncoast free-flying Budgie. *Suncoast News,* 25 April 1981.

Duncan, R.A., and L.R. Duncan 2000. *The Birds of Escambia, Santa Rosa, and Okaloosa Counties, Florida.* Second edition. Self-published.

Edscorn, J.B. 1976. Florida region [Fall 1975 report]. *American Birds* 30: 54-59.

Edscorn, J.B. 1977. Florida region [Fall 1976 report]. *American Birds* 31: 166-169.

Forshaw, J.M. 1977. *Parrots of the World.* Second edition. T.F.H. Publications, Inc., Neptune, New Jersey.

Friend, M., R.G. McLean, and F.J. Dein. 2001. Disease emergence in birds: challenges for the twenty-first century. *Auk* 118: 290-303.

Garrett, K.L. 1993. Canary-winged Parakeets: the southern California perspective. *Birding* 25: 430-431.

Haggerty, T.M. 1995. Carolina Wren (*Thryothorus ludovicianus*). *In* The Birds of North America, No. 188. (A. Poole and F. Gill, eds.) Philadelphia, Academy of Natural Sciences, and Washington, D.C., American Ornithologists' Union.

Henry, J.A., K.M. Portier, and N. Coyne. 1994. *The Climate and Weather of Florida.* Pineapple Press, Sarasota.

Hoffman, W. 1995. Exotic birds in the avifauna. *Birding* 27: 15-20.

Hollingsworth, J. 2001. Mysterious malady killing St. Petersburg area doves. *Tampa Tribune,* 7 June 2001.

Johnson, S.R., and R.W. Campbell. 1995. Crested Myna (*Acridotheres cristatellus*). *In* The Birds of North America, No. 157 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia, PA, and The American Ornithologists' Union, Washington, D.C.

Juniper, T., and M. Parr. 1998. *Parrots: A Guide to Parrots of the World.* Yale University Press, New Haven, CT.

Kale, H.W., II. 1977. Florida region [Spring 1977 report]. *American Birds* 31 988-992.

Kale, H.W., II, B. Pranty, B.M. Stith, and C.W. Biggs. 1992. The Atlas of the Breeding Birds of Florida. Final report to Nongame Wildlife Program, Florida Game and Fresh Water Fish Commission, Tallahassee.

Lipp, F. 1963. Parakeet city—a tourist attraction. *Florida Naturalist* 36(1B): 1. [*Not found*].

Loftin, R.W., G.E. Woolfenden, and J.A. Woolfenden. 1991. Florida bird records in *American Birds* and *Audubon Field Notes* (1947-1989) Species index and county gazetteer. Florida Ornithological Society Special Publication No. 4, Gainesville.

Long, J.L. 1981. *Introduced Birds of the World: The Worldwide History, Distribution, and Influence of Birds Introduced to New Environments* A.H. & A.W. Reed Pty. Ltd., Sydney.

Nolan, P.M., G.E. Hill, and A.M. Stoehr. 1998. Sex, size, and plumage redness predict House Finch survival in an epidemic. Proceedings of the Royal Society of London, Series B 265: 961-965.

Ogden, J.C. 1972. Florida region [Summer 1972 report]. *American Birds* 26: 847-852.

Ogden, J.C. 1973. Florida region [Summer 1973 report]. *American Birds* 27: 859-863.

Owre, O.T. 1973. A consideration of the exotic avifauna of southeastern Florida. *Wilson Bulletin* 85: 491-500.

Pantelidis, V.S., and H.M. Stevenson. 1969. Florida region [Spring 1969 report]. *Audubon Field Notes* 23: 581-583.

Pranty, B. 2000. Field observations winter report: December 1999-February 2000. *Florida Field Naturalist* 28: 127-137.

Pranty, B. In prep. Abundance and distribution of the Monk Parakeet in Florida.

Pranty, B., and S. Epps. In review. The exotic parrot fauna of Broward County, Florida.

Robertson, W.B., Jr. 1972. Florida region [Fall 1971 report]. *American Birds* 26: 50-54.

Robertson, W.B., Jr., and G.E. Woolfenden. 1992. *Florida Bird Species An Annotated List.* Florida Ornithological Society Special Publication No. 6, Gainesville.

Rowan, R. In prep. An annotated checklist of the birds of Alachua County, Florida: A historical perspective, 1886-2001.

Rowan, R., and M. Manetz. 1995. *A Birdwatchers' Guide to Alachua County, Florida.* Self-published.

Shapiro, A.E. 1979. Status, habitat utilization, and breeding biology of the feral Budgerigar (*Melopsittacus undulatus*) in Florida. M Sc Thesis, University of Florida, Gainesville.

Shapiro, A.E. 1980. Florida's Budgies are here to stay. *Florida Naturalist* 53(3): 7-9.

Shapiro, A.[E]. 1981. Melopsittacus undu-WHAT? *Florida Wildlife* 34(6):28-30.

Smith, P.W., and S.A. Smith. 1993. An exotic dilemma for birders the Canary-winged Parakeet. *Birding* 25: 426-430.

Stevenson, H.M. 1963. Florida region [Summer 1963 report]. *Audubon Field Notes* 17: 454-457.

Stevenson, H.M. 1964. Florida region [Summer 1964 report]. *Audubon Field Notes* 18: 503-505.

Stevenson, H.M., and B.H. Anderson. 1994. *The Birdlife of Florida* University Press of Florida, Gainesville.

Wenner, A.S., and D.H. Hirth. 1984. Status of the feral Budgerigar in Florida. *Journal of Field Ornithology* 55: 214-219.

Woolfenden, G.[E.] 1963. St. Petersburg, Fla. [1962-1963 Christmas Bird Count]. *Audubon Field Notes* 17: 166-167.

Woolfenden, G.E., B. Pranty, and R.D. Goodwin. 1994. North Pinellas Christmas Bird Count, 1985. *Florida Field Naturalist* 22: 83-84

—Received 20 June 2001, accepted 20 November 2001.