# Reintroduction and Colony Expansion of the Brown Pelican in Louisiana

**Larry McNease,** *Louisiana Department of Wildlife and Fisheries, Rockefeller Wildlife Refuge, Route 1, Box 20-B, Grand Chenier, LA 70643*

**David Richard,** *Stream Property Management, Inc., P.O. Box 40, Lake Charles, LA 70602*

**Ted Joanen,** *Louisiana Department of Wildlife and Fisheries, Rockefeller Wildlife Refuge, Route 1, Box 20-B, Grand Chenier, LA 70643*

*Abstract:* The eastern brown pelican (*Pelecanus occidentalis carolinensis*) virtually disappeared from Louisiana by 1963. The Louisiana Department of Wildlife and Fisheries (LDWF) and Florida Game and Fresh Water Fish Commission (FGFWFC) reintroduced from Florida to southeastern Louisiana 1,276 fledgling pelicans at 3 release sites between 1968 and 1980. Florida transplants established 2 restored nesting populations, 1 at North Island in the Chandeleur Island chain and 1 at Queen Bess Island in Barataria Bay. The LDWF transplanted 149 fledglings from the Queen Bess colony to Last Island, Isles Dernieres, between 1984 and 1986 which resulted in a third nesting colony. Natural colony expansion occurred in 1990 when more than 100 nests were produced on the Mississippi River mud lumps and on Grand Gosier Island at the south end of the Chandeleur Island chain. The Queen Bess colony fledged 6,051 pelicans between 1971 and 1990. North Island production was 7,609 fledglings between 1979 and 1990. Last Island production was 780 between 1987 and 1990.

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The eastern brown pelican ceased nesting in Louisiana in 1961 and the species in essence disappeared by 1963. In 1968 the LDWF and FGFWFC began a pilot program to reintroduce birds to Louisiana from a relatively stable Florida population. Florida nestlings were transplanted annually through 1980 and reestablished colonies were monitored for reproductive success, survivability, and environmental pollutants (Nesbitt et al. 1978, McNease et al. 1984). Several southeastern state game departments, the U.S. Department of the Interior Fish and Wildlife Service,

and the National Audubon Society participated in the organizational phases of the program.

The goal of the Louisiana eastern brown pelican program was to reestablish the bird to its historic nesting range. The program consisted of 4 phases: reintroduction of Florida pelicans to Louisiana, establishment of breeding colonies with birds of Florida origin, transplantation of Louisiana produced fledglings to vacant range to establish nesting colonies, and natural colony expansion.

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## Methods

Historically, nesting colonies were described on the Chandeleur Island Chain, Isle aux Pitre, Mississippi River mud lumps and extending westward to Last Island, Isles Dernieres, all located in southeastern Louisiana (Lowery 1955, 1974; McNease et al. 1984). Island terrain is flat, low, and subject to tidal flooding. The climate is subtropical with infrequent freezing temperatures. The vegetation is characterized by saltmarsh grasses and incidental low shrubs. Land area is characterized by sand dunes, reef shell shelves, and marshy soils.

### Reintroductions

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 (McNease et al. 1984). All young pelicans (8–11 weeks old) were hand captured, crated, trucked to Louisiana, and 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 on barrier islands 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 a white patagial wing streamer. Louisiana-raised fledglings were banded from 1971 to 1980. Bands or streamers were not applied after 1980 because of colony disruptment and the stress caused by handling and confinement.

The LDWF transplanted 149 fledglings from the Queen Bess colony to Last Island, Isle Dernieres between 1984 and 1986.

### Monitoring

Between 1968 and 1980, we periodically visited nesting colonies. Records were 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 of sexual maturity (McNease et al. 1984). 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). Aerial surveys and photography were conducted in addition to ground surveys. Aerial photographs provided a permanent record of nesting and fledging. Periodic aerial surveys were conducted throughout the year to check on survival and dispersal from release sites.

After 1980, we monitored reproductive success of each colony by helicopter survey and aerial photography. Because of an extended nesting sequence (November–July), 3 to 4 surveys per year were required to obtain sufficient data to determine fledgling success. We used helicopters because of the isolated nature of the colonies, the 280 kilometers survey distance, the non-invasive nature of aerial monitoring, and slow flight requirements for photography. Surveys were conducted during peak nesting and prefledging periods. Winter nesting and the resultant multiple renesting sequence made it impossible to count every nest that produced a fledgling. Therefore, the numbers of nests presented and fledglings produced for each colony are conservative estimates.

## Results and Discussion

### Reintroductions

Survivability of Florida transplanted nestlings was excellent (McNease et al. 1984). The numbers of Last Island nesting females in 1987, 1988, 1989, and 1990 (12, 50, 125, and 275, respectively), and the progressive increases each year indicate that survival of Louisiana transplants and their offspring was very good.

### Nest Construction

We estimate that 90% of nests constructed were on the ground. The scarcity of shrubs or trees on the nesting islands precludes overstory nesting. Several unusually severe freezes since 1980 have decimated coastal black mangrove (*Avicennia nitida*) which historically was the nesting shrub of choice for pelicans. Nests are usually constructed of sticks and twigs, roseau cane (*Phragmites communis*), sea purslane (*Sesuvium* sp.), sea matrimony (*Lycium carolinianium*), and oyster grass (*Spartina alterniflora*). Manmade materials, such as window screen, rope, pieces of plastic, and fishing line were used quite commonly.

## Reproductive Success

*Queen Bess Colony.*—Six thousand fifty-one pelicans were fledged from 4,782 nests by this colony from 1971–1990. An average of 1.27 young were fledged per nest during that 20-year period (Table 1).

Winter, spring, and summer nesting at this colony resulted in 2 or 3 major renesting attempts each year because of weather-related nesting failure (McNease et al. 1984).

*North Island Colony.*—For the 1979–1990 period, 7,609 pelicans were fledged from 4,580 nests. An average of 1.66 young were fledged per nest during that 12-year period (Table 1).

Late spring and summer nesting by this colony resulted in a 4–5 month reproductive cycle compared to the 8–9 month cycle of Queen Bess. Renesting attempts were infrequent on North Island.

*Last Island Colony.*—A total of 780 pelicans were fledged by this colony for the 1987–1990 period. The number of young fledged per nest averaged 1.69 for 462 nests during that 4 year period (Table 1).

This colony nested only in the spring-summer and renesting is minimal. This colony, which originated from a wintertime nesting colony, characteristically nested during warmer seasons characterized by less violent weather events.

**Table 1.** Reproductive success of Louisiana brown pelican colonies, 1971–1990.

| Year | *N* nests | | | *N* fledged | | | *N* fledglings per nest | | |
|---|---|---|---|---|---|---|---|---|---|
| | Q.B.[a] | N.I. | L.I. | Q.B. | N.I. | L.I. | Q.B. | N.I. | L.I. |
| 1971 | 11 | | | 8 | | | 0.72 | | |
| 1972 | 23 | | | 14 | | | 0.60 | | |
| 1973 | 42 | | | 26 | | | 0.61 | | |
| 1974 | 90 | | | 104 | | | 1.15 | | |
| 1975 | 82 | | | 13 | | | 0.16 | | |
| 1976 | 49 | | | 56 | | | 1.14 | | |
| 1977 | 83 | | | 1 | | | 0.01 | | |
| 1978 | 140 | | | 128 | | | 0.91 | | |
| 1979 | 179 | 17 | | 150 | 9 | | 0.84 | 0.53 | |
| 1980 | 158 | 16 | | 184 | 10 | | 1.17 | 0.63 | |
| 1981 | 214 | 40 | | 300 | 50 | | 1.40 | 1.25 | |
| 1982 | 237 | 94 | | 427 | 163 | | 1.80 | 1.73 | |
| 1983 | 467 | 135 | | 680 | 220 | | 1.46 | 1.63 | |
| 1984 | 455 | 254 | | 660 | 457 | | 1.45 | 1.80 | |
| 1985 | 427 | 364 | | 600 | 600 | | 1.41 | 1.65 | |
| 1986 | 400 | 450 | | 500 | 800 | | 1.25 | 1.78 | |
| 1987 | 225 | 700 | 12 | 300 | 1,000 | 0 | 1.33 | 1.43 | 0 |
| 1988 | 500 | 800 | 50 | 600 | 1,400 | 80 | 1.20 | 1.75 | 1.60 |
| 1989 | 600 | 1,050 | 125 | 800 | 1,900 | 200 | 1.33 | 1.81 | 1.60 |
| 1990 | 400 | 660 | 275 | 500 | 1,000 | 500 | 1.25 | 1.52 | 1.82 |
| Total/ave. | 4,782 | 4,580 | 462 | 6,051 | 7,609 | 780 | 1.27 | 1.66 | 1.69 |

[a]Q.B. = Queen Bess; N.I. = North Island; L.I. = Last Island.

*Natural Colony Expansion.*—Natural colony expansion occurred in 1990 when more than 100 nests were established on the Mississippi River mud lumps and on Grand Gosier Island. However, human interference resulted in complete loss of nests and eggs on the Mississippi River mud lumps. No nesting was accomplished on the mud lumps in 1991. Production on Grand Gosier was not determined in 1990; however, 80 late nests were constructed.

### Habitat Outlook

Louisiana's bay islands and barrier islands have undergone tremendous detrimental change in recent years. Bagert (1989) categorized coastal wetland change (loss) rates as low, moderate, severe or very severe. Pelican nesting habitat was classified in the severe to very severe loss category. In addition to subtle island land loss changes (lack of sediment enrichment, subsidence and rising sea level) most outer islands have very obviously suffered from wave action/storm surge erosion since 1968 (La. Dep. Nat. Resour., Public Info. Release 1989). As a result, pelican nesting habitat has been greatly reduced compared to that reported by Lowery (1955, 1974).

Efforts to restore Queen Bess Island were recently undertaken. The LDWF and Louisiana Department of Natural Resources in cooperation with the United States Corps of Engineers placed dredge material from a nearby ship channel on and adjacent to Queen Bess. Approximately 12,800 cubic m of shell material were spread over the Queen Bess Island nesting area and adjacent marsh to raise elevation where nesting occurred. The additional spoil is intended to retard erosion and secure the island as nesting habitat.

### Population Recruitment

Recruitment (*N* fledglings/breeding female) for the 3 oldest colonies averaged 1.27 for Queen Bess (1971–1990), 1.66 for North Island (1979–1990), and 1.69 for Last Island (1987–1990) (Table 1). The higher numbers recorded for North Island and Last Island reflect more secure nesting habitat and a spring/summer nesting sequence. The low recruitment for Queen Bess reflects a degrading nesting habitat and a winter nesting sequence. Henny (1972) indicated that a recruitment standard of 1.2 to 1.5 young per breeding female is necessary to maintain a stable population. Compared to Henny's recruitment standard, the 1.27 average for Queen Bess indicates the population is just holding its own. Production figures for 1983 through 1990 averaged 580 fledglings/year (range 300–800) and 1.34 fledglings per nest. The colony population appears to be relatively stable, which supports Henny's (1972) conclusions.

The 1.66 and 1.69 fledglings/nest average for North Island and Last Island indicate an expanding population. This is confirmed by our observations and is consistent with Henny's (1972) findings. The Last Island colony has shown a very healthy increase each year since 1988, and the North Island colony, with the exception of 1990, showed a steady annual increase during 1981–1989 (Table 1). North Island and Last Island offer more acreage, greater elevation, more cover, and better nesting materials than Queen Bess.

### Catastrophic Weather Related Events

Our observations indicate that storms accompanied by severe tidal flooding are the most frequent and most devastating negative factor affecting productivity, especially to ground nesters sitting at low elevation. We have observed as many as 400 nestlings and large numbers of eggs lost to a single flood.

Our observations indicate that a female which has produced nestlings will not nest again that season. Likewise, renesting may not occur when eggs are lost late in the nesting cycles.

Severe freezes have been particularly catastrophic, although they occur infrequently. Severe freezes in 1983 and 1989 resulted in high initial mortality by quick death hypothermia, mortality due to prolonged exposure (frost bite), and death while plunge-diving into ice. We recovered 169 brown pelicans in juvenile and adult plumage which died during the 1989 freeze. Severe freezes also caused surface ice to form which limited feeding opportunity of the birds. Fish mortality related to freezes probably negatively impacts the pelican's food supply on a short-term basis. Black mangrove, which historically was used for nesting, was killed off and is just now beginning to be reestablished after a 9-year absence.

Island habitat degradation is a chronic factor which has adversely impacted nesting since the first egg was laid in 1971. This factor possesses particular significance to the long-term survival of Louisiana's official state bird and is caused, in part, by lack of sediment deposition necessary for island maintenance. Storm surges tend to wreak immediate havoc on island habitat.

### Environmental Pollutants

A well publicized die-off occurred in 1975 attributed to endrin poisoning (Blus et al. 1979, Nesbitt et al. 1978). Blus et al. (1974) believed that DDE residues were high enough in Louisiana brown pelicans to induce egg shell thinning but not high enough to interfere with reproductive success.

We are unaware of any pollutant-related pelican mortality that occurred during the past 15 years. Excellent reproductive success achieved at North Island and Last Island indicates that pollutants are not high enough to significantly interfere with reproductive success.

We feel that the general health of the Queen Bess colony since the environmental contamination incident in 1975 must be good because pelicans there undergo the rigors of winter while nesting; plus their reproductive season lasts for up to 9 months.

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