

## **The Brown Pelican Restocking Program in Louisiana**

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*Abstract:* The eastern brown pelican (*Pelecanus occidentalis carolinensis*) ceased nesting in Louisiana in 1961 and the species completely disappeared by 1963. From 1968 to 1980, the Louisiana Department of Wildlife and Fisheries and Florida Game and Fresh Water Fish Commission reintroduced 1,276 pelicans at 3 release sites in southeastern Louisiana. Two restored nesting populations were established, 1 at North Island in the Chandeleur Island chain and 1 at Queen Bess/Camp Island in Barataria Bay. The Queen Bess/Camp Island colony fledged 2,751 birds between 1971 and 1984. North Island production was 909 fledglings between 1979 and 1984. The restored North Island colony first nested successfully when the birds were 2 years old. Reintroduced birds at the Queen Bess/Camp Island site first nested successfully when 3 years of age.

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The recent history of the eastern brown pelican in Louisiana involved the extirpation of a large population of birds, the reintroduction of pelicans from a relatively stable Florida population, and most recently encouraging reproductive success at 2 restored colony sites.

Historically, the brown pelican population in Louisiana was undoubtedly a large one, but the extreme variability of earlier counts makes the accuracy

of such counts suspect. In 1919, the Louisiana brown pelican population was estimated as more than 50,000 birds (Pearson 1919, as cited in King et al. 1977:419). Oberholser (1938) estimated approximately 5,000 breeding pairs for the entire state, while Lowery (1955) reported as many as 5,000 adults plus their young on East Timbalier Island alone. Although there are discrepancies among the earlier estimates, brown pelicans are known to have occupied the entire Louisiana coastal beach zone at one time. The largest nesting colonies were reported to occur in southeastern Louisiana on the Chandeleur Island chain, Isle aux Pitre, mud lumps at the mouth of the Mississippi River, and extending to the barrier island chain of the Timbaliers (Lowery 1955).

Newman (1958) first reported a declining brown pelican population in Louisiana. The last nesting record of brown pelicans was in May 1961 when Van Tets (1965) found adults with young on North Island in the Chandeleur chain. In 1962, Williams and Martin (1968) found only 6 non-breeding brown pelicans remaining at North Island. James (1963) reported brown pelicans had been common along the Louisiana coast until 1958 but had completely disappeared by 1963 (King et al. 1977).

In 1968, 7 years after the brown pelican ceased to nest in the state, the Louisiana Department of Wildlife and Fisheries and the Florida Game and Fresh Water Fish Commission jointly undertook a program to reestablish the species by stocking previously occupied range with young birds from Florida colonies. Secondary objectives were to monitor survivability, reproductive success, and environmental pollutants. Several governmental agencies and private organizations participated in the original organizational phases of the program. These agencies included southeastern state game departments, the U.S. Department of the Interior Fish and Wildlife Service, and the National Audubon Society.

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## **Methods**

From 1968 to 1976 nestling brown pelicans were captured from nesting colonies on Florida's Atlantic coast and released at Grand Terre, Louisiana (Nesbitt et al. 1978). From 1977 to 1980, nestlings were captured from Florida's gulf coast and transported to North Island and Isle aux Pitre. Three primary reintroduction sites were restocked from 6 capture areas between 1968 and 1980 (Fig. 1).

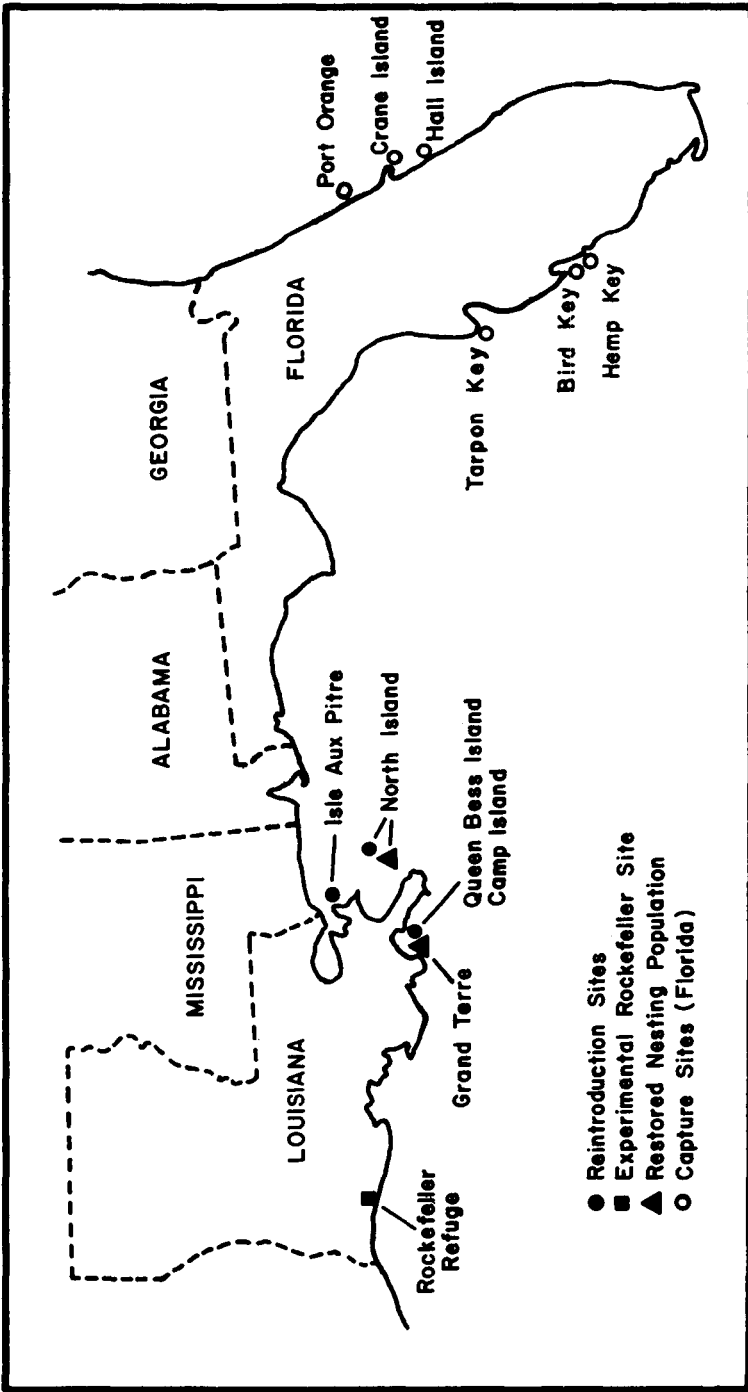


Figure 1. Brown pelican capture and restoration sites (redrawn from Nesbitt et al. 1978).

All young pelicans (8–11 weeks old), were hand captured, crated, and trucked to Louisiana. The birds were then transported by boat to the release site. Time of confinement for the birds varied from 30 to 36 hours, depending upon capture time, highway distance between Florida capture and Louisiana boat dock sites, and length of boat ride to final destination. Direct release with 2 daily feedings was found to be the most effective method for establishing the birds in Louisiana (Joanen and McNease 1974, Nesbitt et al. 1978).

Reintroduced young pelicans were banded with a U.S. Fish and Wildlife Service leg band and also a white patagial wing streamer at time of release. Louisiana-raised fledglings were banded from 1971 to 1980. Banding was discontinued after 1980 because of the stress caused by banding operations. Monitoring programs near the release and nesting sites consisted of retrieval of dead birds (adult and young), addled eggs, egg shells, and regurgitant materials found around the nest sites. These materials were analyzed for insecticide residues and egg shell thinning (Blus et al. 1975, 1979). Records were also maintained on nesting activity, timing of nesting, location, number of nesting pairs, number of nests, number of eggs per nest, hatchability, survival of young, and age at sexual maturity. Aerial photographs provided a permanent record of nesting and fledging. Periodic aerial surveys were conducted throughout the year in order to check on survival and dispersal from release sites.

## Results and Discussion

### Survival of Reintroduced Pelicans

The survival rate for 1,318 transplanted nestling Florida pelicans was 96.8% during transport and 89.5% at the end of 2 weeks following release (Table 1). This period was judged to be the most critical in terms of survivability.

A dieoff of both white (*P. erythrorhynchos*) and brown pelicans began in the late winter of 1975 and continued into spring. Approximately 35% of the standing population of 400 to 450 brown pelicans were lost (Nesbitt et al. 1978).

### Reproductive Success of Restored Colonies

A total of 2,751 pelicans were fledged by the Queen Bess/Camp Island colony for the 1971–84 period. The number of young fledged per nest averaged 1.2 for 2,305 nests which contained eggs during that 14-year period (Table 2). The active nesting period generally began in November and extended into July. The number of major renesting attempts per year ranged from 2 to 5, a reflection of the detrimental effects that severe winter and early spring environmental conditions had on reproductive success. High tides, high winds, cold temperatures, torrential rainfall, and wind driven waves caused many nesting failures.

**Table 1.** Transplant success of Florida brown pelicans sent to Louisiana, 1968–1980.

Year	N taken	Capture site (Fla.)	N surviving		Release site (La.)
			Transport	2 weeks after release	
1968	50	Hall Island	49	46	Grand Terre
1969	55	Hall Island	53	50	Grand Terre
1970	100	Hall Island	100	94	Grand Terre
1971	65	Hall Island	65	63	Grand Terre
1972	100	Hall Island	100	86	Grand Terre
1973	102	Port Orange	100	97	Grand Terre
1974	102	Port Orange	100	100	Grand Terre
1975	103	Port Orange	101	97	Grand Terre
1976	58	Crane Island	99	72	Grand Terre
	43	Port Orange			
1977	102	Tarpon Key	95	90	North Island
1978	118	Tarpon Key	101	95	I. Aux Pitre
1979	122	Tarpon Key	122	120	I. Aux Pitre
1980	198	Bird Key	191	169	I. Aux Pitre
		Hemp Key			
Total	1,318		1,276	1,179	

The reestablished North Island colony fledged 909 brown pelicans out of 556 nests (with eggs) from 1979 to 1984. The number of young fledged per nest averaged 1.6 during the 6-year period (Table 3). The North Island birds generally began nesting in April and their young were fledged by July. Nesting by the North Island colony was generally adversely affected by late spring weather fronts. However, this colony always completed its reproductive efforts with fewer renesting attempts than did the Queen Bess/Camp Island colony.

Winter and early spring nesting by the Queen Bess/Camp Island colony resulted in an extended reproductive cycle because of weather-related nesting failure, as reflected by the number of major renesting attempts presented in Tables 2 and 3. The lower number of young fledged per nest for Queen Bess/Camp Island (1.2) when compared to North Island (1.6) is a direct reflection of an 8–9 month reproductive cycle as compared to a 4–5 month cycle. North Island nests were generally better constructed than those at Queen Bess/Camp Island, perhaps because of availability of nesting materials and/or competition for available materials.

#### Queen Bess/Camp Island Colony

During the non-nesting period, July–October, birds were observed to move out approximately 32 km around the release site. The pelicans fed in Barataria Bay close to the release site in the Gulf of Mexico and also took trash fish dumped by commercial fishing boats returning to port. However, during the nesting period, the birds, both adults and immatures, were usually found gathered at the nesting colony.

**Table 2.** Reproductive success of brown pelicans in Louisiana, 1971–1984.

Year	Nest initiation	Last young fledged	Reneesting attempts	Ground nests (%)	N nests	N fledged	
						Total	Per nest
1971	Mar 1971	Jun 1971	—	100	11	8	0.72
1972	Jan 1972	Jun 1972	2 QB-1 CI <sup>a</sup>	80-100	0-23	0-14	0-0.60
1973	Feb 1973	Jul 1973	1 QB-2 CI	50-100	42-25	26-0	0.61-0
1974	Nov 1973	Jun 1974	2 QB	50	90	104	1.15
1975	Nov 1974	Jul 1975	2 QB-2 CI	70-100	82-36	13-0	0.16-0
1976	Oct 1975	Aug 1976	2 QB-3 CI	80-100	49-14	56-0	1.14-0
1977	Nov 1976	Apr 1977	3 QB	10	83	1	0.01
1978	Nov 1977	Jul 1978	1 QB-3 CI	80-100	62-78	74-54	1.19-0.69
1979	Nov 1978	Jul 1979	2 QB-3 CI	80-100	104-75	130-20	1.25-0.27
1980	Nov 1979	Jul 1980	3 QB	50	158	184	1.17
1981	Dec 1980	Jul 1981	2 QB	90	214	300	1.40
1982	Nov 1981	Jun 1982	3 QB	90	237	427	1.80
1983	Dec 1982	Jul 1983	2 QB	90	467	680	1.46
1984	Dec 1983	Jul 1984	3 QB	90	455	660	1.45
Total					2,305	2,751	1.19

<sup>a</sup> QB = Queen Bess Island; CI = Camp Island.

The first nesting attempt at the Grand Terre release took place in March 1971 on a manmade shell island approximately 3 km from the original release site, at the mouth of the Barataria Bay ship channel. Wing rivets with remnants of patagial streamers and leg bands identified all the nesting birds as those released in the summer 1968. At that time, the nesting birds were almost 3 years old (Williams and Joanen 1974). Thirteen nests were found, 11 of which contained 22 eggs. From this effort, 8 young were fledged. Survival from the original 1968 stocking indicated almost a 100% survival to age 3.

The 1972 nest construction and egg laying effort began on a low shell island in late January; however, this attempt was lost due to high tides and wave action. After 3 fruitless nesting attempts, a fourth successfully produced 14 fledglings. The 1973 nesting effort began in mid-February; however, this attempt proved unsuccessful. In April of that year, the birds began nest construction and successfully fledged 26 young (Joanen and McNease 1974). The

**Table 3.** Reproductive success of Brown Pelicans on North Island, Louisiana, 1979–1984.

Year	nesting began Date	young fledged Date last	reneesting attempts N major	nests N	N fledged	
					Total	Per nest
1979	Apr 1979	Jul 1979	1	17	9	0.53
1980	Apr 1980	Jul 1980	2	16	10	0.63
1981	Mar 1981	Jun 1981	1	40	50	1.25
1982	Apr 1982	Jul 1982	1	94	163	1.73
1983	Apr 1983	Jul 1983	1	135	220	1.63
1984	Mar 1984	Aug 1984	2	254	457	1.80
Total				556	909	1.63

birds began nesting again in November of the same year. This nesting attempt was successful and carried over into 1974, producing 104 young.

The onset of laying varied considerably from year to year and the termination of nesting was extended until a successful nesting effort was accomplished. The 1975 nesting attempt began in November and produced only 13 fledgling young. That year, a notable dieoff of white and brown pelicans occurred in winter and early spring. The colony was reduced to approximately 250 brown pelicans, a loss of approximately 35%. Carcasses of both white and brown pelicans were collected and sent to a laboratory for analysis. Tissue analysis indicated the presence of endrin, which was the probable causative agent (Nesbitt et al. 1978).

About 40 pairs initiated nesting in the winter of 1975 at the colony site. Fifty-six young were fledged from 49 nests in 1976.

The 1977 effort began in early November 1976 and after 3 major nesting attempts only 1 young was fledged.

From 1978 to 1984, the majority of nesting was accomplished on Queen Bess Island. The number of young produced and also the number of young fledged per nest generally increased each successive year (Table 2). This is a rather large island approximately 80 ha in size with a high beach rim. The island is vegetated with sea matrimony (*Lycium carolinianum*) and black mangrove (*Avicennia nitida*). Camp Island, badly destroyed by the high winds and wave action in 1976, was completely eroded away by tides and wave action early in 1980.

Henny (1972) indicated that a recruitment standard of 1.2 to 1.5 young per breeding female is necessary to maintain a stable population. The Queen Bess colony met or exceeded this standard each year from 1978 to 1984 (Table 2). Although nesting was usually initiated in November, rarely did these early attempts produce young. Due to the severe weather and high tides produced from advancing cold fronts, low shell nesting islands were inundated and nests were lost.

Nests were constructed of sticks and twigs of black mangrove, roseau cane (*Phragmites communis*), sea purslane (*Sesuvium* sp.), sea matrimony, and oyster grass (*Spartina alterniflora*). Manmade materials, such as window screen, rope, pieces of plastic, and fishing line were used quite commonly. Nest dimensions measured during 1973 indicated an average nest was 76 cm long x 64 cm wide x 22 cm high. The average egg cavity dimensions were 30 cm x 27 cm x 9 cm deep. Thirty percent of the nests were constructed in *Avicennia* and *Lycium*, with an average height above the ground of 33 cm.

#### North Island Nesting

The first nesting attempt on North Island was begun in April 1979 and 9 young were fledged (Table 3). Young produced per nesting attempt increased each year until 1982 with a high of 1.7. The total number of young fledged in 1983 was 220 out of 135 nests for a 1.6 ratio. The North Island

colony met Henny's (1972) 1.2 to 1.5 fledglings per nesting female recruitment standard in 1981 and exceeded it in 1982, 1983, and 1984 (Table 3). This colony has nested each year very close to the original release site. All North Island nests were built on the ground. During the nonnesting period, however, pelicans were usually spread out some 80 km over the entire Chandeleur Island chain. A total of 909 young have been fledged in the colony since it was established in 1977.

The restored North Island brown pelicans first nested successfully when they were 2 years old. Individuals marked with wing buttons and leg bands from the 1977 transplant were 21 months old when they first began nest construction. Banding records indicate a few birds from the original Florida transplants were recovered in Florida, some 250 km from the original release site. These data indicate a small number of birds probably abandoned the release site and wandered east toward their former Florida colony.

#### Environmental Pollutants, Queen Bess/Camp Island Colony

Egg shell thickness of 147 pelican eggs collected from 1971 through 1976 averaged 6.7% to 13.5% less than the mean thickness of eggs collected before 1947 (Blus et al. 1979). Blus et al. (1979) also found that all egg contents analyzed contained residues of *p,p'*-DDD, dieldrin, PCB's, and endrin. Residues of *p,p'*-DDT, heptachlor epoxide, hexachlorobenzene, toxaphene, and chlordanes also were identified; however, mirex residues were not identified in any of the samples. Residues of endrin and several other organochlorines were found in tissues of brown and white pelicans involved in the dieoff in Louisiana in 1975. Endrin was the major factor in the dieoffs because residues in brains of several of the pelicans were similar to those found in brains of experimental birds dying on endrin dosage (Blus et al. 1979).

The dieoff in 1975 coincided with the peak in endrin residues in pelican eggs (Blus et al. 1979). Blus et al. (1974) also concluded from their studies of pelicans in South Carolina that residues of DDE were high enough in Louisiana brown pelicans to induce eggshell thinning but not high enough to interfere with reproductive success.

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