



RECOVERY PLAN FOR THE

***eastern
brown
pelican***

RECOVERY PLAN FOR THE EASTERN BROWN PELICAN
(Pelecanus occidentalis carolinensis)

The Agency Review Draft (February 1978) was approved by the Director, U. S. Fish and Wildlife Service, on July 1979, with minor revisions. Those revisions and other minor revisions were made for this edition.

Prepared August 1, 1980
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THIS IS THE COMPLETED EASTERN BROWN PELICAN RECOVERY PLAN. IT HAS BEEN APPROVED BY THE U.S. FISH AND WILDLIFE SERVICE. IT DOES NOT NECESSARILY REPRESENT OFFICIAL POSITIONS OR APPROVALS OF COOPERATING AGENCIES AND IT DOES NOT NECESSARILY REPRESENT THE VIEWS OF ALL RECOVERY TEAM MEMBERS, WHO PLAYED THE KEY ROLE IN PREPARING THIS PLAN. THIS PLAN IS SUBJECT TO MODIFICATION AS DICTATED BY NEW FINDINGS AND CHANGES IN SPECIES STATUS AND COMPLETION OF TASKS ASSIGNED IN THE PLAN. FUNDS WILL BE EXPENDED TO ATTAIN GOALS AND OBJECTIVES IN ACCORDANCE WITH APPROPRIATIONS, PRIORITIES, AND OTHER BUDGETARY CONSTRAINTS.

LITERATURE CITATIONS SHOULD READ AS FOLLOWS:

EASTERN BROWN PELICAN RECOVERY PLAN, DATED JULY 19, 1979, PREPARED BY THE U.S. FISH AND WILDLIFE SERVICE IN COOPERATION WITH THE RECOVERY TEAM COMPOSED OF THE FOLLOWING INDIVIDUALS:

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Resume: This Recovery Plan is intended to acquaint the managing agencies with history of the Eastern Brown Pelican's problem (Part I); to recommend the directions that recovery efforts should take (Part II); to assign important tasks to that end and to estimate their costs (Part III); and to make management recommendations for current populations (Part IV). Part V is the literature cited and Part VI contains appendices.

The Eastern Brown Pelican was extirpated from Louisiana and nearly so from Texas during the late 1950's and very early 1960's. A small population remains in Texas, but the only Brown Pelicans now in Louisiana are those restocked from Florida since 1968, and their offspring. The new Louisiana population suffered a reduction of about 40% from endrin pollution in 1975. The South Carolina and North Carolina populations are relatively small and approximately stable. The Florida population of 20,000 to 30,000 is stable at or near historic levels.

The Recovery Plan calls for re-establishment of Louisiana and Texas populations on all historically used nesting sites. Known environmental limiting factors should be monitored. Pelican populations themselves should be monitored to detect impacts of new factors that may not be detected by routine environmental monitoring. When population trends are seriously downward in monitored colonies, investigations should be conducted to learn why. Further study should be undertaken to quantify any newly discovered limiting factors involved and to affect remedies.

Little is known about the relationship between population size and species survival. Current information suggests that the agent that extirpated the Brown Pelican from Louisiana would have been equally effective regardless of how many pelicans were there in the late 1950's and very early 1960's. For that reason, the theme of this recovery plan is that there is no safety in numbers

for the brown pelican. The Recovery Team views the wide distribution of the species, rather than its absolute numbers, as its major strength against extinction.

Estimated costs for the implementation of this plan are \$53,000 for 1980, \$121,000 for 1981, and \$131,500 for 1982. These estimates have to be adjusted annually.

PART I
INTRODUCTION

The Recovery Team

Recovery Teams are volunteers appointed by the U.S. Fish and Wildlife Service to draft "Recovery Plans" for endangered species, subspecies, or populations and to advise the Service when requested. A recovery plan is a guide to show how to bring back the species or population from near extinction. Theoretically, successful implementation of a recovery plan will result in the species being removed from the endangered list.

The Eastern Brown Pelican Recovery Plan delineates and schedules a management plan to re-establish the eastern subspecies as a viable part of its ecosystem. Recovery teams for other populations of the Brown Pelican may eventually be appointed, but this plan deals only with the "Eastern" subspecies (Pelecanus occidentalis carolinensis).

Six members of the Eastern Brown Pelican Recovery Team were appointed on 23 September 1975; the seventh member was appointed on 4 June 1976.

Lawrence Blus, U.S. Fish and Wildlife Service was involved with pelican research while in Laurel, Maryland, specializing in pesticide problems in the eastern United States since 1968; Larry McNease has been primarily involved with the Louisiana pelican restoration project which began in 1968; Burkett Neely was Refuge Manager of Cape Romain National Wildlife Refuge during the early period of Brown Pelican research there from 1971 through 1974; Stephen Nesbitt and Lovett Williams are working in Florida on a Brown Pelican conservation program that began in 1966. Ralph Schreiber conducted an eight-year study of pelican nesting behavior in Florida while at the University of South Florida. Kirke King, U.S. Fish and Wildlife Service, who joined the Team

in 1976, has worked on the species in Texas since 1970.

The Recovery Plan

This plan is designed around the "step-down" system (Phenicie and Lyons 1973) involving a process of problem identification and problem solution propositions. This approach helps guard against being seriously distracted by the many potential avenues for research and management that may be desirable for various reasons but that would not necessarily bear on the immediate problem of preventing the extinction of the Eastern Brown Pelican. Guidance and format were provided by "Endangered and Threatened Species Recovery Plan & Team Guidelines for Fish and Wildlife Service Personnel, Recovery Team Members and Cooperators" (U.S. Dept. of Interior, Fish and Wildlife Service, Office of Endangered Species, May 20, 1974 and its recent revisions).

The block diagram (Figure 5) is the skeleton of the recovery plan, but it is terse and easily misinterpreted because little room exists in such a diagram for explanatory wording. The annotated outline (pp. II-3 through II-8) contains additional information about each block.

The plan will be updated to meet new goals or management objectives periodically as necessary.

The members of the Recovery Team share responsibility for all portions of the report. The Team Leader compiled and edited the Recovery Plan. Our work was made easier by the sense of cooperation that existed throughout the planning process.

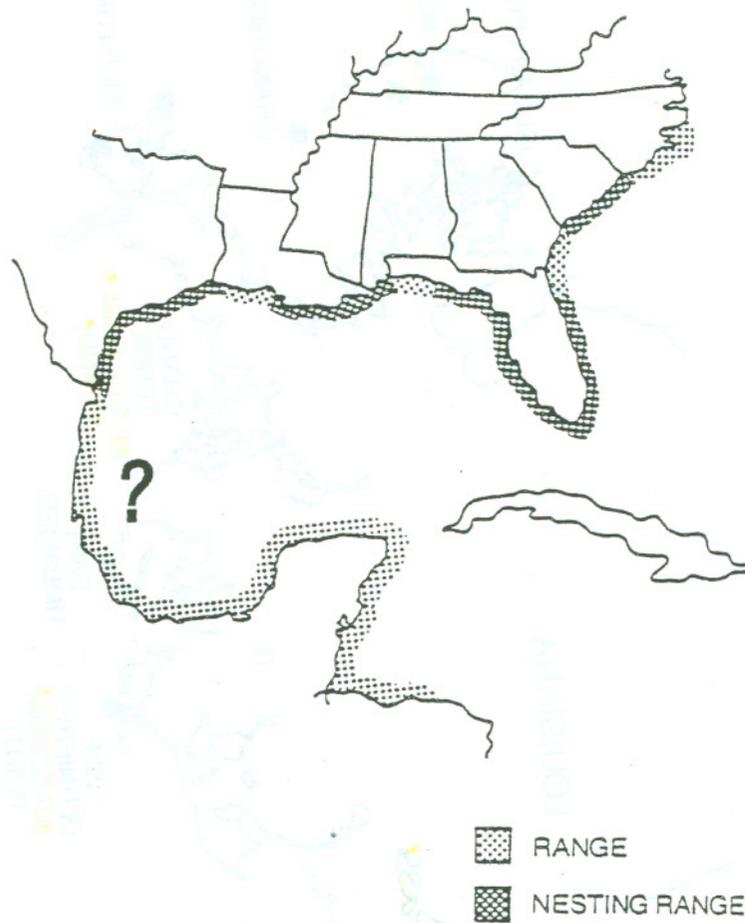


FIGURE 1. HISTORIC RANGE OF THE EASTERN BROWN PELICAN. STATUS IN EASTERN MEXICO AND WEST INDIES UNCERTAIN AT THIS TIME.

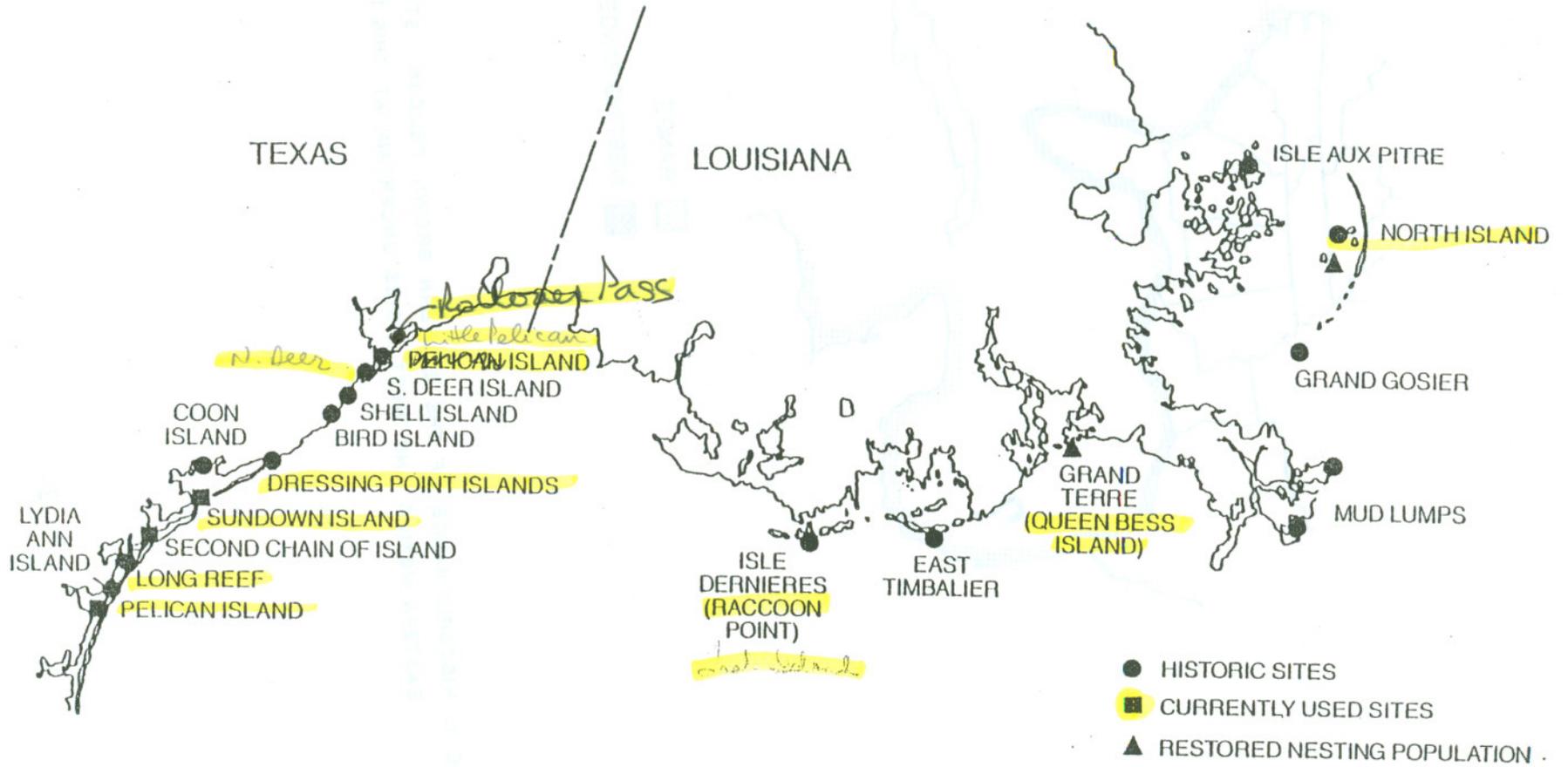


FIGURE 2. EASTERN BROWN PELICAN NESTING SITES IN LOUISIANA AND TEXAS.

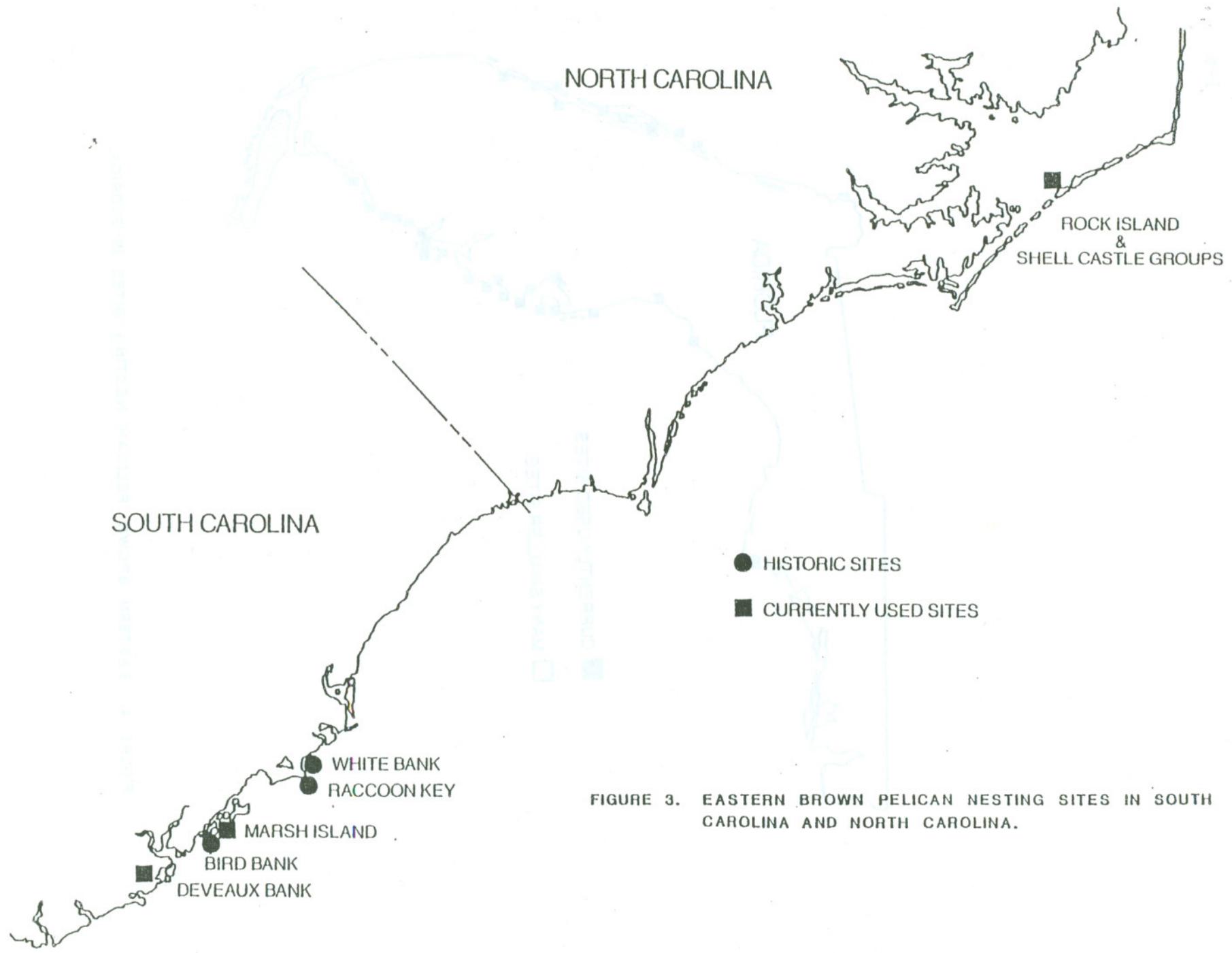


FIGURE 3. EASTERN BROWN PELICAN NESTING SITES IN SOUTH CAROLINA AND NORTH CAROLINA.

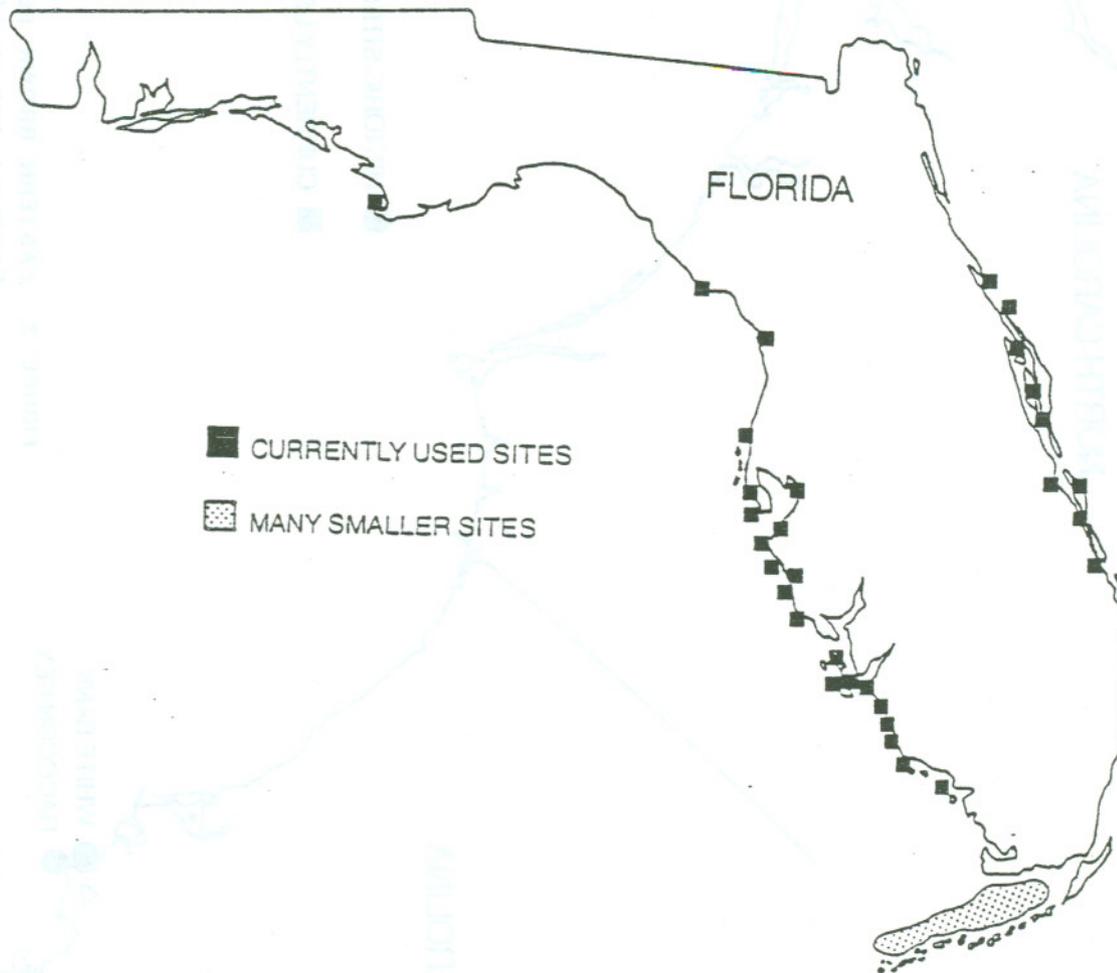


FIGURE 4. EASTERN BROWN PELICAN NESTING SITES IN FLORIDA.

The Brown Pelican in General

The Brown Pelican is one of two species of pelican in North America--the other is the White Pelican (Pelecanus erythrorhynchos). The Brown Pelican weighs up to 8 pounds (4,000 g) and may have a wing spread over 7 feet (2 m). It feeds almost entirely on fishes captured by plunge diving in coastal waters. Brown Pelicans are rarely found away from salt water and do not venture more than 20 miles (32 km) out to sea except to take advantage of especially good fishing conditions.

The Eastern Brown Pelican once nested on the coasts of eastern Mexico, Texas, Louisiana, Florida, South Carolina and North Carolina. They have not been known to nest in Alabama, Georgia, or north of North Carolina. Significant U.S. breeding populations are now limited to Florida and South Carolina. The northerly population of this race migrate to Florida, to the Caribbean coasts of Columbia and Venezuela, and throughout the Greater Antilles to Trinidad (Figure 1). Many pelicans in the eastern United States spend the winter close to their nesting areas. Some reports of the Eastern Brown Pelican along the Pacific Coast of Central America from Guatemala to El Salvador are not adequately verified. Only a few inland records exist in the United States. Other subspecies of the Brown Pelican occur elsewhere in the eastern hemisphere, primarily in the subtropics and tropics.

Brown Pelicans are colonial nesters, using only small coastal islands where they construct nests in available vegetation. Occasionally, they nest on the ground. Nesting occurs mainly in early spring and summer, but fall and winter nesting has occurred. Three eggs are the normal clutch. Hatching is asynchronous.

Some pelicans are tame and will seek food handouts from people at fishing piers and boats. Their tameness, choice of coastal habitat, large size, and

unique anatomical features make them well known and prominent in popular literature.

Habitat requirements, limiting factors, population status, and conservation efforts that are crucial to the recovery effort are discussed in Part II.

Endangerment

Ornithologists have often mentioned instability of Brown Pelican populations. As early as 1931, the species was reported to be disappearing from Louisiana (Dabney 1931, Anonymous 1931a, Anonymous 1931b). Serious population declines have occurred in South America (Murphy 1936, p. 818). Weather, predation, starvation, and vandalism have been blamed for serious impacts on the species.

New problems now exist along with the old. In the early 1960's the Brown Pelican disappeared as a nesting species on the Louisiana coast (Williams and Martin 1968) and seriously declined along with the Texas coast where it once had been abundant (King et al. 1977). Of the several species of coastal breeding birds along the Louisiana and Texas coasts, only the Brown Pelican was known to suffer so severely. Its nesting habitat in Louisiana was virtually undisturbed. A large proportion of the population had survived recent hurricanes. Mass vandalism or food shortages of a scope necessary to exterminate the species was unlikely. In short, there is at this time no adequate explanation for the disappearance of the breeding population from Louisiana, but the demise of the entire adult population between 1957 and 1961 suggests an extremely lethal agent.

There is no evidence to support the belief that DDT was responsible for the demise of the Brown Pelican in Louisiana. To the contrary, DDT

poisoning in pelicans impairs reproduction through eggshell thinning, but is not lethal to the birds even at the higher levels that have been recorded in the environment. Unpublished data from Louisiana pelican carcasses obtained from time to time between 1962 and the present time revealed low levels of DDT and its metabolites--no level approaching the levels found in California pelicans that failed to reproduce in the late 1960's and 1970's.

During the early 1960's in South Carolina there was a suggestion of declining annual reproduction that some workers believe was due to chemical (mainly pesticide) pollution. The evidence for population decline was not strong, however. The only population known definitely to be stable during the 1960's was in Florida (Williams and Martin 1970).

Meanwhile, in California, the several hundred adult Brown Pelicans (Pelecanus occidentalis californicus) that attempted to nest each spring failed consistently to produce young (Schreiber and Risebrough 1972)--a result of eggshell thinning caused by DDE (Keith et al. 1970). Eventual extirpation of the species from California seemed to be only a matter of time. DDE levels in pelican body tissues exceeded 1,000 parts per million. This trend has now been reversed by rapidly declining DDE levels in the California environment and in the birds themselves (Anderson et al. 1975).

Limiting Factors

To provide perspective of the factors potentially limiting populations of the Eastern Brown Pelican, we have listed and classified them (Table 1). Any single limiting factor, if of sufficient magnitude, is capable of causing extinction if it acts over a long enough period of time. Conversely, it may be inconsequential when it operates at a low level of impact or only briefly. The major need in reaching the prime objective of this Recovery

Plan is to accurately assess the impact of each factor singly and collectively so that they can be dealt with appropriately. This calls for identification of, and a proper emphasis on, each of the real problems.

We have followed the Fish and Wildlife Service's suggestion in developing the recovery plan through the "step-down" planning process (Phenicie and Lyons 1973). The Annotated Recovery Outline (p. II-3) and Block Diagram (Fig. 5) feature proposed remedies for controlling those limiting factors which the Recovery Team has identified as significant at this time. Our approach has been to analyze the problems and their solutions to the point that discreet tasks can be described and assigned. Some of the tasks (Fig. 5) could be further sub-divided but that would extend the length of the block diagram past the point of diminishing returns.

Past and Current Conservation Efforts

By the early 1960's the Brown Pelican had ceased to nest on the Louisiana coast and was faring almost as badly on the Texas coast. A few aerial surveys revealed that the pelican was virtually absent as a breeding species on the eastern shore of Mexico north of Veracruz by 1968. Only in Florida and possibly in South Carolina were populations at or near historic levels. This has been reviewed in greater detail by Williams and Martin (1968).

In January 1968 at the request of the National Audubon Society and the Louisiana Wildlife and Fisheries Commission about 30 biologists, wildlife managers, and wildlife administrators of the southeastern United States and federal and private agencies met at Rockefeller Wildlife Refuge

in Louisiana to develop a course of action to save the Eastern Brown Pelican from extinction.

Commitments made at the Rockefeller meeting resulted in a number of informational, research and management activities that are still in progress. A "Brown Pelican Newsletter" was initiated to facilitate communication among biologists working on the pelican problem. A "Banding Committee" was formed to plan and coordinate banding and color-marking studies in the southeastern United States. Each state conservation agency involved agreed to annually census the Brown Pelicans within its boundaries. A "Brown Pelican Committee" was formed jointly by the Southeastern Section of The Wildlife Society and the Southeastern Association of Game and Fish Commissioners.

The impetus provided by the Rockefeller meeting was partly responsible for the widespread public awareness of the plight of the Brown Pelican during the 1960's that ultimately resulted in its being listed as "endangered". The momentum of this early interest in pelican conservation has carried through to the present time.

Research has clarified the Brown Pelican's status and problems since 1967, particularly in relation to pesticides (Blus et al. 1974a, Blus et al. 1974b, Blus et al. 1975 and a number of others). Ralph Schreiber's studies in the Tampa Bay area have produced several publications on life history, general biology, and behavior. Papers pertinent to Brown Pelican conservation are listed in the Literature Cited (Part V).

In addition to research, substantial progress has been made toward informing the public of the pelican's plight. Public interest and appreciation are high, judging from the treatment the Brown Pelican receives in the news media. Posters and other informative materials informing the

public that the species is "endangered" and protected by law and explaining how fishermen should remove hooked pelicans from their fishing lines have been disseminated by the Florida Game and Fresh Water Fish Commission since 1970. This public information campaign has been taken up by private conservation organizations, bird rehabilitation "hospitals", and research foundations. A few large Florida nesting colonies have been posted against public trespassing by the Florida agency since 1971.

Regular population monitoring in Florida has indicated approximate stability since at least 1968 (Williams and Martin 1970, Schreiber and Schreiber 1973, Nesbitt et al. 1977) thus providing some optimism that the future is not hopeless. A stable Florida population has provided breeding stock for the Louisiana restoration project (Williams and Joanen 1974), and a restocking project using crippled pelicans from Florida is being attempted in Texas at this time.

Thus, the Team recognizes that this recovery plan does not represent the beginning of the recovery effort for the endangered Eastern Brown Pelican. Rather, this plan takes the matter up "in the middle" with the intention of providing a better organized format for further progress toward the recovery effort that was initiated 10 years ago.

The incomplete coverage of the Eastern Brown Pelican situation in Mexico is a serious deficiency in the recovery plan at this time. Very little information about the status of the species in eastern Mexico is available but it appears that it is not faring well there, perhaps being limited there by some of the same factors that exist in Texas. In an effort to obtain more information, a meeting of the Recovery Team was scheduled in conjunction with the 1977 meeting of the Southeastern Section

of The Wildlife Society in San Antonio, Texas to which the Republic of Mexico was invited through U.S. Government channels to send a representative. Efforts will be continued to establish contact with Mexican officials to obtain information about Brown Pelicans in Mexico. The Brown Pelican situation in the northern part of the West Indies will also be addressed by the Team as time permits in the future.

PART II
THE PLAN

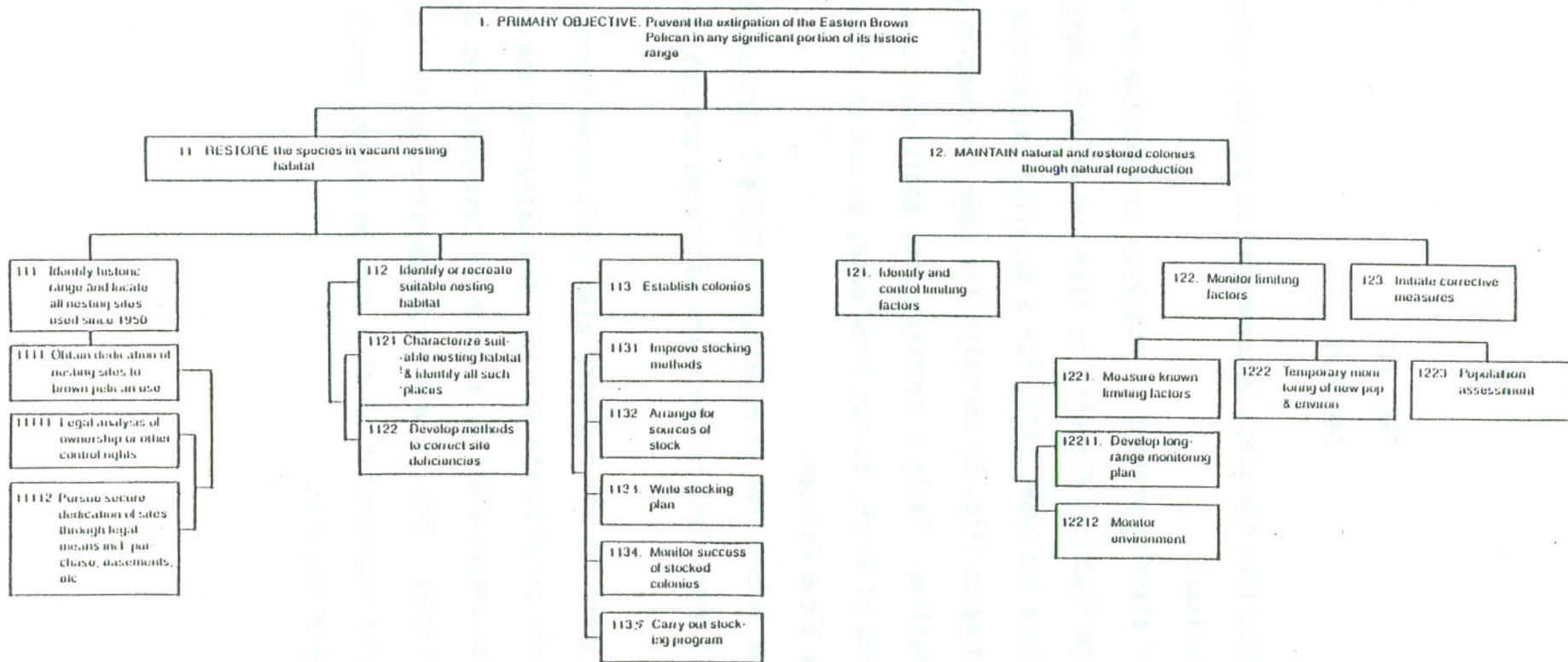
This section describes the steps recommended to achieve recovery of the Eastern Brown Pelican.

The "step-down" planning process is not easy to describe or use. The reader is referred to "Tactical Planning in Fish and Wildlife Management and Research" (Phenicie and Lyons 1973) for a detailed explanation of this system. The block diagram (Fig. 5) contains the same information as the Annotated Recovery Outline. Table 1 contains some additional theoretical limiting factors, some of which, to our knowledge, do not at this time adversely affect the Brown Pelican.

Much of the same information is repeated in Table 2 (Implementation Schedule) of Part III where funding needs are estimated and job assignments are recommended.

In tentatively approving the recovery plan draft dated February 1978, the Director (U.S. Fish and Wildlife Service) indicated that the primary objective of this plan should quantify a definite "end-point" at which the species would be de-listed. This is under consideration by the Team at this time but cannot be incorporated in this edition without unduly delaying the issuance of the plan.

FIGURE 5. BLOCK DIAGRAM.



Annotated Recovery Outline

1. PRIMARY OBJECTIVE: Prevent the extirpation of the Eastern Brown Pelican in any significant portion of its historic range.
11. RESTORE the species in vacant nesting habitat. One characteristic of the species to resist extinction is its wide distribution. This distribution must be maintained.
 111. Identify historic range and plot locations of all nesting sites used since 1950. Historic range is based on records of nesting along the Atlantic and Gulf Coasts. This task has been accomplished by the Recovery Team (Figures 1-4).
 1111. Obtain dedication of nesting sites to Brown Pelican use. Although some nesting sites are in wildlife refuges and on other public property, there remain possible conflicts of uses that could be made of those properties. This is to be resolved in two steps.
 11111. Legal analysis of ownership and other control rights. The ownership of some Brown Pelican nesting sites is not clear. An analysis of legal ownership and possible alternative management easements will precede any recommendations by the Recovery Team for land acquisition for Brown Pelican management.
 11112. Pursue secure dedication of sites through legal means including purchase, easements, et cetera.
 112. Identify extant or recreate suitable nesting habitat. This involves two steps:
 1121. Characterize suitable nesting habitat and identify all such places. Habitat now used for nesting will be

characterized to establish initial specifications of important features.

1122. Correct site deficiencies. Marginal or unsuitable habitat situations can be improved for nesting by modifying certain features, after appropriate study.

113. Establish colonies. General distribution of the species is directly related to, and probably dependent upon, locations of nesting colonies; thus it is the nesting distribution, within the former range, that is of initial concern. After nesting has been mapped, it would be appropriate to establish (or re-establish) nesting colonies in accord with the stocking plan. This will require the following steps.

1131. Develop stocking methods. Stocking practices should approximately follow those used in the Louisiana restoration project. Alternative techniques should be tested and evaluated. Natural colonization, although a conceivable means to restoration, is too slow and uncertain to accomplish the necessary restoration within a reasonable length of time.

1132. Find and arrange sources of stock. Stock for new colonies should come only from secure populations with state and federal agency concurrence and with public support. Genetic relationships should be considered in choosing stock sources.

1133. Write stocking plan. Restocking of nesting sites should be planned for attainment of the primary objective. This would call for initial stocking only of the better sites which, by their locations and number, would result in

re-establishment of the species in areas of former abundance. A stocking plan should be written.

1134. Monitor success of newly stocked colonies. Transplanted stock should be monitored for survival, reproductive success, and the impacts of identifiable limiting factors. This could probably be done best in connection with jobs (mentioned below) for routine environmental and population monitoring.

1135. Carry out stocking program. This covers capturing of stock, logistical and other activities associated with moving the stock, and care of transplanted birds until they can survive unattended.

12. MAINTAIN natural and restocked colonies through natural reproduction.

Populations should be monitored to detect whether nesting colonies are self-sustaining. It would not be realistic to specify population size goals since a basis for such specifications does not exist at this time. On the other hand, population trends will indicate whether populations are self-sustaining or not, regardless of their absolute size.

121. Identify and control limiting factors. This will involve continuous vigilance for presently known limiting factors, or manifestation of possible limiting factors and study of habitat quantity and quality requirements. As limiting factors are identified, they will be monitored in task 1221.

Any suspected manifestation of a factor that falls within this classification should be investigated to identify it and monitor it if appropriate. This task might overlap with other monitoring tasks at times. The determination of a serious limiting factor would lead to a corrective measure (Task 123).

Research is needed to identify and quantify the overall habitat needs of the species so that realistic critical habitat can be listed and bonafide habitat needs can be effectively provided.

122. Monitor limiting factors. Monitoring should be designed to routinely measure quantifiable known factors (DDE, etc.) and to search for suspected new factors when population failures cannot be accounted for by known limiting factors. This can be approached in two ways: by monitoring for those factors that are suspected of being limiting (Fig. 5, block 1221) and by measuring population success itself (Fig. 5, block 1223). It will also be necessary to monitor the new Louisiana population and its environment temporarily until a monitoring plan is prepared.

1221. Measure known limiting factors. This form of monitoring would assess the potential impact of limiting factors (DDT, etc.) that can be quantified by environmental measurements.

12211. Develop long range monitoring plan. Monitoring to date has been primarily investigation of die-offs; obtaining baseline data from healthy specimens; analyses for pesticides and other chemical pollutants; and disease research. A long-range monitoring plan should be developed by pesticide experts, with assistance from specialists in health sciences. The monitoring plan should provide for proper emphasis on measuring all detectable limiting factors

including pesticides and other chemicals, disease, colony site erosion, human encroachment, et cetera. The objective should be to produce the kind and amount of data that would be necessary to detect problems as soon as they appear and before they become serious.

12212. Monitor environment. This provides for the implementation of a long-range monitoring plan and differs from task 1222 (below).

1222. Temporary monitoring. At least minimal monitoring of populations and the environments is necessary until the long range monitoring plan (task 12211) is prepared and implemented (task 12212). Special emphasis should be on the new population in Louisiana with the particular objective there of determining the role of endrin in any future die-off. Temporary monitoring is discussed in greater detail in Part IV.

1223. Population assessment. This monitoring would concern itself with detecting population failure and trends within the pelican population itself. Local population failure may be the first evidence of the presence of a new limiting factor in the environment. Data obtained under this task will, in a general way, indicate progress in the recovery effort.

123. Initiate corrective measures. When known limiting factors are detected in significant magnitude, measures should be taken to alleviate them. This might take the form of a recommendation

that a certain pesticide be removed from use in the pelican's environment or that some special protective measure be enacted. However, until limiting factors are actually identified and measured, further task description is not possible.

PART III

IMPLEMENTING THE PLAN

This section consists of the Implementation Schedule (Table 2) showing tasks, lead agencies, sources of funding, target dates for accomplishment, assigned priority, and estimated costs, for the period 1980-1982. It will require revision annually.

Tasks relate to the block diagram (Fig. 5) and the Annotated Recovery Outline (pages II-3 through II-8).

We envision that much of the recovery effort will be funded with cooperative state and federal funds under the Endangered Species Act of 1973 (1/3 state; 2/3 federal). For the time being, this may be a problem with the States of Louisiana and Texas because they do not have cooperative agreements with the U.S. Fish and Wildlife Service to enter into the cost sharing provision of the 1973 Act. The present version of the Implementation Schedule has been prepared without taking such special circumstances into account in the belief that consistent assignment of tasks should be our goal and that deviations will become necessary only in special cases based on agreements with each agency involved. If one state cannot participate to the extent recommended in the Implementation Schedule, other arrangements will be made, but we can only recommend what we believe is the most appropriate assignment at this time.

Numbers in the Implementation Schedule correspond to Figure 5 and to the Annotated Recovery Outline (page II-3). Several numbers in the outline and block diagram do not appear in the Implementation Schedule because they are not "tasks".

Four levels of priority are shown. Priority 1 tasks are viewed as mandatory by the Team and should be done as scheduled. Priority 2 tasks will, in all likelihood, have to be done before the Eastern Brown Pelican can be considered fully recovered but may be scheduled to be done after priority 1 items as funds become available. Priority 3 tasks are highly desirable for orderly recovery but should not be undertaken with recovery funds until all priority 1 and 2 tasks are funded and well along toward accomplishment. Priority 4 tasks should not be funded by responsible agencies without further consideration and better justification and until all priority 1, 2, and 3 tasks are accomplished. Changing circumstances will occasionally require reassignment of priorities.

Table 2. Implementation Schedule, Fiscal years 1980-82

Task Block No. & Title	Lead Agency or Work Responsibility	Suggested Source of Funding	Target Dates		Priority (1-4)	Estimated Cost (\$1,000)			
			Begin	Finish		FY80	FY81	FY82	
111 Habitat Security	Identify historic range and record locations of nesting sites	FWS	FWS	FY78	FY78	Done	--	--	--
11111	Ownership analysis	FWS	FWS	FY80	FY81	1	6	--	--
11112	Dedicate nesting sites	FWS & cooperators	FWS	FY80	Continue	3	6	--	--
1121 Habitat Mgmt.	Characterize nesting habitat	Research Contract ¹	Each state ²	FY80	FY81	3	--	12	6
1122	Correct site deficiencies	Each state	States	FY80	Continue	4	--	--	6
1131 Stocking	Stocking methods	Louisiana & Texas	Each state ²	FY80	Continue	3	5	5	5
1132	Arrange sources of stock	Florida	Florida	Underway	Not Applicable	2	--	--	--
1133	Write stocking plan	FWS	FWS	FY80	FY81	1	1/2	1	1/2
1134	Monitor success of colonies	Each state ⁴	Each state	Underway	Continue	1	4	4	6
1135	Carry out stocking program	Fl., La., Tx. ³	Each state ²	Underway	FY82	2	10	10	20
121 Limiting Factors	Identify & control limiting factors	All cooperators	Each state, FWS	FY80	Continue	2	--	25	50
12211 Monitoring	Develop monitoring plan	Patuxent WRC	Patuxent (FWS)	FY80	FY81	1	5	15	--
12212	Monitor environment	Research Contract ¹	Each state ²	Underway	Continue	2	10	20	20
1222	Temporary monitoring	States & Patuxent (FWS)	State & Patux- ent (FWS)	On-going	FY81	1	6	--	--
1223	Population assessment	N.C., S.C., Fl., La., Tx.	Each state ²	On-going	Continue	3	8	8	8
123	Institute corrective measures ⁵	Each state	Each state	FY80	Continue	3	6	10	10

¹Contracts for research should be made to qualified agencies, organizations, or individuals.

²Funding would be appropriate under State and Federal cost sharing projects through the Endangered Species Act of 1973.

³Louisiana and Texas appear to be the only states requiring restocking at this time. This will be dealt with in detail in the stocking plan.

⁴Each restocked state should furnish data to the Recovery Team for routine evaluation of its restored colonies.

⁵Assignments, timing, and costs cannot all be anticipated until the types of corrective measures are known.

PART IV

DISCUSSION AND GENERAL RECOMMENDATIONS

A number of items concerning the routine management of the Eastern Brown Pelican have come to the attention of the Recovery Team. Some of these do not seem to be essential to the primary objective of the recovery plan, but responsible management is not limited solely to recovery from the endangered status. The recovery effort will influence all management decisions to some degree by affecting priorities of the managing agencies. It would thus seem useful to discuss briefly some of these.

Banding Programs and Research

Ecological research should be encouraged with emphasis on well-planned studies that have pertinence to the conservation of the Brown Pelican and do not involve adverse impacts on the species. Purely zoological research should also be allowed when it does not interfere with the recovery effort or with other research with definite conservation objectives. Hobby type research and colony visitation by inexperienced or otherwise unqualified persons should be discouraged.

The following recommendations for banding are based on the judgment of the Recovery Team members and will be amended as new information becomes available:

- 1) Bandings should be done late in the nesting season to minimize disturbance to young, to nests containing eggs, and to adults guarding eggs.

- 2) Nestlings younger than six weeks should not be banded routinely.
- 3) Banding parties of 3 to 6 persons are recommended in order to expedite that activity and minimize prolonged disturbance.
- 4) Banding should be done by professional conservation personnel assisted, when necessary, by experienced laymen.
- 5) The frequency and duration of colony visits for banding and other research purposes should be held to an absolute minimum. Two, 2-hour banding visits per colony should be sufficient, if properly timed, to result in several hundred birds being banded in large colonies.
- 6) Banding Brown Pelicans distant from nesting colonies should be permitted provided the birds can be captured, handled, and released expeditiously and without injury.

Banding and research proposals that have merit should be permitted on National Wildlife Refuges as well as in other colony sites.

Scientific Specimens

There is a need in museums for Brown Pelican specimens, especially for known-age birds, alcohol preserved specimens, and tissue and/or internal organ samples. At this time, specimens should not be taken from the wild for these purposes but an effort should be made to make maximum utilization of any specimens that become available through accident or other ways.

Scientific work related to survival of the species is especially important at this time. Some of this work will require taking of specimens, particularly for monitoring and restocking. Research proposals that call for such taking should be judged on their merits in the permit application, case by case.

It is difficult to insure that the availability of dead specimens will be known to persons who would use them. We recommend that an effort be made by the managing agencies to extend communications between the agencies, bird rehabilitation centers, and scientists who might use such specimens when they become available.

Captive Rearing

Brown Pelicans have nested in captivity as both "normal" birds and as permanent cripples unable to fly (Meischner 1959 & 1962; Klos 1966; Dooley, R. E. and O. Heyland 1969).

Rearing in captivity has three possible applications in Brown Pelican conservation. First, the species could be maintained in captivity as stock against extinction in case of some holocaustic incident in its natural environment. Secondly, captive rearing would facilitate laboratory research on pesticides, diseases, nutrition, and other aspects of Brown Pelican biology that may be important to its recovery. And thirdly, public support of the Brown Pelican conservation program is important--the general public should have a clear concept of what a Brown Pelican is, by being able to see them in zoos.

Captive rearing programs for research and public education purposes should be encouraged by the States and Fish and Wildlife Service when crippled pelicans are available that cannot survive as wild birds. Rearing methods should be documented and simplified to the greatest possible degree.

Restoration in Louisiana

The Brown Pelican population in Louisiana was a large one, although considerable differences in numerical estimates exist. Arthur (1831) and

Bailey (1918) reported 50,000 Brown Pelicans on the Mississippi River mud
lumps. Arthur (1931) further estimated the total Louisiana population to
be 75,000 to 85,000 adults. Oberholser (1938), however, recorded only
10,000 breeders for the entire Louisiana coast. While it is impossible
to estimate historic numbers of Brown Pelicans in Louisiana from the small
amount of contradictory evidence available, the Recovery Team feels that
estimates of about 10,000 breeding pairs is probably more accurate than
the others.

The last nesting record for Brown Pelicans in Louisiana involved 200
pairs in 1961 (Van Tets 1965) until Brown Pelicans from Florida were intro-
duced to Louisiana during the period since 1968. Between 1971 and 1976, at
least 220 young were fledged in the restored population. At the end of 1976
numbers stood at approximately 400 Brown Pelicans. Of the original 765
stocked and 220 fledged approximately 260 were killed by a pesticide incident
in 1975. The remainder are unaccounted for, having probably died of various
causes and/or dispersed from the vicinity.

The translocation of 100 fledglings in the summer of 1977 was to North
Island in the Chandeleur Chain of Islands where Louisiana's last natural
nesting occurred in 1961. This new population is being monitored closely
by the Louisiana Wildlife and Fisheries Commission. Plans call for future
releases to be made only on North Island and at a new location on or near
Isle Aux Pitre. All three restocked sites are east of the flow of the
Mississippi River.

Information and Public Education

The effectiveness of the Brown Pelican recovery effort is dependent on
agency and public support, in spirit and funding. To obtain the necessary
support, accurate information about the seriousness of the pelican's plight

should be made widely available so that all potential contributors will have an opportunity to support the pelican conservation program.

Participation in the recovery effort (or lack of it) by conservation agencies and organizations should be made known, when appropriate. Credit should be given to those who contribute substantially to the attainment of the recovery goals.

The public should be given opportunities to actively participate when pamphlets are distributed, signs are posted at fishing piers, et cetera.

News items on the recovery effort should be technically accurate, professional, and in a reasonably serious tone in order to convey the proper air. Technical personnel should review news items and scripts and assist public relations personnel in preparing them.

Regulation and Enforcement

The Brown Pelican is susceptible at times to disturbance and to habitat alteration. Attention should be given to regular patrols and the enforcement of conservation regulations. Important habitat, including nesting, feeding, and resting areas require protection from human encroachment. Curtailment of human disturbance is especially important in nesting colonies.

The dedication of key nesting areas as Brown Pelican sanctuaries through purchase of long-term easements, in combination with effective enforcement, would add stability to the pelican management program.

Section 7 of the Endangered Species Act of 1973 should be enforced by the appropriate federal agencies to make maximum use of the provision in the Act that would prevent any federal agency from becoming involved in any activity that would degrade the "critical habitat" of the Brown Pelican.

("Critical habitat" has been recommended in a separate transmittal to the U.S. Fish and Wildlife Service. It will be described in future editions of the plan after final approval.)

Ownership of Nesting Sites

Table 4 lists all colony sites in the United States used by Brown Pelicans since 1950 with information about ownership of each.

Of the 46 colony sites occupied since 1950, 26 (57 percent) are in state ownership; 9 (20 percent) are in Federal ownership as National Wildlife Refuges or National Parks; 6 (13 percent) are in private ownership and 5 (11 percent) are in miscellaneous or uncertain ownership. Most of the colonies in state ownership are poorly dedicated and some of these could be modified, sold, or destroyed under present law. The future of those in private ownership is even more uncertain. A few colonies are under management control of wildlife agencies and organizations, but the terms and duration of such control are not clear. An effort should be made to dedicate those colony sites now in state ownership as state wildlife refuges, or by some other means insure their remaining in a suitable condition for pelican nesting. Important nesting islands in private ownership should be adequately dedicated to insure that Brown Pelican conservation is given very high priority.

A thorough analysis of the ownership and management rights of each colony site is recommended (task 11111).

Table 4. Ownership of Pelican Nesting Sites Used Between 1950 and 1976.

State	County/ Parrish	Local Name	Latitude- Longitude	Documented Year of Activity Since 1950	Ownership
N.Carolina	Carteret	Rock Island (3 sites)	35°06' - 76°04'	1950-1976	Public Ownership (State or Federal)
S.Carolina	Charleston	Deveaux Banks	32°33' - 80°10'	1950-1976	State Ownership
S.Carolina	Charleston	Marsh Islands	32°59' - 79°32'	1951, 55-59, 62, 64, 65, 67-76	National Wildlife Refuge
S.Carolina	Charleston	Bird Bank	32°57' - 79°34'	1951, 57, 61, 63, 65, 66, 71, 74	National Wildlife Refuge
S.Carolina	Charleston	Raccoon Key	33°00' - 79°29'	1952	National Wildlife Refuge
S.Carolina	Charleston	White Banks	33°01' - 79°31'	1956, 58-60, 63, 65	National Wildlife Refuge
Florida	Volusia	Port Orange	29°09' - 80°58'	1968-1976	State Owned Spoil Island
Florida	Brevard	New Smyrna	29°02' - 80°55'	1976	State Owned Spoil Island
Florida	Brevard	Crane Island	28°49' - 80°46'	1950-1976	National Wildlife Refuge
Florida	Brevard	Hall Island	28°23' - 80°37'	1968-1976	State Owned Sovereignty Land
Florida	Brevard	George & Brady Islands	28°17' - 80°40'	1974-1976	Brevard County

Table 4. Continued

State	County/ Parrish	Local Name	Latitude- Longitude	Documented Year of Activity Since 1950	Ownership
Florida	Indian River	Pelican Island	27°48' - 80°26'	1950-1976	National Wildlife Refuge
Florida	Indian River	Vero Beach	27°38' - 80°22'	1968-1976	State Owned Spoil Islands
Florida	St. Lucie	Ft. Pierce	27°28' - 80°20'	1968-1976	State Owned Spoil Islands
Florida	Martin	Sewell Pt.	27°11' - 80°11'	1974-1976	Private Ownership
Florida	Monroe	Don Quizote Key	24°40' - 81°19'	1968-1976	Private Ownership
Florida	Monroe	Molasses Key	24°41' - 81°11'	1968-1976	Private Ownership
Florida	Monroe	Remainder of Florida Bay & Keys (Little Duck Key, South Nest Key, Big Tern Key, Cowpens, West Key, South Bouyx Key, Palm Key, Frank Key, both Buchanan Keys, Barnes Key, Arnsnicker Key, Channel Key, Fanny Key, East Bahia Key, Coon Key, Rattle- snake Key, Bill Finds Key, Cattel Key, Marquesas Key and Dry Tortugas.)		1968-1976	National Wildlife Refuge and National Park

Table 4. Continued.

Florida	Collier	Everglades City	25°51' - 82°25'	1968-1976	National Park
Florida	Collier	Marco Pass	25°58' - 82°41'	1971-1976	Unknown
Florida	Lee	Estero Bay	26°22' - 82°50'	1968-1976	State Owned Sovereignty Land
Florida	Lee	N. Estero Bay	26°25' - 82°53'	1971-1976	State Owned Sovereignty Land
Florida	Lee	Miguel Key	26°30' - 82°01'	1969, 1973	State Owned Sovereignty Land
Florida	Lee	Masters Landing	26°34' - 82°04'	1968-1973	State Owned Aquatic Preserve
Florida	Lee	Hemp Key	26°36' - 82°09'	1968-1976	State Owned Sovereignty Land
Florida	Lee	Bird Key	26°40' - 82°14'	1968-1976	State Owned Sovereignty Land
Florida	Charlotte	Gasparilla Pass	27°49' - 82°16'	1975-1976	West Coast Inland Navigation District
Florida	Sarasota	Venice	27°03' - 82°26'	1968-1974	State Owned Sovereignty Land
Florida	Sarasota	Osprey	27°12' - 82°32'	1972-1974	State Owned Sovereignty Land
Florida	Sarasota	Roberts Bay	27°18' - 82°32'	1970-1976	State Owned Sovereignty Land
Florida	Manatee	Buttonwood Harbor	27°23' - 82°38'	1968-1976	State Owned Sovereignty Land
Florida	Manatee	Cortez	27°28' - 82°41'	1968-1976	State Owned Sovereignty Land
Florida	Manatee	Bird Key	27°33' - 82°36'	1968-1976	State Owned Sovereignty Land

Table 4. Continued.

State	County/ Parrish	Local Name	Latitude- Longitude	Documented Year of Activity Since 1950	Ownership
Florida	Hillsborough	Bird Island	27°51' - 82°24'	1968-1970	Private Ownership
Florida	Pinellas	Tarpon Key	27°40' - 82°41'	1968-1976	National Wildlife Refuge
Florida	Pinellas	Johns Pass	27°47' - 82°46'	1971-1976	a) Private Ownership b) City of Maderal Beach
Florida	Pinellas	Ancolet Sound	28°06' - 82°49'	1968-1972	State Owned Sovereignty Land
Florida	Citrus	Bird Key	28°49' - 82°45'	1968-74, 76	State Owned Sovereignty Land
Florida	Levy	Seahorse Key	29°07' - 83°03'	1968-1976	National Wildlife Refuge
Florida	Gulf	Port St. Joe	29°50' - 85°20'	1971, 1972, 1976	State Owned Sovereignty Land
Louisiana	Plaquemines	Queen Bess Island	28°18' - 80°95'	1971-1976	State Owned
Louisiana	San Bernard	North Island	29°52' - 88°55'	1961-1962	State Owned

State	County	Local Name	Latitude-Longitude	Years Active	Ownership
Texas	Galveston	S. Deer Is.	29°17'-94°15'	1950-1961	State (leased to National Audubon Society)
Texas	Galveston	Shell Is.	29°11'-95°00'	1950-Appx. 1961	State
Texas	Brazoria	Bird Is.	29°06'-95°08'	1950-1961	State (Leased to NAS)
Texas	Matagorda	Dressing Point Is.	28°44'-95°46'	1950-Appx. 1961	State
Texas	Matagorda	Coon Is.	28°39'-96°14'	1950's	State
Texas	Matagorda	Sundown Is.	28°27'-96°21'	1974	State
Texas	Aransas	Second Chain of Islands	28°11'-96°49'	1965, 1968, 1970, 1972-74, 1976	State (Leased to NAS)
Texas	Aransas	Long Reef	28°04'-96°57'	1969, 1977	State (Leased to NAS)
Texas	Nueces	Pelican Island	27°49'-97°10'	1967, 1970-72 1975-76	Port of Corpus Christi Navigation District (Bird Sanctuary)

Monitoring

The decline of the Brown Pelican in Louisiana, Texas and California in the 1950's went unnoticed by conservation agencies until the populations had reached seriously low levels. This emphasizes the need for monitoring. Temporary monitoring should proceed throughout the range of the Eastern Brown Pelican until a long-range monitoring plan is developed. The following discussion is designed to offer interim guidance in this area.

Florida. Temporary monitoring in Florida should include continuation of the annual aerial survey and prompt investigations of reported die-offs. At least two visits should be made to three widely separated nesting colonies during the nesting season to observe nesting success, or, more specifically to detect nesting failure, thin shelled eggs, or other serious reproductive problems.

More intensive field monitoring should commence in the event that a serious problem is detected.

Louisiana. Nesting success in the two new colonies should be monitored closely. Die-offs should be rapidly and carefully investigated as to the cause. Provisions should be made to routinely collect and store specimens of fishes and marine birds in the vicinity of nesting colonies for later analysis in the event of a bird or fish kill, with the objective of specifically determining the possible role of endrin.

Texas. All colonies should be monitored carefully for reproductive success. All dead pelican specimens available should be autopsied for cause of death and analyzed for pesticides.

South Carolina and North Carolina. The three colonies in these two states

should be monitored for reproductive success by regular boat visits. Adled eggs should be collected and dead specimens saved for possible autopsy and pesticide analysis.

Mexico and the West Indies. No monitoring is suggested at this time. Attention should be given to these populations in the long range monitoring plan (task 12211), however.

Delisting of the Eastern Brown Pelican

We know of no basis for predicting when or under what circumstances the Eastern Brown Pelican can be removed from the Endangered Species List. The Brown Pelican became endangered in the first place because of its extreme sensitivity to unknown factors. Its demise was not detected by conservation agencies in Louisiana (or the western subspecies in California) until reproductive failure had taken place (California) and the populations had been depleted (Louisiana). We believe that to remove the Brown Pelican from the endangered or threatened species list because of its perceived recovery in any part of its range may place such populations again in jeopardy unless there were some other means of staffing and funding an adequate monitoring program for the species. At this time there exists no dependable means of monitoring a non-game, non-threatened bird in the states in which the Brown Pelican occurs.

Special provisions should be made for financial support to monitor delisted endangered and threatened species: otherwise, recovery teams will probably not recommend their species for delisting.

PART V

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PART VI

APPENDICES

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APPENDIX A. Summary of reviewer comments on the Preliminary Draft

The Preliminary Draft of the Recovery Plan was issued on 1 November 1976 and mailed to 65 agencies, organizations, and individuals including state and federal agencies likely to be interested in Brown Pelican management, for critical review. Formal written responses were received from 12 reviewers, less formal review comments in the margins of the manuscript were received from 5 reviewers, informal hand-written notes were received from two reviewers, and brief verbal comments and the team's responses are on file at the U.S. Fish and Wildlife Service Regional Office, 75 Spring Street, SW, Atlanta, Georgia 30303.

The reviews contained mostly editorial suggestions on grammar and style. Most criticism concerning omissions and other shortcomings of the manuscript were adopted and are reflected in this edition of the plan.

One criticism that was repeated by several reviewers had to do with certain management recommendations that were made in the narrative portion of the plan but which did not appear in the block diagram or the implementation schedule. This has been corrected by a clear statement that Part IV of the revised plan contains general management recommendations that are offered in addition to the steps believed essential for recovery of the species and will thus not be scheduled for implementation as part of the Recovery Plan.

Several reviewers questioned what they viewed as undue emphasis on nesting season limiting factors and nesting colony management at the exclusion of other periods during the bird's life cycle. The Team has not intended to ignore any need of the Eastern Brown Pelican, but, with

the exception of pollution, we know of no serious survival problem requiring attention that is not focused on or most readily detected in the nesting colony or some related aspect of reproduction. As other problems are identified, they will be considered and dealt with. A study is being recommended to determine crucial habitat components the year around.

At least three reviewers cautioned the Team about the genetics of transplanted stock. This is an extremely difficult thing to deal with. First, nothing is known about genetic variation and its meaning to adaptation, except those few physical characters used in describing the races of the Brown Pelican. Secondly, there is no way to reconstruct the genetic makeup of an extirpated population--any restoration work will of necessity be done with birds of conceivably different ancestry. Perhaps the most pertinent case in point concerns the possible origin of stock that may be used to restock the Texas coast where a few of the original pelicans still persist. Be assured that the Recovery Team will move cautiously in this area.

Some reviewers felt that the plan contains too much emphasis on restocking. Our answer to that is that we know of no other way to restore the species as a breeding bird in portions of the former range. Natural re-colonization is too uncertain and slow. Restocking suitable habitat with natural wild animals is a well demonstrated game management technique that rarely fails to re-establish populations in former range and is equally appropriate for a non-game species like the Brown Pelican under some circumstances. As stated in the plan, stocking will be done only to restore the species in its former range. We do not intend to give this undue emphasis.

A few of the reviewers who made the most thorough reviews of the manuscript suggested that the plan should contain information or recommendations on topics that were beyond the scope of the plan's purpose, for example: winter census, "ecosystem" rather than "species" approach, and general discussion of environmental pollutants. We have attempted to clarify the plan objectives in the revised edition and to explain that while much worthwhile work needs to be done in the way of research and management of the Brown Pelican and its environment, the Recovery Team is narrowly constrained to deal only with its survival.

