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ABSTRACT

The Savannah River Plant has 28 ponds and 189 Carolina Bays on its 192,000-acre site. Excluding the Par Pond system, the mean pond area is 17.6 acres, with a range of 0.4 to 202.8 acres. Par Pond is the largest pond, with an area of 2,500 acres. The mean Carolina Bay area is 6.6 acres, with a range of less than 0.3 to 124.0 acres. The geographical location of each pond and bay has been digitized and can be graphically displayed by computer. This capability will facilitate identification of wetland areas as required by Executive Order 11990 (Protection of Wetlands, May 24, 1977).

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LOCATIONS AND AREAS OF PONDS AND CAROLINA BAYS AT THE SAVANNAH RIVER PLANT

INTRODUCTION

Executive Order 11990 (Protection of Wetlands, May 24, 1977) requires that each Federal agency provide leadership and take action to minimize the destruction, loss, or degradation of wetlands. Federal agencies shall also take action to preserve and enhance the natural and beneficial values of wetlands by (1) acquiring, managing, and disposing of Federal lands and facilities; (2) providing federally undertaken, financed, or assisted construction and improvements; and (3) conducting federal activities and programs affecting land use, including but not limited to water and related land resources planning, regulating, and licensing activities.[1]

The U.S. Department of Energy's Savannah River Plant (SRP), a 192,000-acre site near Aiken, South Carolina, is required to comply with Executive Order 11990. SRP's program to comply with the Order includes: (1) location and categorization of wetlands at SRP; (2) identification of site activities that affect these systems; (3) identification of literature pertinent to SRP wetlands; (4) study of the response of aquatic systems to routine releases from SRP operations; and (5) suggested site action programs to increase emphasis on wetlands preservation. This document reporting the categorization and location of SRP ponds and Carolina Bays is a contribution to the first part of the program.

This report summarizes the locations and areas of all ponds and Carolina Bays on the Savannah River Plant Reservation. The ponds are defined as a body of water formed by the blockage or obstruction of the natural drainage pattern of streams.[2] They can be either natural or manmade, and they include farm ponds, oxbows, and ponds caused by beaver dams. Carolina Bays are elliptical depressions that are usually oriented in the northwest-southeast direction, with no apparent inlet or outlet.[3] The long axes of the bays range from a few hundred feet to a thousand feet in length. The bays are generally shallow and sometimes contain no standing water. "Suspect bays" are also included in this summary. These are bays that have been identified by aerial photographs as having the characteristics of Carolina Bays, although they have not as yet been documented by field studies.

DETECTION AND MEASUREMENT OF PONDS AND BAYS

Depressions at the SRP site were located by examining a set of infra-red aerial photographs taken in March, 1978. All of the ponds and bays were then located on a topographic map of the Savannah River Plant using the Plant Grid System (Tables 1 and 2). The north and east plant grid coordinates for each pond and bay were then entered into the JOSHUA Computer Site Mapping Program for a graphical presentation.

The approximate area of each depression was determined with an Ott polar planimeter from the infra-red aerial photographs. The photographs had been taken normal to the surface, and their scale was 1:15,840. A comparison of the planimeter measurements with the accepted size of engineered ponds[4] showed planimetry accuracy decreased as the size of the pond decreased. The relative precision of the area measurements of the Carolina Bays varied, with a precision of about 5% for the larger bays. The detection limit was 0.3 acre.

RESULTS

This study revealed 28 ponds and 189 Carolina Bays on the SRP site. The mean pond area is 17.6 acres when Par Pond is not included, with a range of 0.4 to 202.8 acres. Par Pond is the largest pond, with an area of 2,500 acres. The mean Carolina Bay area is 6.6 acres, with a range of less than 0.3 to 124.0 acres. Areas and locations are shown in Table 1 for ponds and in Table 2 for bays.

All Carolina Bays do not hold water, but the presence of aquatic vegetation, such as marsh grass and cattails, indicates higher soil moisture content compared to surrounding forest or grassland areas. The water depth in any Carolina Bay depends on seasonal variations in precipitation.

The north and east plant grid coordinates for each pond and bay, which are stored in the JOSHUA Computer System, allow for convenient display by computer graphics. Sample maps are shown in Figures 1 to 6. The size distribution for the Carolina Bays is shown in Figure 7.

REFERENCES

1. U.S. Department of Energy. *Floodplain Management and Protection of Wetlands.* Federal Register, July 19, 1978 (Part III), page 31108.

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3. *Geologic-Engineering Investigation, Savannah River Plant.* Conducted for the Atomic Energy Commission and E. I. du Pont de Nemours and Company by Charleston District Corps of Engineers, U.S. Army. Published in two volumes by Waterways Experiment Station, Corps of Engineers, U.S. Army, Vicksburg, Mississippi (March 1952).

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ACKNOWLEDGMENT

The efforts of J. E. Suich in preparing the computer programs to display the data are gratefully acknowledged.

TABLE 1

Areas and Locations of Ponds at SRP

Pond Number	*SRP Grid Coordinates*		*Area, acres*
	East	*North*	
1	116100	70400	2.5
2	113400	60000	2.5
3	114700	60390	2.4
4	93100	60000	4.4
5	62560	84740	1.6
6 (Steed's Pond)	51220	94500	11.2
7	67900	71000	2.0
8 (Pond A)	78000	59300	6.4
9 (Pond 1)	69500	52000	0.4
10 (Pond 2)	69600	53000	19.6
11	66200	62700	0.8
12	49000	51300	7.1
13	66800	22300	0.8
14	21000	48200	2.3
15	16400	45700	0.5
16	30000	31860	0.9
17	31500	24500	2.5
18	31800	16700	16.8
19 (Pond B)	88000	57000	202.8
20 (Pond C)	84000	50000	132.4
21 (Par Pond)	85000	40000	2500.00*
22 (Pond 4)	76700	50100	35.3
23 (Pond 5)	78000	50000	9.9
24	42200	56800	1.2
25	48800	85280	1.2
26	58100	66700	0.8
27	18100	83000	5.4
28	36300	90160	0.8

With Par Pond: Mean Area 102.7 acres
Range 0.4 to 2500 acres

Without Par Pond: Mean Area 17.6 acres
Range 0.4 to 202.8 acres

* As given in Reference 4, not measured in this study.

TABLE 2

Areas and Locations of Carolina Bays at the Savannah River Plant

Bay Number	*SRP Grid Coordinates*		*Area*
	East	*North*	*acres**
1	61000	98500	3.7
2**	62000	99000	9.3
3	64000	93000	14.0
4	64000	96500	3.2
5	33000	103000	2.4
6	33000	101500	11.2
7**	32500	96000	6.2
8**	34500	96500	2.5
9	35000	97000	4.3
10	35500	97500	0.3
11	36500	98000	1.9
12**	36500	96000	1.9
13**	37000	95000	2.5
14	36000	94500	3.7
15	35500	95000	2.5
16	35000	95000	5.0
17**	36500	104500	3.7
18**	30000	90000	<0.3
19**	29500	89500	0.3
20**	28500	90500	3.7
21**	27000	89500	1.9
22**	26000	90000	<0.3
23	25500	89000	3.7
24	26500	88500	1.6
25	28500	84500	2.5
26	26500	81500	1.2
27	27000	81500	1.9
28	47000	101500	5.0
29	48000	102000	0.3
30	61000	84500	1.9
31	29000	80000	12.4
32**	71000	76000	9.3
33**	73000	76000	12.4
34**	78000	68000	4.3
35	72000	65000	3.1
36**	73500	62000	3.1
37**	71500	62000	2.5
38**	71000	63500	20.5
39**	69000	59000	1.2
40	67000	60000	13.0

TABLE 2 (Cont'd)

Bay Number	*SRP Grid Coordinates*		*Area*
	East	*North*	*acres**
41	66000	63000	0.3
42	64500	61500	9.3
43**	68000	56500	5.0
44	66500	56000	5.0
45	66500	76500	<0.3
46	63500	69000	4.3
47**	58000	60500	5.6
48	58000	59500	0.6
49**	56500	62000	4.3
50**	53000	68000	5.0
51	90000	64500	4.3
52	91500	61500	0.6
53**	101000	55000	0.6
54**	102000	53500	0.3
55	98000	49000	1.2
56	86000	58500	8.1
57	83000	59500	9.9
58	83500	57500	8.1
59	76000	54500	0.7
60	81000	50000	9.9
61	72500	53500	13.0
62	81000	45500	1.9
63	92000	39000	1.7
64	91000	37500	9.9
65	111500	53000	2.5
66	110000	52000	27.9
67	109000	52000	17.4
68	107000	51500	3.7
69	106500	51000	2.4
70	105500	49500	6.8
71	107000	49000	4.3
72	108000	47500	3.1
73	107000	47500	4.3
74	105500	45000	0.3
75	98000	50000	0.6
76	105000	43000	0.6
77	102500	43500	124.0
78	101500	45000	9.9
79	100500	44500	1.2
80	100000	44000	5.0

TABLE 2 (Cont'd)

Bay Number	SRP Grid Coordinates East	North	Area, acres*
81	95500	39500	9.3
82	93500	38000	1.9
83	88000	29500	10.9
84	80000	39000	5.0
85	73000	43000	8.1
86	78500	33000	2.5
87	80000	26000	4.3
88	74500	29500	1.9
89**	71500	33000	1.2
90	70000	31500	2.5
91	68500	28500	1.9
92	68500	27500	3.1
93**	67500	28000	8.1
94	66500	41000	2.5
95	67000	40500	1.2
96	66000	38000	91.1
97**	66000	33000	79.4
98	68000	38000	104.9
99**	62000	40500	3.7
100**	63500	39000	0.6
101	62000	37000	1.2
102**	60000	32000	2.5
103**	58500	32000	4.3
104**	54000	28500	6.8
105	56000	19000	5.6
106	53000	17000	6.2
107	56000	14000	5.0
108**	66000	49500	3.1
109**	66000	48500	7.4
110	64500	46000	1.9
111	61000	47500	0.3
112	61500	47500	0.3
113**	59000	47000	3.1
114	61500	44000	1.2
115**	62000	47000	9.9
116	57000	46000	1.2
117**	61500	41000	1.2
118	57000	39000	2.5
119**	61000	42000	1.3
120	53000	35500	1.9

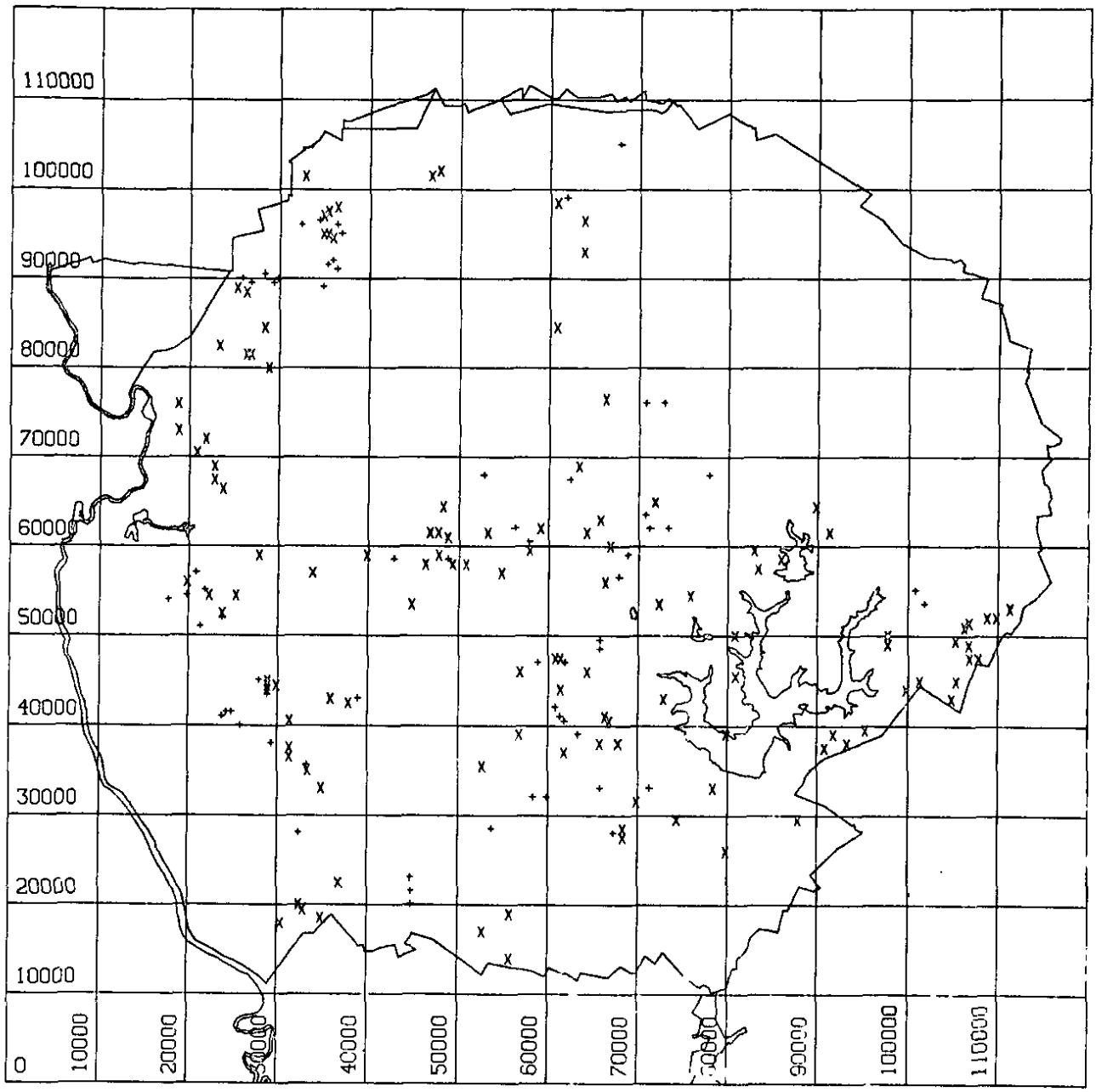
TABLE 2 (Cont'd)

Bay Number	SRP Grid Coordinates East	SRP Grid Coordinates North	Area, acres*
121	55000	57000	3.7
122	53500	61500	5.6
123	48500	64500	1.9
124	47000	61500	3.5
125	48000	61500	5.0
126	49000	61000	0.6
127	48000	59000	8.7
128**	49000	58500	5.0
129	51000	58000	1.2
130	46500	58000	6.8
131	49500	58000	2.5
132	45000	53500	7.4
133**	39000	43000	3.7
134	38000	42500	1.2
135	36000	43000	2.5
136	31500	40500	1.8
137**	29500	38000	1.8
138	31500	37500	1.9
139	31500	36500	1.2
140**	33500	35500	3.7
141	33500	35000	1.0
142	35000	33000	14.3
143**	32500	28000	1.2
144**	45000	23000	1.9
145**	45000	21500	3.1
146**	45000	20000	1.9
147	37000	22500	5.0
148	32500	20000	0.3
149	33000	19500	1.2
150	35000	18500	0.3
151	30500	18000	0.3
152**	26000	40000	3.7
153**	25000	41500	2.5
154**	24500	41500	1.9
155**	24000	41000	5.0
156	30000	44500	1.9
157	29000	44000	<0.3
158	29000	44500	<0.3
159	29000	45000	<0.3
160**	28000	45000	1.2

TABLE 2 (Cont'd)

Bay Number	*SRP Grid Coordinates*		*Area, acres**
	East	*North*	
161**	21500	51000	3.7
162**	24000	52000	0.6
163	24000	52500	1.9
164	25500	54500	2.5
165	22500	54500	2.5
166**	22000	55000	<0.3
167**	18000	54000	2.0
168	20000	56000	2.0
169**	21000	57000	0.5
170	28000	59000	3.1
171	34000	57000	1.7
172	40000	59000	1.9
173	23000	67500	3.1
174	23000	69000	7.4
175	21000	70500	3.7
176	22000	72000	27.9
177**	43000	58500	5.2
178	24000	66500	5.1
179	19000	73000	2.5
180	19000	76000	0.6
181**	36500	91000	0.6
182**	35000	89000	2.5
183**	36000	92000	6.6
184**	68000	105000	0.4
185	23500	82500	6.0
186**	29000	43500	0.3
187**	62500	67500	<0.3
188**	20000	54500	<0.3
189	59300	62000	2.4
		Mean	6.6
		Range	<0.3 to 124.0

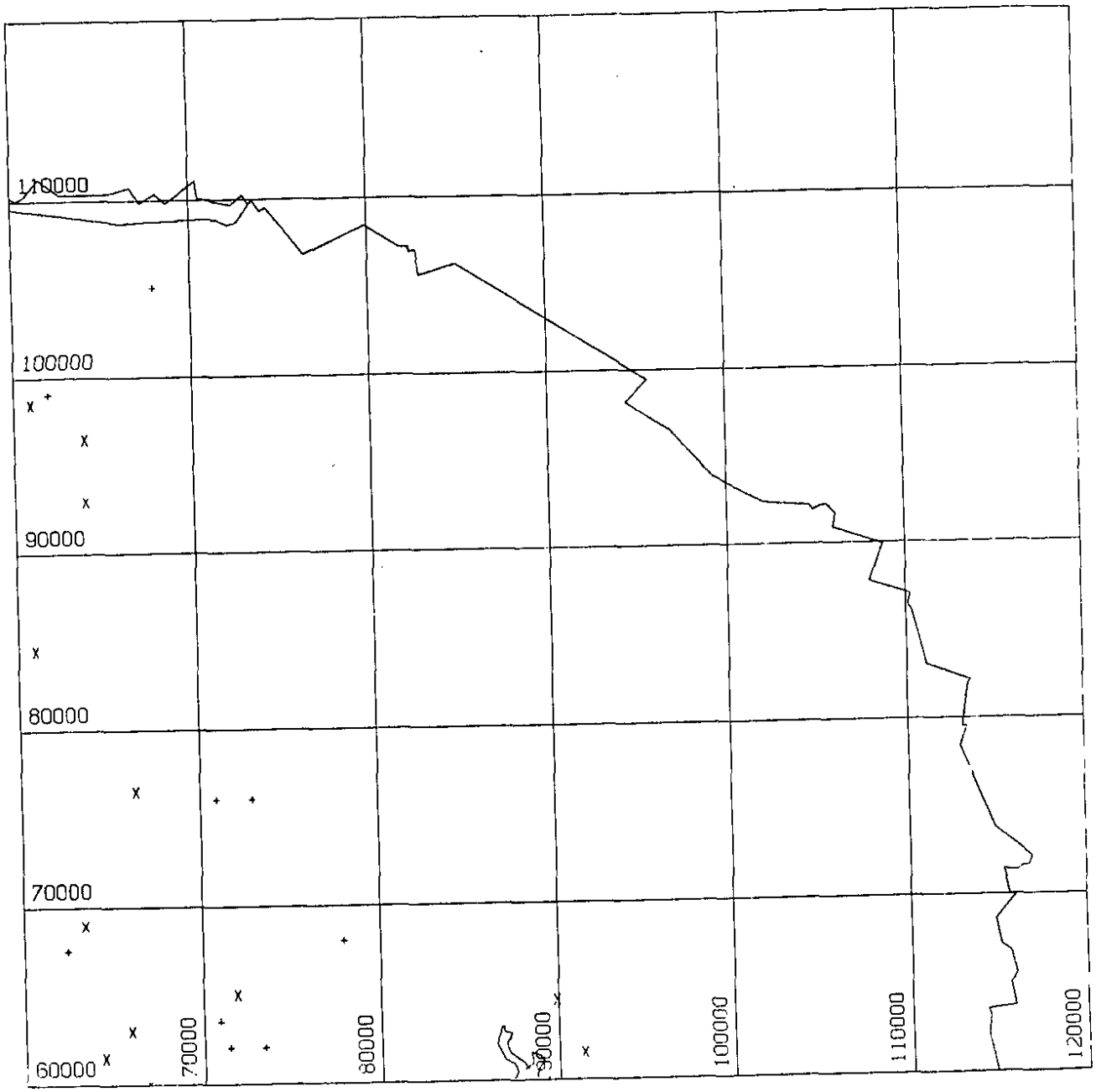
* The smallest measurable area with the planimeter was 0.3 acre.
** Suspected bays.



X = known or probable bay

\+ = suspected bay

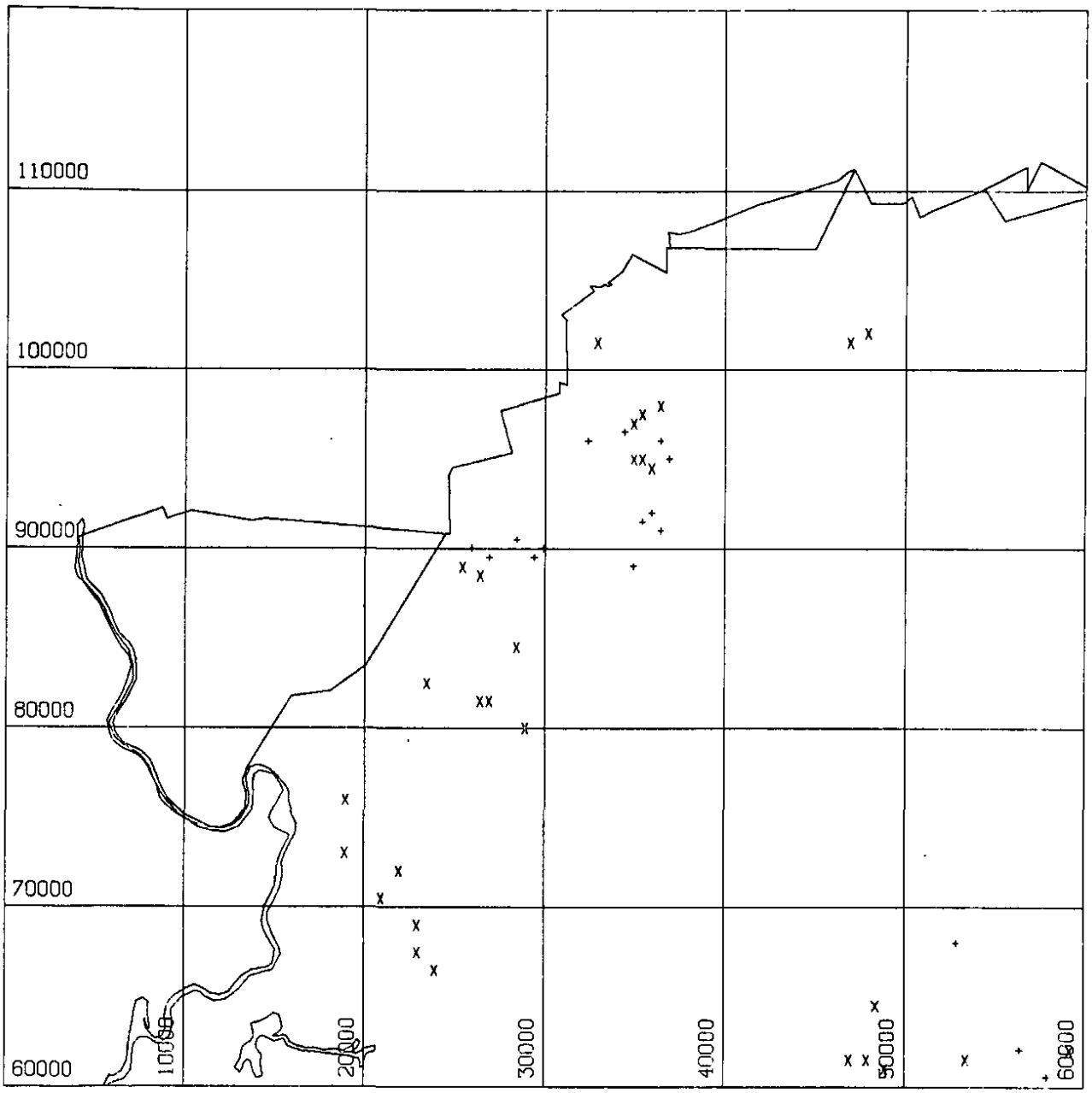
FIGURE 1. Carolina Bays on the Savannah River Plant Reservation



X = known or probable bay

\+ = suspected bay

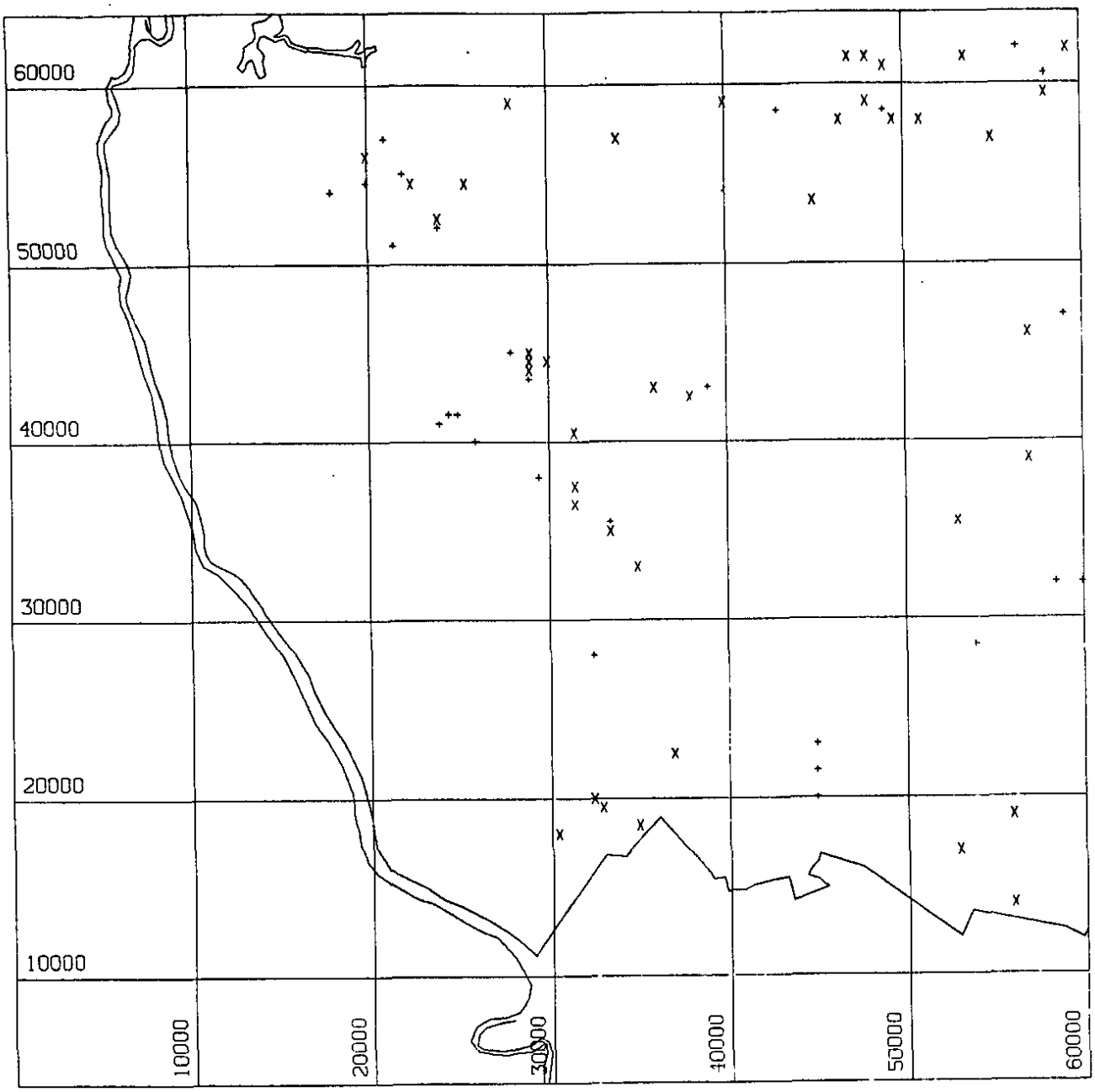
FIGURE 2. Carolina Bays on the Northeast Quadrant of the Savannah River Plant Reservation



X = known or probable bay

\+ = suspected bay

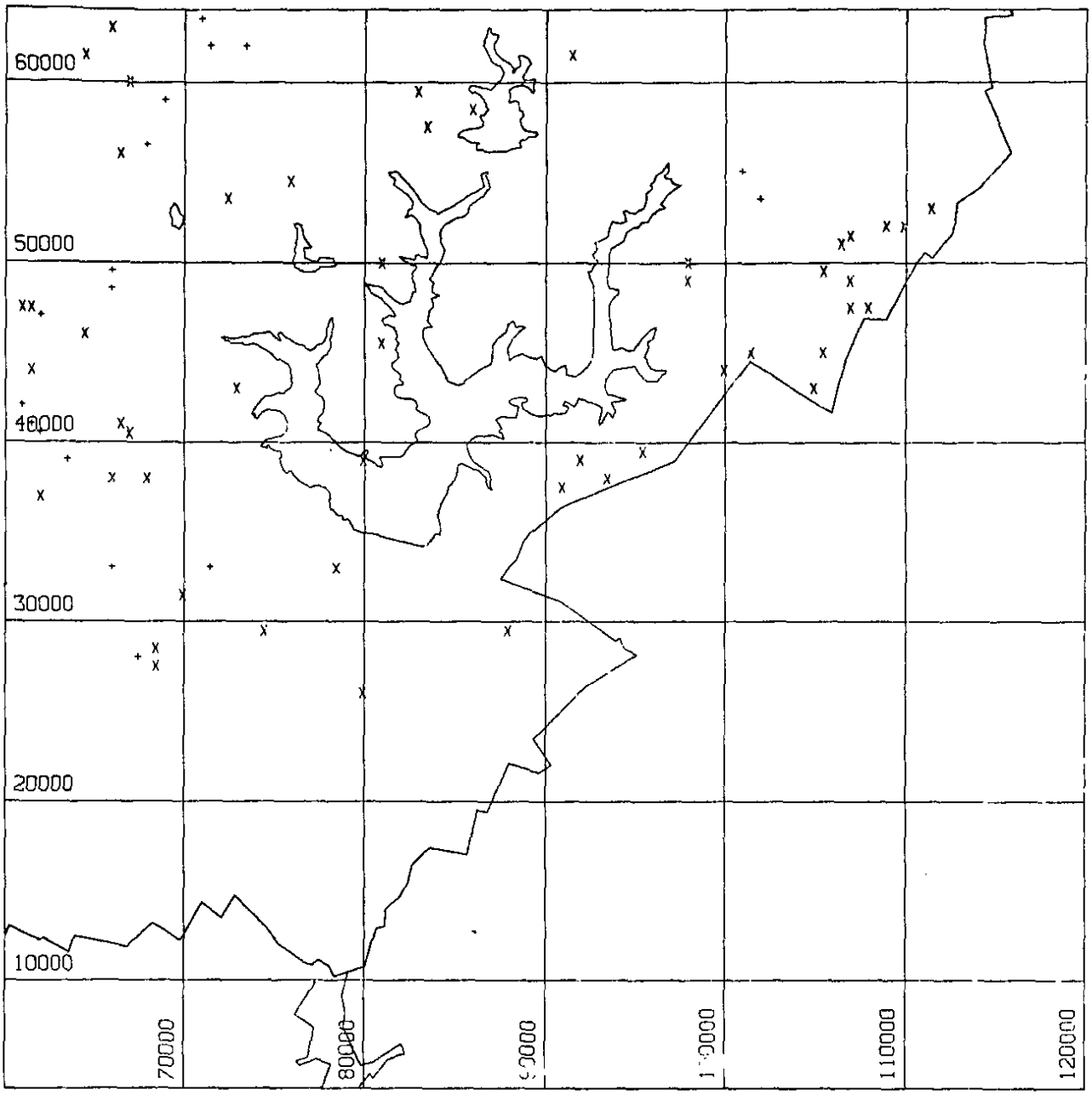
FIGURE 3. Carolina Bays on the Northwest Quadrant of the Savannah River Plant Reservation



X = known or probable bay

\+ = suspected bay

FIGURE 4. Carolina Bays on the Southwest Quadrant of the Savannah River Plant Reservation



X = known or probable bay

\+ = suspected bay

FIGURE 5. Carolina Bays on the Southeast Quadrant of the Savannah River Plant Reservation

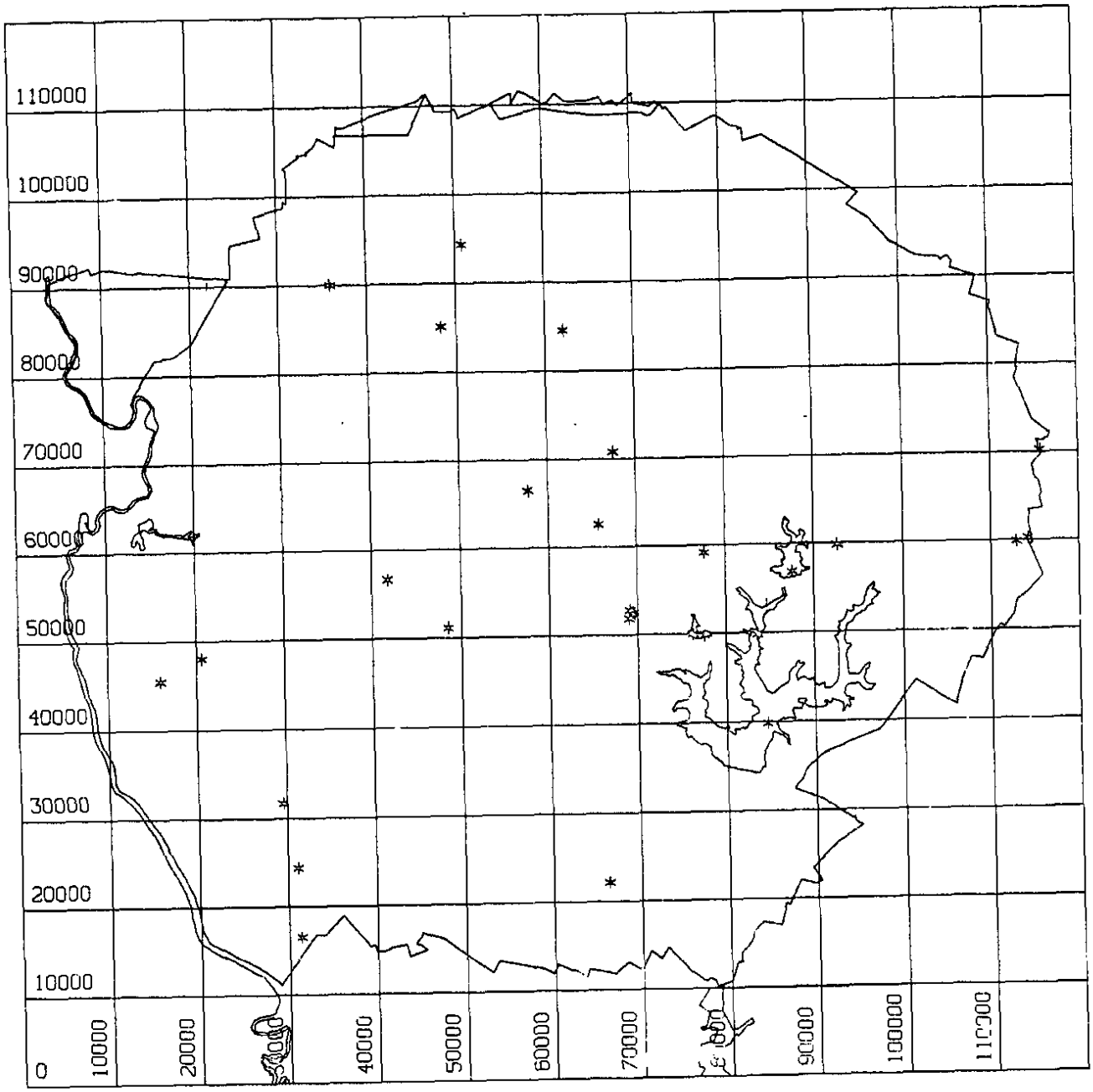


FIGURE 6. Ponds on the Savannah River Plant Reservation

FIGURE 7. Size Distribution of Carolina Bays at SRP