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Dan C. Holliman
Birmingham-Southern College

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CLAPPER RAIL (*Rallus longirostris*) STUDIES IN ALABAMA¹

Dan C. Holliman
Biology Department
Birmingham-Southern College
Birmingham, AL 35204

ABSTRACT: The habitat and distribution of the clapper rail *Rallus longirostris saturatus* in salt and brackish-mixed marshes of Alabama is described. A total of 4,490 hectares of habitat is mapped. Smaller units of vegetation are characterized in selected study areas. A comparison of these plant communities and call count data is shown for each locality. Concentrations of clapper rails generally occurred in those habitats with the higher percentage of *Spartina alterniflora*. A census technique utilizing taped calls is described. Trapping procedures are given for drift fences and funnel traps. Life history data are presented including an early date of April 1 for first eggs in Alabama. Seven stomachs from summer birds yielded remains of *Uca* and unidentified seed material. *R. l. saturatus* was the only subspecies found during winter and summer surveys.

Clapper rails are permanent residents along the Alabama Gulf Coast. They are found in sound and bay areas and along coastal rivers and creeks where salt-marshes and brackish-mixed vegetation persist. Little is known of the biology of clapper rails in this area. This population has not been subjected to hunter harvest in Alabama (Mangold, 1977), where rail hunting is practically nonexistent. The lack of extensive habitat and significant high tides that would concentrate large numbers of birds in small areas probably accounts for the lack of hunting pressures. Thick marsh vegetation and shallow water even at high tides discourage hunters from using boats and dogs.

It was thought that northern races may winter along the Alabama coast. Field observations in the late 1960's suggested that concentrations of these birds used certain areas for nesting, and that the local population experienced an increase during the winter. Moreover,

several remote off-shore islands and other less accessible coastal regions were thought to afford an unknown potential for rail habitat. Earlier field work also suggested a need to determine productivity and to gather more concrete life history data.

Clapper rails have always been abundant in Alabama tidal marshes. In earlier years there were significant stretches of marshland along the shores of Mississippi Sound, Mobile, Weeks, Bon Secour and Perdido Bays. Surveys begun by the Coast and Geodetic Survey in 1856 mapped almost twice the area of tidelands that are present today. Howell (1928) reported the clapper rail plentiful on Dauphin and Petit Bois Islands and in the Perdido Bay marshes. He also found it on Blakely Island in Mobile River and in the marshes around Bayou la Batre. The coastal marshes of Alabama began to decline noticeably by the early 1950's (personal observations). By the mid 1960's low areas along the Mississippi Sound and the bay areas of Baldwin County were filled with dredge spoil, and much of the existing natural beaches were replaced by seawalls (Traylor, 1971). In 1969 tropical storm Camille virtually destroyed the existing marsh-

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land on the west end of Dauphin Island. Crance (1971) recorded approximately 19,357 acres of emergent plants in Mississippi Sound, Mobile Bay, Perdido Bay and Little Lagoon. Chermock (1975) tabulated approximately 15,052 acres of tidal marshland in these areas. However, he included 781 acres of fresh-mixed marsh. Vittor and Stout (1975) mapped nearly 16,000 acres of salt marsh and brackish-mixed marsh in the Alabama coastal zone. Imhof (1976) described the clapper rail to be abundant but strictly confined to salt marshes. Holliman (1977) reviewed the status of rail and gallinule habitat on a range wide basis and projected a ten year management plan for these wetland resources.

The purpose of this paper is to describe the existing habitat and distribution of *Rallus longirostris*, Boddoert in Alabama, and include life history data and field techniques.

MATERIALS AND METHODS

Description of habitat

In the northern Gulf Coast portion of their range clapper rails are found in both salt and brackish-mixed marshes. In terms of vegetation patterns these habitats are not usually clearly defined but blend inseparably one into the other.

"Pure" saltmarshes are subject to constant tidal flooding and experience salinities over 15 ppt at least part of the year. This habitat type is characterized by smooth cord grass, *Spartina alterniflora*, which is most abundant where wave action is mitigated and accretion occurs. Saltmarshes also contain inclusions of black needle-rush, *Juncus roemerianus*, at slightly higher elevations.

Brackish-mixed marshes, on the other hand, are subject to fresh water, some tidal flooding and experience salinities

from 5 to 15 ppt at least part of the year. This habitat type is characterized by *S. alterniflora* and giant cord grass, *S. cynosuroides*. *S. alterniflora* may be greatly reduced and typically forms thin borders around brackish-marshes. *S. cynosuroides* is usually found at slightly higher elevations and is generally more abundant than *S. alterniflora*. Other dominating plants in brackish-mixed marshes include *J. roemerianus*, *Distichlis spicata* (salt grass), *Borrichia frutescens* (sea ox-eye), and *Scirpus* spp. (three square). *Sagittaria falcata* (duck potato) generally marks the transition zone between brackish-mixed and fresh-mixed marshes.

Within both salt and brackish-mixed marshes saltbush communities may be present in areas of raised elevations. *Baccharis halimifolia* (saltbush), and *Iva frutescens* (marsh elder) characterize this plant association.

Saltflat communities may interdigitate the inland border of both salt and brackish-mixed marshes. These exposed areas are inundated only by very high wind tides and excessive water run-off. High soil salt concentrations are present. Typically the saltflats are barren with the exception of scattered communities of *Salicornia* spp. (glasswort), *Batis maritima* (saltwort), *D. spicata* and certain bluegreen algae and diatoms.

Selection of Study Areas

Small units of cover were selected so that detailed vegetative and population studies could be made. Likely-looking locations for study areas were examined by air, then reached by truck or boat and subsequently explored on foot. Areas were closely examined where there were abundant signs such as old nests, tracks, or evidence of feeding. Numerous calls as well as flushed birds led to the final

selection of specific study areas. The boundaries of each location were established at the farthest points that clapper rail signs could be found in all directions. These parameters were measured on the ground and checked against topographical maps and aerial photographs (See Fig. 1). A digital planimeter was used to compute exact acreage for each tract. A transect was then plotted as close to the longitudinal axis of each area as possible. These transects necessarily conformed to local topography and ran the entire length of each study area. They served as both call count routes and transects for vegetative studies. Vegetative data were gathered (m^2) at 50 meter intervals along the transect.

Census Technique

A census technique was developed to locate concentrations of birds in the study areas. The technique of using magnetically taped calls on a portable tape recorder was followed as described by Varoujean (1972) and Tomlinson and

Todd (1972). Counts were made in each study area during May, June and July of each year. The survey was conducted by playing the eastern clapper "Kek" and "Clatter" call at 50 meter intervals along the transect. The number of stops where the tape was played varied according to the length of the transect. Various hours were tried to determine the most productive periods of the day. Weather data were collected and recorded. If readings exceeded 2 (Beaufort scale) for either sky or wind the count was not made. Taped calls were broadcast with a portable Sony TC 900 tape recorder (use of brand names does not imply endorsement by the Federal Government). Both solicited and unsolicited calls were recorded only in one direction along the transect to prevent counting the same birds twice. This technique of using taped calls on a portable tape recorder was also used to locate clapper rails in bay areas and along rivers. The boat was stopped in likely areas where responses could be elicited. This method proved

Fig. 1. Clapper Rail habitat in Alabama: 1. Bayou la Fourche, 2. Bull Bay Bayou, 3. East Marsh Is., Grand Bay, 4. Point aux Pins, 5. Little Bay and Litte River, 6. Isle aux Herbes, 7. Marsh Island, Portersville Bay, 8. Cat Island, 9. West Fowl River, 10. Heron Bay Bayou, 11. West end of Dauphin Is., 12. Little Dauphin Is., 13. Grave-line Bay, 14. St. Andrews Bay, Little Point Clear, 15. Oyster Bay.

highly effective in dense brackish-mixed marshes that were otherwise inaccessible except by boat.

A main objective of developing this census technique was to locate concentrations of clappers rather than to produce an accurate index of the breeding population. To achieve this objective and stay within the time limitation, selected areas were evaluated rather than attempt random sampling along the entire Alabama coast line. Because of inclement weather on several occasions it was impossible to accomplish the same number of counts at each locality. Therefore the relative number of birds recorded at specific locations was not necessarily indicative of the precise densities of the clapper population there.

Habitat Inventory

A working copy of the vegetation maps produced by Vittor and Stout (1975) was traced on film and then checked by air flights and ground truth surveys to delineate clapper rail habitat. Small, isolated areas less than 8 contiguous hectares or inclusions within larger marshes that have been ecologically disturbed were not plotted. Scattered pieces and small strips of marsh in bays and along rivers were also deleted. A digital planimeter was used to compute the area in the habitat inventory (Table 1).

Trapping

Clapper rails have been trapped in other parts of their range by a variety of methods. Each method was developed to suit local field conditions. Because of the low water level even during periods of high tide the use of air boats with lights and nets at night was not feasible. Because of the basic similarity of vegetation patterns of Alabama and

Louisiana marshes, the rectangular box-type trap with funnel entrances, as described by Bateman (1965) in a Louisiana study, was tried. It was thought that this type would function more efficiently than a drop door trap since the extremely thick vegetation would hamper the mechanism of the moveable parts. The Point aux Pins field station was chosen as a trapping locality because of its accessibility and relatively large number of birds as determined by the census technique. The basic differences in the study area at the Point aux Pins with those studied by Bateman (1965) is a lack of significant high tides and a scarcity of extensive mud flats and numerous interconnecting tidal "guts" or ditches of the former location.

Two trap types were field tested during the study. A description of dimensions, construction and materials follows. Both traps had two funnel entrances that were staggered so that a trapped bird would not pass out of the trap once inside. One trap, a modified dove trap, was constructed of 2.5 x 3.1 cm mesh weld wire with the funnels made of the same material. This trap was 86.4 cm in length, 25.4 cm in height and 45.7 cm in width (Fig. 2). The other was constructed of 2.5 cm mesh heavy duty galvanized wire, 86.4 cm in length, 30 cm in height and 30 cm in width. Funnels for this trap were con-

Table 1. Salt marsh and brackish marsh inventory (1976), of Alabama.

LOCATION	HECTARES
Mississippi line east to Grand Bay	626
Grand Bay including east and west Marsh Islands	85
Point aux Pins, Sandy Bay and Little River	243
Little River to Bayou La Batre	221
Coden, north bank of West Fowl River and Grand Point	471
Heron Bay and Mon Louis	2,000
Isle aux Herbes (Coffee Island)	258
Marsh Island, Portersville Bay	27
Cat Island	10
Cedar Point	30
Little Dauphin Island	196
Graveline Bay (Airport marsh)	135
West Dauphin Island	145
St. Andrews Bay, Little Point Clear	28
Oyster Bay	15
TOTAL	4,490 hectares

structed of 1 cm hardware cloth with the inner wires shredded in long strips to form a one way passage. The entrance for each funnel varied from 10 to 30 cm wide and extended not more than 25.4 cm into the trap. The innermost opening of the funnels was less than 2.5 cm and in most cases the protruding wires from each side of the funnel almost touched. Both types of traps were provided with weld wire bottoms to prevent predators from killing trapped birds. Hinged doors, 35 x 30 cm, were placed in the center top of each trap for the removal of birds. Each trap was assembled with 1 cm hog rings.

Drift fences made of 2.5 cm mesh, 60 cm high and 46 m long were set in areas of abundant rail signs. An attempt was made to traverse tidal guts, trails, feeding platforms and tidal ponds with these drift fences. The traps were selectively placed along the length of the drift fence in likely places; with one side of the trap flush against the drift fence. An apron 1.6 m long, constructed of the same size wire as the drift fence, was extended from the "outside" corner of each trap. Some aprons were positioned at a 45° angle while others were formed into an arch curving back towards the drift fence. The purpose of these aprons was to redirect birds back into the drift fence in case the entrance was initially bypassed. Some drift fences were erected in a straight line; others were placed to conform to existing features such as ponds, nutria and muskrat lodges, etc. Wooden stakes 1 m long and 1.3 cm square were used to support the drift fences and aprons and to secure the traps.

The traps and drift fences were placed in three different areas in the marsh:

- 1) well above the high tide line, usually covered with less than 0.3 m of water;
- 2) usually covered with between 0.3m

Figure 2. Devices for trapping clapper rails.

and 0.6m of water; 3) usually covered by more than 0.6m of water.

RESULTS

Clappers were prone to answer calls throughout the study period (Table 2). Both the "Kek" and "Clatter" calls as described by Tomlinson and Todd (1972) were effective in eliciting responses. These were the most common calls and frequently two or more birds would go into a "widely spaced" chorus. The "Agitated Kek" and "Kek-burr" were heard but were not as numerous as the "Kek" and "Clatter" calls. Another call heard in this study was a "Purr" call given by a trapped immature bird while held in the hand. This call was very low in volume and resembled the purr of a kitten. Another immature bird continuously emitted a series of the "Agitated Purr" alarm notes thus called two adult

rails within 1 m of the trapping area at the Point aux Pins. On July 9, 1975 four first year birds were heard giving the "Hoo" call as they fed with adults at the mouth of Magnolia River. This low "Hoo" call appeared to keep the family unit together in thick vegetation rather than serving as an alarm call.

Early morning and late evening times yielded the most data, at which time there was less human interference and disturbance from other bird species, such as laughing gulls and terns. Wind velocity and cloud cover appeared to be the most significant environmental factors. Some birds answered but did not approach; some would approach and not answer; others would both approach and answer. An attempt was made to spend no more than 60 minutes along the length of the transect. Wind speed probably had the greatest effect on detecting solicited calls. Birds usually responded immediately to the taped calls, and because of their "scattered" nature, the chorus effect as described by Gill (1972) did not have a significant effect in reducing the number of birds heard. No attempt was made to determine the sex of the

bird giving the call.

Table 3 characterizes and compares each study locality. These comparisons are based upon the estimated per cent of *Spartina* and rails per hectares. The estimate of rails per hectares was based upon size of study area, and the average number of birds either seen or heard in each study area during the study period. The number of counts indicate the total number of times each study area was censused. The number of birds represents the total number of birds counted during the three year study period in each locality.

Study Specimens

All specimens examined by the investigator during this study were referable to:

Rallus longirostris saturatus Ridgway
Rallus longirostris var. *saturatus*
 "Henshaw" Ridgway, Bull. Nuttall
 Orn. Club, 5, no. 3, July 1880, p.
 140. (Louisiana = Rigolets, Lake
 Borgne, LA)

Five color phase and various degrees of intermediates between these phases were encountered as follows (modified after Oberholser, 1937):

Table 2. Description of calls given by *R. l. saturatus* along the Alabama Gulf Coast.

Name of Call	Description
Kek	Regular spaced Kek-Kek-Kek-Kek call.
Agitated Kek	Higher pitched and more insistent than regularly spaced Kek call. Usually trilling down the scale towards end of call.
Clatter	Coarse with considerable more volume than the Kek call.
Ker-burr	Resembles the Kek call. Terminal notes with a trilled "brrr" sound. Usually heard after Kek and Clatter calls.
Purr	Low purred note usually difficult to hear unless close to the bird.
Agitated Purr	A louder Purr call with more insistence. Can be heard at a greater distance than simple Purr call.
Hoo	Extremely low in volume and usually heard within family groups while feeding or moving through thick vegetation.

1. **Light gray phase:** Feathers of dorsum and scapulars with medium light to grayish-brown centers. Border broad and clear gray.
2. **Dark gray phase:** Feathers of dorsum and scapulars much darker with dark brown to blackish centers. Border broad and clear gray to darker.
3. **Light brown phase:** Feathers of dorsum and scapulars centrally dark with rufescent brown cast. Border light olive brown.
4. **Dark brown phase:** Feathers of dorsum and scapulars very dark brown or black. Border light olive brown.
5. **Gray-breasted phase:** Feathers of dorsum and scapulars resemble dark brown phase. Jugulum and breast clear to rather dark gray, not cinnamon.

Measurements

Following a method used by Bateman (1965) a division point between the mean

of each sex was established for bill length and middle toe length. A division point for bill length of 60 mm and a division point for middle toe length of 48 mm was established. Birds with measurements below these points are usually females. These measurements fall within the range given by Oberholser (1937). In adult birds usually the distinction was easily made by following these division points. The method of aging chicks was followed as described by Adams and Quay (1958).

average of ten females - Wing 135 mm (130-154), Bill 57 mm (54-66), Toe 40 mm (39-48)

average of ten males - Wing 160 mm (141-164), Bill 65 mm (53-68), Toe 49 mm (43-53)

one chick, nine weeks old - Wing 45 mm, Bill 38 mm, Toe 47 mm

one chick, eight weeks old - Wing 30 mm, Bill 38 mm, Toe 28 mm

Table 3. Characterization and comparison of clapper rail study areas along the Alabama coast.

Location	Type of marsh	Size of study area (hectares)	Number of counts	Number of birds	<i>Juncus</i> %	Other %	<i>Spartina</i> %	Rails/hectare
Marsh Island								
Portersville Bay	Insular	6.1	2	32	10	5	85	2.64
Heron Bay Bayou	Fringing	10.1	4	90	35	—	65	2.22
Isle aux Herbes	Insular	12.1	2	49	3	2	95	2.02
East Marsh Island, Grand Bay	Insular	3.2	3	17	15	5	80	1.72
Graveline Bay (Airport marsh)	Fringing	10.9	12	224	35	5	60	1.70
Point aux Pins	Fringing	8.1	13	159	15	10	75	1.51
Cat Island	Insular	5.7	3	23	30	20	50	1.36
St. Andrews Bay, Little Point Clear	Fringing	8.1	2	20	50	10	40	1.24
Little Bay and Little River	Fringing	20.2	3	74	30	20	50	1.21
Bayou la Fourche	Fringing	2.0	3	7	90	—	10	1.14
West Fowl River	Fringing	12.1	10	124	60	—	40	1.01
Little Dauphin Is.	Insular	8.1	5	37	70	5	25	.91
Bull Bay Bayou	Fringing	2.0	3	5	85	—	15	.84
Oyster Bay	Fringing	8.1	2	5	80	5	15	.32
West End of Dauphin Island	Insular	11.3	8	10	2	95	3	.12

Fringing - marsh bordering shoreline or tidal pools and bayous inside peninsular or mainland

Insular - marsh bordering shoreline or tidal pools and bayous inside island

one chick, seven weeks old - Wing 29.9 mm, Bill 20.1 mm, Toe 20.7 mm
 one chick, seven weeks old - Wing 25.2 mm, Bill 24.5 mm, Toe 21.2 mm

Eggs

Eggs were taken April 1 to July 22; downy young were taken May 3 to August 30. Egg data are summarized in Table 4.

Forty eggs measured by Bent (1926) averaged 42 by 29.3; the eggs showing the four extremes measured 46 by 30, 41.2 by 31.6, 39.5 by 28.5 and 40 by 28.4.

Nests

Nests were typically located close to secondary and tertiary tidal creeks in large open areas of *S. alterniflora* that grew to 0.6 m in height. The minimum distance between active nests was 10 m. It was not uncommon to find inactive "nests of the year" within 10 cm of productive nests. No nests were found in pure *Juncus* stands or in areas where there was a mixture of only *Distichlis* and *Spartina*.

Nests were built of uniform pieces of *Spartina* stems interwoven among the living stems of this same species, thus forming a platform with a slight concavity. They were placed 15-25 cm above the floor of the marsh. This height usually accommodated the normal high tides. Some nests were provided a canopy of living *Spartina* leaves. Usually there would be a "ramp" of *Spartina* stems leading into each. Dispersed in the thatched floor of successful nests could usually be found fragments of egg shells. At least two of the nests located during this study were used as a feeding platform after the young had hatched.

Apparently the principal predator on the clapper rail in the study areas is the

raccoon, *Procyon lotor*. Twenty-eight nests were found that had been destroyed by raccoons. Storm tides accounted for the destruction of 10 nests and 14 others were destroyed by undetermined causes.

Food Habits

Stomachs from seven summer specimens yielded remains of *Uca* and some seed materials. On August 6, 1975 a single clapper rail was observed feeding on a small fish in a tidal pool on the west end of Dauphin Island. The identification of the fish was not made.

Trapping

A prediction cannot be made as to which trap design or trapping area is the most productive for Alabama marshes. Approximately equal numbers of birds were caught and/or seen in each location. Numerous birds escaped through funnel entrances as evidenced by droppings and feathers in empty cages. In three instances birds were observed escaping after having been trapped. Trapping began on July 17, 1974 at the Point aux Pins marsh and was terminated August 16, 1974. Three hundred and seventy trap-days produced 10 birds. In 1975 trapping was resumed on July 20 and terminated August 3. One hundred and forty-four trap-days produced 5 birds. Heavy rains generated by three tropical depressions seriously hampered field activities in 1975. No trapping was attempted in 1976.

DISCUSSION

Generally, the study areas containing the most *Spartina* habitat also had the highest density of birds. This is particularly true for certain off-shore islands and other relatively inaccessible areas on the mainland. Coastal Alabama lacks

Table 4. Measurements from eggs of six nests from the Point aux Pins study area in 1974.

CLUTCH SIZE	WEIGHT (G)	LENGTH (MM)	WIDTH (MM)
7	av 18.3 (17.4) 19.1	av 42.3 (40.2) 43.1	av 29.8 (29.0) 30.3
7	av 17.7 (16.3) 19.9	av 41.0 (39.8) 42.2	av 28.8 (27.4) 29.4
7	no weight taken	av 41.5 (40.0) 43.4	av 28.8 (28.6) 29.1
7	av 17.6 (16.7) 18.3	no measurements taken	no measurements taken
6	av 17.5 (16.8) 19.1	av 40.7 (39.0) 42.0	av 29.6 (29.1) 30.2
2	no weight taken	av 41.7 (41.5) 42.0	av 30.5 (30.8) 30.3

extensive, uninterrupted expanses of *Spartina* marshes. The southern portion of the Isle aux Herbes, or Coffee Island has the largest *Spartina* meadow in the state at more than 125 hectares. Smaller "pure" *Spartina* marshes such as those on Marsh Island and Cat Island in Portersville Bay and East Marsh Island in Grand Bay, support significant populations of clapper rails for their size. Degradations of *Spartina* marshes by human development and by tropical storms within the last 20 years have reduced considerably the amount of *Spartina* cover for both Little Dauphin Island and the west end of Dauphin Island. Where "pure" stands of *Juncus* occur, such as at the Bayou la Fourche, Bull Bayou and Oyster Bay study sites, low populations of rails were found.

Searches for birds by using the tape-call technique as described in this paper were made in all of the Alabama coastal rivers and creeks. In other parts of their range *R. l. saturatus* is commonly found at the mouths of coastal rivers and along bayous wherever cordgrass occurs (Man-

gold, 1977). The Yuma Clapper Rail (Tomlinson and Todd, 1972) is the only subspecies found in brackish and fresh water along the Colorado River between Arizona and California in cattail (*Typha latifolia*) and tule (*Scirpus acutus*) marshes. During this Alabama study rails were located in fringing *Spartina* marshes along West Fowl, Deer and Dog Rivers. Their distribution became more disjunct in those rivers where there was a paucity of *Spartina*. For example, in Fish River, rails were located one-half kilometer up river from its mouth. Solicited calls were also recorded from a small fringing marsh at the mouth of Magnolia River at Weeks Bay. These two *Spartina* marshes were less than 2 hectares and were surrounded by fresh-mixed vegetation. Likewise the up river distribution of clappers in Little, East Fowl and Bon Secour Rivers was limited to small strips of *Spartina* less than fifty meters long and ten meters wide. No birds were found in the Mobile delta or east of Oyster Bay along the intra-coastal waterway or in Perdido Bay where

there are no *Spartina* marshes. The distribution of clapper rails may also be influenced by the occurrence of *Uca*. The northern extent of *Uca*'s territory in the Alabama coastal zone is unknown. Freshwater may limit its range as well as that of *S. alterniflora* and *S. cynosuroides*.

Since *Spartina* marshes are so important as habitat for clapper rails it is suggested that rough estimates of population size could be determined from inspection of aerial photographs taken annually. Air flights and ground truth surveys can be made to check for inaccuracies in defining floral signatures. It has been shown that the tape-call technique can serve as "point" checks for concentrations in given areas during the nesting season when the birds are most vocal. This information, coupled with nesting density data, could be used to determine population sizes for specific habitat types and sizes. These figures could thus be extrapolated to arrive at a total population estimate for a given time.

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contributed flight time for low level aerial inspection and photography during 1974. The Alabama Department of Conservation and Natural Resources also provided plans for the trap design that was modified during this study. Hq 187th TAC RECON GP Dannelly ANG photographed and produced serial imagery of the Alabama coastal region and off-shore islands both in 1974 and 1975. Remotely sensed imagery and high altitude aerial photography were obtained from the EROS center in Sioux Falls, SD. NASA at Bay St. Louis, MS made available their planimeter.

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