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Survey of the Interior Least Tern on the Arkansas and White Rivers in Arkansas

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Arkansas Academy of Science

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DROPTERIS CARTHUSIANA AT MT. MAGAZINE, LOGAN, CO., ARKANSAS

Until the present, the only verifiable Arkansas population of the spinulose wood fern, *Dryopteris carthusiana* (Villars) H. P. Fuchs (*D. spinulosa* [O. F. Muell.] Watt), was one discovered by D. M. Moore on 7 August, 1960, at the entrance to Rowland Cave in Stone Co. This population represents the most extreme southwestern population of this species in eastern North America (Carlson & Wagner, Contr. Unif. Michigan. Herb. 15:141-162, 1982). In spite of the phytogeographic importance of this species in Arkansas, its presence and location has not been known with much certainty.

It was first reported for Arkansas by Lesquereux (A catalog of the plants of Arkansas, Pp. 346-399 in Owen, *Second report of a geological reconnaissance of the middle and southern counties of Arkansas made during the years 1859 and 1860*, 1860) from "woods". Based on this report, it was included in state lists by Harvey (Bot. Gaz., Crawfordsville 6:188-190, 1881) and Branner & Coville (A list of the plants of Arkansas, Pp. 155-242, in Branner, *Annual report of the Geological Survey of Arkansas for 1888*, Vol. IV, 1891). Buchholz (Am. Fern J. 14:33-38, 1924) expressed doubt about the presence of this species in Arkansas, in that he could not locate voucher material. Based on a discovery by Dwight M. Moore in 1924 (Moore, Am. Fern J. 31:63-71, 1941), Buchholz and Palmer (Trans. Acad. Sci. St. Louis 25:91-155, 1926) reported this species from the north side of Mt. Magazine, Logan Co., Arkansas. Recent efforts to locate a voucher or plants at that locality were also unsuccessful (Taylor & Demaree, *Rhodora* 81:503-548, 1979; Taylor, *Arkansas ferns and fern allies*, 1984, p. 106).

On 5 October, 1985, while surveying the status of *Woodsia scopulina* D. C. Eat. on Mt. Magazine, I located 4 plants of *D. carthusiana* on the northside of the mountain, near its summit, in the vicinity of Brown's Spring. This population, associated with three other fern species also occurring as peripheral populations (*Dennstaedtia punctilobula* [Michx.] Moore, *Dryopteris marginalis* [L.] Gray, and *Woodsia scopulina* D. C. Eat.), is most probably the population initially discovered by Moore in 1924. Verification of the occurrence of a Mt. Magazine population extends the known range of *D. carthusiana* 300 km to the southwest of the Stone Co. population. The occurrence of this northern species in Arkansas appears to be related to "northern" environmental factors provided in Logan Co. by elevation (860 m) at the top of the tallest mountain in Arkansas and in Stone Co. by moderated, cool, moist air blowing from a cave entrance. Based on the known locations of *D. carthusiana* in Arkansas, it is most improbable that Lesquereux ever saw this species in Arkansas during his travels; the earlier attributions of this species in the Arkansas flora must be considered spurious.

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A SURVEY OF THE INTERIOR LEAST TERN ON THE ARKANSAS AND WHITE RIVERS IN ARKANSAS

Potential tern sites were first identified by aerial surveillance and then explored by boat. The initial step involved a two-day helicopter search for evidence of nesting terns on the Arkansas River from Little Rock to the Oklahoma state line (26 June), and from Newport to St. Charles on the White River and again on the Arkansas River from Lock and Dam #3 to Little Rock (27 June). Due to a need to refuel frequently, and the limited availability of refueling stations, the lower 30 miles of the White River and the Arkansas River from its mouth to Lock and Dam #3 were not surveyed from the air.

All potential tern colonies identified by air on the Arkansas River, upstream from Little Rock, were visited by boat (1, 2, and 8 July), and the lower White River from Lock and Dam #1 to the Mississippi River and back up the Arkansas River to Dam #2 also was surveyed by boat (17 July).

The helicopter, provided by the Corps of Engineers and piloted by Army Reserve pilots, flew at heights of 100 to 200 feet above the ground at speeds of 30 to 75 m.p.h. Care was taken not to disturb tern colonies with prop wash. Visits to sandbars upstream from Little Rock were made in early morning (before 9:00 a.m.) and evening (after 6:30 p.m.) hours to avoid exposing young birds and eggs to the heat of the mid-day sun. However, sandbars on the lower White and Arkansas rivers were searched from the water in mid-day due to the late start of that survey.

Four rookeries were observed, one of them previously known, on the Arkansas River above Little Rock, and one rookery was found at the mouth of the Arkansas River. Approximately 80 adult least terns, 86 juveniles, and 40 eggs were counted at the five rookeries. No terns were found elsewhere on the Arkansas River or on the White.

The rookery at river mile 147, located on a side channel bar (spoilbank), was surveyed three times. On 1 July, 14 adults and one downy chick were found. No eggs or egg fragments were seen. A second trip to the ternery on 19 July proved more fruitful. Eight juvenile birds, seven of which were highly mobile, and 16 adults were counted. On a third visit, made 27 July, two flying young of the year were seen, but only six adults and no nests or flightless young. Though adults dive-bombing in one area of the spoilbank indicated that at least one nest was still active,

General Notes

it appeared that several adult and juvenile birds had left the rookery.

Farther upstream at river mile 161.5, four adult birds were counted 1 July on a large side-channel bar. No juveniles, eggs, or nests were found, although three nests with three eggs each plus six empty nests and 16 adult birds had been observed there 26 May (Carroll Green pers. comm. 30 May 1985), and 30 adults, five flying young, and a nest with one hatching and one egg were found on 14 July 1984.

A mid-channel sandbar at river mile 240.4 provided habitat for ten adult birds. No juveniles and only one scrape with two eggs were counted. Fragments of three other eggs were discovered, possible indications that juvenile birds were on the island. The observation of an adult tern carrying a minnow also supports the possibility of young birds having been present.

A rookery located on a mid-channel sandbar at river mile 275 was the largest ternery on the Arkansas River above Little Rock. Twenty-four adults, seven juvenile birds (one of which was dead), and 36 eggs were found. Twenty nests, several of which contained eggs, were observed just downstream of river mile 275 on 4 July 1981. Closer to Fort Smith, six nests and three eggs were found in June 1958. In June 1959 two nests were discovered, and later in July, two juveniles were observed at the same site.

Downstream on a side-channel sandbar at the mouth of the Arkansas River (Mississippi River mile 582) was the second largest tern colony ever reported in the state. More than 20 adults and 70 juvenile birds were counted along a two-mile stretch of beach on the Mississippi River side of the island.

The distribution of interior least terns on the Arkansas River is determined by water levels. As terns move upriver into Arkansas, they settle only on exposed sandbars. Because sandbars on the lower reach of the Arkansas River from Little Rock to its confluence with the Mississippi River and the White River from Newport to the navigation channel often are inundated in May and early June, these lower river sections probably are bypassed by terns. Therefore, in May and June, the beginning of the tern nesting season in Arkansas, terns will be found upstream where sandbars are exposed.

The slope of the Arkansas River also has much to do with the location of terns and their rookeries. In the river's upper reach, the slope is greater — which causes the river to cut deeper into the channel, therefore creating higher sandbars. Below Little Rock, the slope is less, the river is broader, and sandbars are flatter, more spread out. Consequently, it takes less water (volume) to inundate downstream sandbars, which often can remain wet into June or early July.

Because of its location, the sandbar at the mouth of the Arkansas River is not influenced significantly by water levels on the Arkansas. Most of the island borders the Mississippi River and the rookery here actually should be considered a Mississippi River colony. However, since it was found as part of the Arkansas River survey, it is included in this report.

In contrast to the Arkansas River, sandbars on the White River are not as extensive. The channel of the White River is narrower and much more convoluted. Long, wide bends, ideal for the deposition of sand and gravel and common on the Arkansas River, are absent on the White. Sandbars on the White River, therefore, are smaller and usually are found on the inside bend of the channel. These areas normally remain under water into June. Together, the lack of sandbars and high water levels prohibit the use of the White River and its major tributaries for least tern nesting.

Colonies of interior least terns on the Arkansas River are vulnerable to several threats including high water levels, dredging operations, cattle grazing and all-terrain-vehicle (ATV) use. Of these, high water is probably the most serious threat to rookeries and the most difficult to control, given the unpredictability of Arkansas weather and the frequency of summer flooding in the state. For example, the sandbar downstream of Fort Smith that had a rookery on it in June 1981 was under water the next year. Had terns reused the island in 1982, eggs and newly hatched chicks would have been swept away. After such an experience, it might take several days or weeks before adult terns would attempt to renest. To illustrate further the potential threat, high water levels have been recorded at river mile 275, in May and June, six times in the last five years.

Considerable habitat destruction occurred at three of the five rookeries surveyed this year. The rookery at river mile 147 may have been impacted by a bulldozer leveling spoil material from a nearby dredging operation on 1 July 1985. Only one chick, no eggs, and very few scraps were found in an area which had been leveled recently. A part of the rookery apparently survived the bulldozing since eight juvenile birds were discovered in an undisturbed area on 19 July.

Dredging itself, posed no threat to tern colonies since no sandbars used by the terns were located in the navigation channel. The deposition of spoil during the nesting season, though, could cause serious problems for the Arkansas River rookeries.

Unusual as it may be, at river mile 161.5, cattle may have reduced a thriving colony of least terns and young in 1984 and on 26 May 1985 to only four adult birds by 1 July 1985. The sandbar, one of the most extensive surveyed on the Arkansas River, was covered with cattle tracks. On the other hand, eggs and juvenile birds observed in May could have developed into fledged young by July and left the sandbar along with the adult terns.

At river mile 240.4, ATVs were a serious threat to a rookery. ATV tracks criss-crossed the primary nesting area on the sandbar. Several scrapes were located, but only one scrape had eggs and no young or tracks of young were discovered. Spent rockets and fireworks also covered the area. The fourth of July, no doubt, is a peak period for ATV recreationists on the Arkansas.

The author appreciates the valuable contributions made to the interior least tern survey by the Little Rock District of the Corps of Engineers and the Arkansas Game and Fish Commission. As noted earlier, the Corps procured a helicopter and pilots for the aerial survey and provided a river-worthy boat for the lower Arkansas River survey. The Game and Fish Commission made available a truck and boat for the upper Arkansas River tern survey. The contributions of biologists Clyde Gates (Corp of Engineers) and Craig Uyeda (Game and Fish Commission) are noted with appreciation. Gates and Uyeda stayed with the survey throughout its duration and assisted in many ways.

The assistance provided by Bill Shepherd of The Arkansas Natural Heritage Commission was invaluable. Bill provided excellent guidance at every phase of the project, and his keen eyes and expert identification skills kept me from mistaking killdeer for terns. Lance Peacock of the Arkansas Nature Conservancy assisted by participating in the aerial survey. Special thanks are extended to Carol Smaniotto for typing the report.

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ADDITIONAL RECORDS OF DISTRIBUTION AND HOSTS FOR THE BAT BUG, *CIMEX PILOSELLUS* IN ARKANSAS

The bat bug, *Cimex pilosellus* Harvath, is a wingless, parasitic insect approximately 6mm in length. It is a common ectoparasite of many chiropteran species. As reported by Usinger (1966, Monograph of Cimicidae, Entomol. Soc. Amer., College Park, Maryland) this insect usually stays in the roost while bats forage. It is in the roost that the insect obtains its blood meal.

The initial record of *C. pilosellus*, in Arkansas was reported by Price et. al. (1982, Proc. Ark. Acad. Sci. 37:98). This record was obtained