

Environmental Sensitivity Mapping and GIS: the Louisiana G-WIS Database

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Louisiana State University

Project Introduction

- G-WIS = MMS's Gulf-Wide Information System
- Based on the Environmental Sensitivity Index (ESI) mapping system
- ESI: (1) a shoreline classification system and, (2) a GIS compilation of natural resources data using a standard database structure
- ESIs have been developed nation-wide by NOAA, MMS, EPA, and various states
- Primary use is for oil spill planning and response

ESI Overview

- Shoreline habitat classification
- Sensitive biological resources
- Human-use resources

Shoreline Classification

- Primarily based on geomorphology
- Shorelines ranked by oil sensitivity and difficulty of cleanup
- Various contingency planning documents and standard spill response manuals reference ESI shoreline types

<i>ESI</i>	<i>Definition</i>
1B	Exposed solid man-made structure
2A	Exposed wave-cut platform in mud
2B	Exposed scarp or steep slope in mud
3A	Fine to medium-grained sand beach
3B	Scarp or steep slope in sand
4	Coarse-grained sand beach
5	Mixed sand and shell beach

<i>ESI</i>	<i>Definition (cont.)</i>
6A	Shell beach
6B	Exposed riprap
7	Exposed tidal flat
8A	Sheltered scarp in mud
8B	Sheltered solid man-made structure
8C	Sheltered riprap
8D	Vegetated steeply sloping bluff

<i>ESI</i>	<i>Definition (cont.)</i>
9A	Sheltered tidal flat
9B	Vegetated low bank
10A	Salt-brackish marsh
10B	Freshwater marsh
10C	Swamp
10D	Mangrove or scrub-shrub wetland

Biological Resources

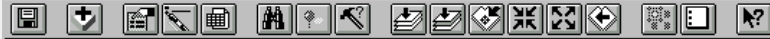
- Focus on quantitative survey data
- Habitat-based mapping approach
- Key wildlife groups included waterfowl, colonial waterbirds, alligators, fur-bearing mammals, rare and endangered species, etc.
- Inland fisheries emphasized (coastal fisheries part of separate MMS/NOAA G-WIS project)

Biological Attributes

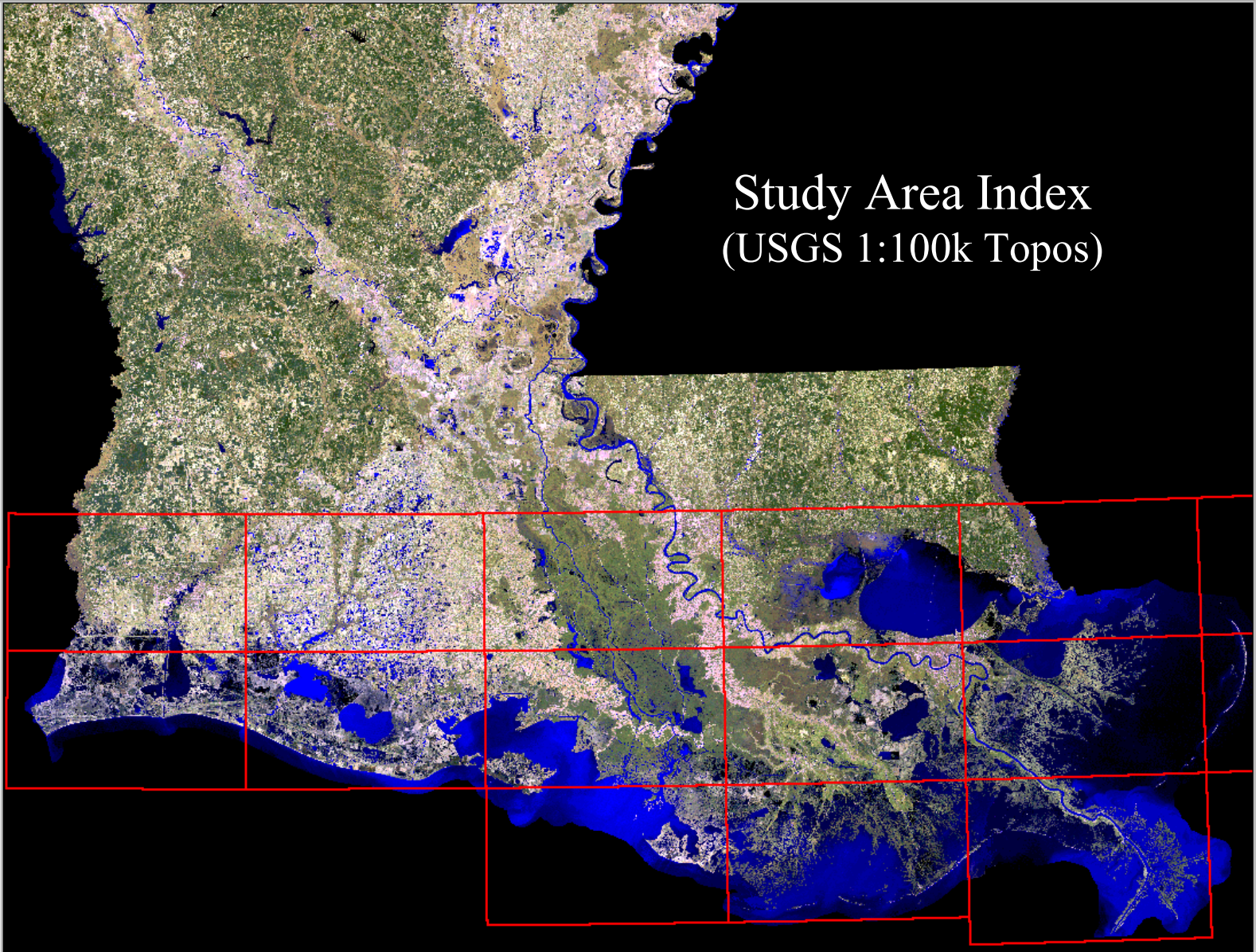
- Species name
- T&E status
- Concentration, density, or abundance
- Seasonality and life-history time-periods
- Feature and species level source metadata

Human-Use Resources

- Management areas
- Water intakes
- Access (airports, boat ramps, marinas, etc.)
- Other recreational, consumptive, and cultural features
- Primarily compiled and developed by other groups, particularly LOSCO and LSU



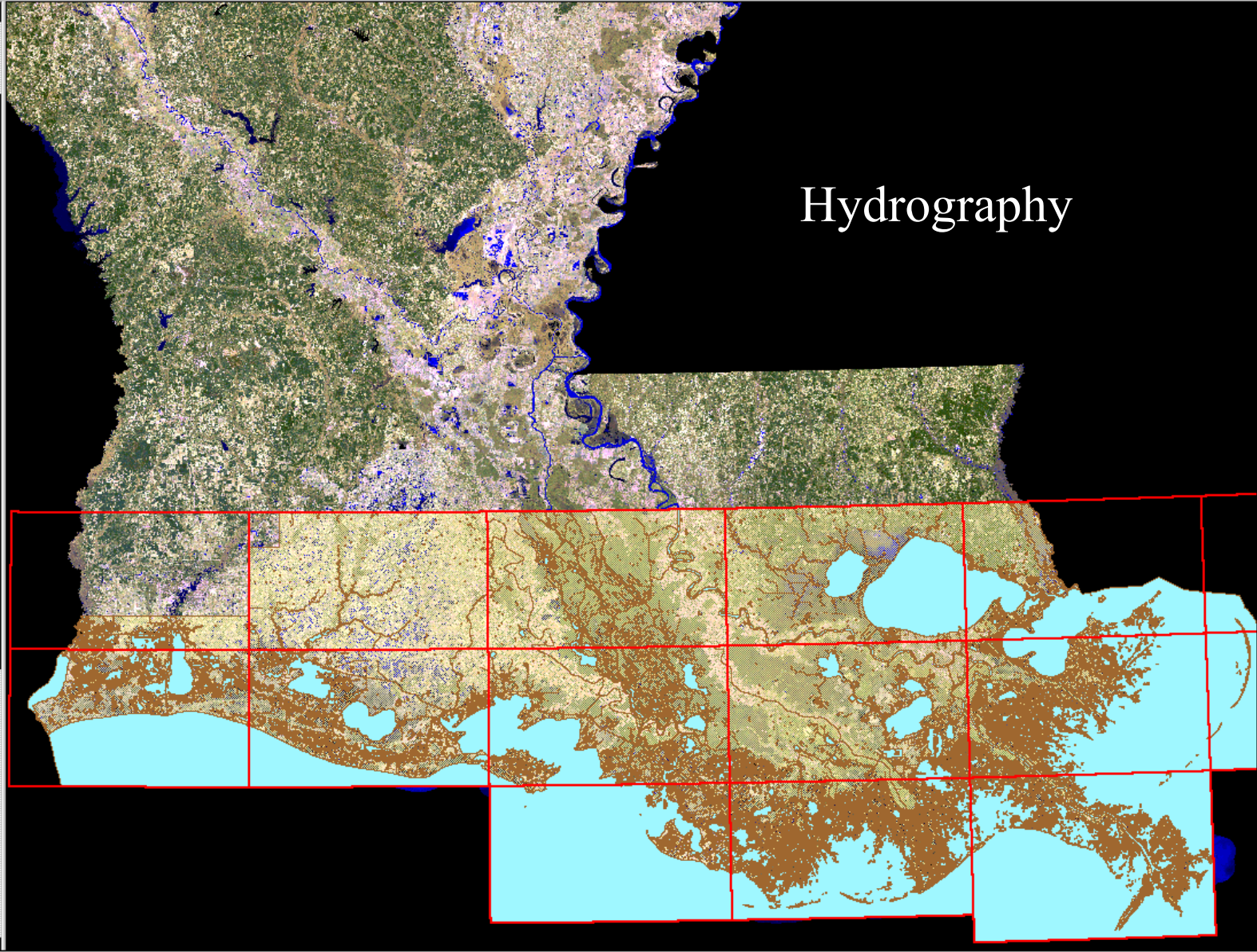
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- Parish.shp
- Oc_esi.shp
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 - 8A
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 - 9B
- Fresh_marsh.shp
- Intermediate_marsh.shp
- Brackish_marsh.shp
- Salt_marsh.shp
- Swamp.shp
- Masterydrop.shp
 - L
 - U
 - W
- Waterfowl
- Waterbird Colonies
- NHP
- Gator Nests
- Fur-bearers
- Inland Finfish



Study Area Index
(USGS 1:100k Topos)



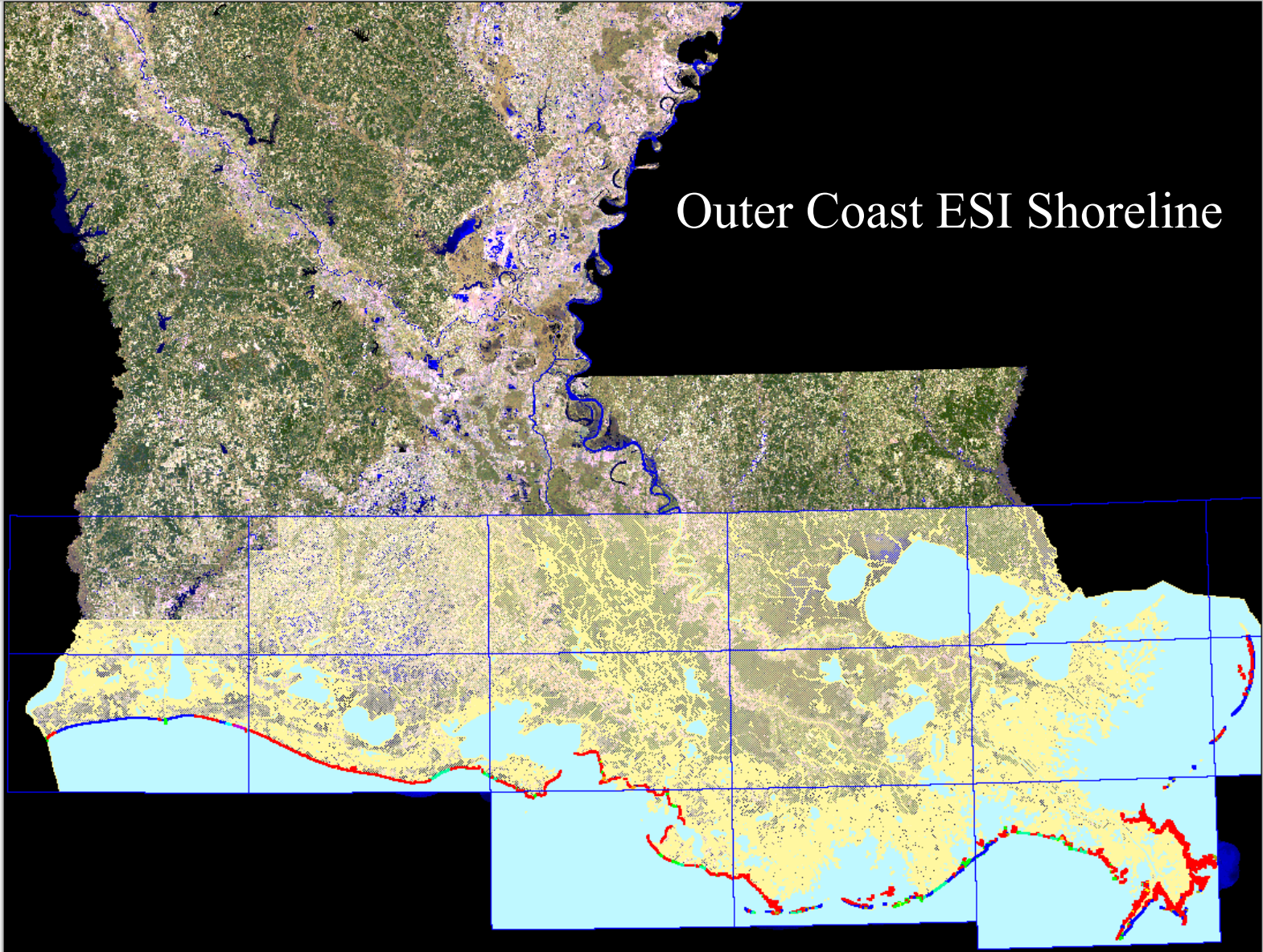
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- Masterhydrog.shp
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Hydrography

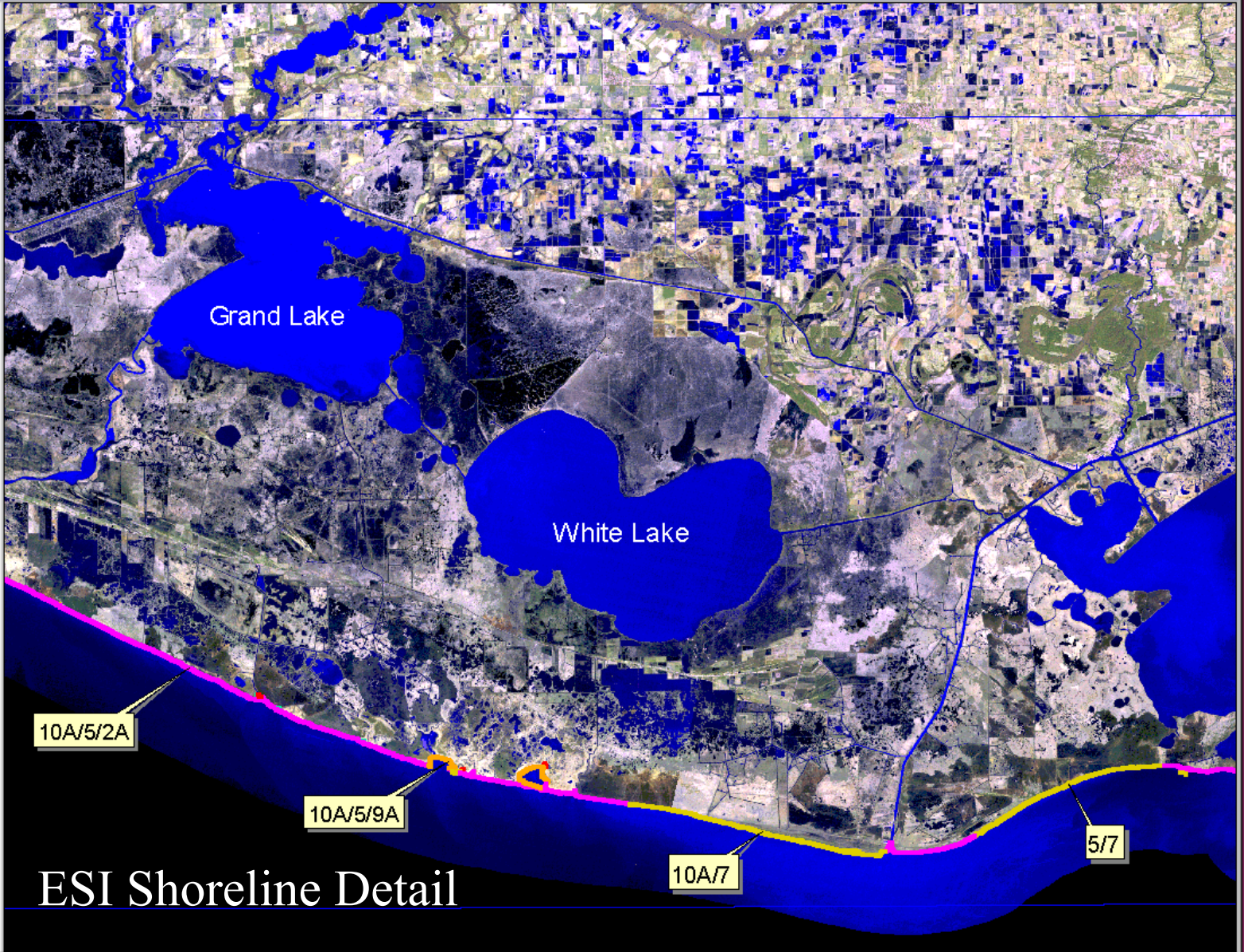


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- NHP
- Gator Nests
- Fur-bearers
- Inland Finfish
- Inland Shellfish

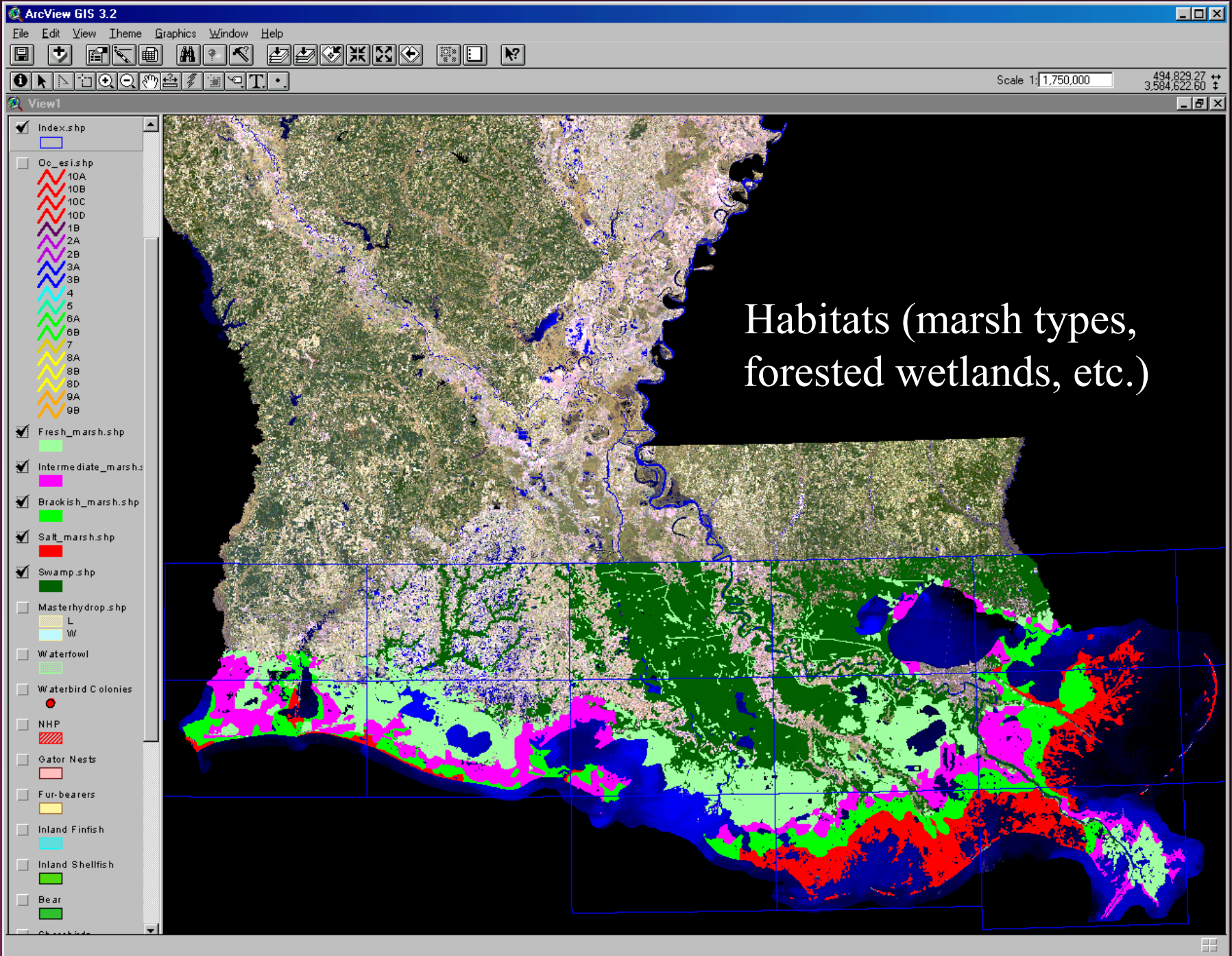


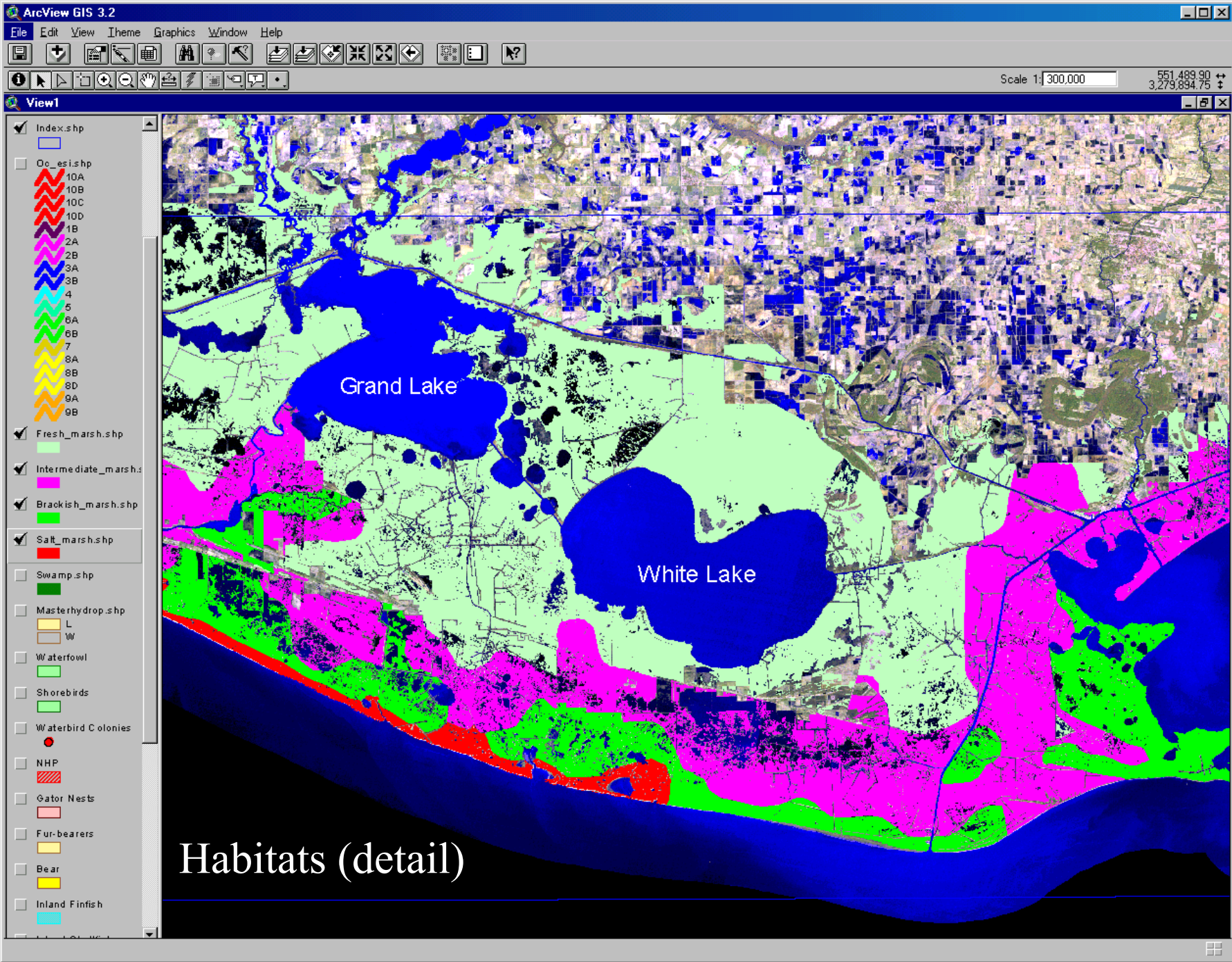


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ESI Shoreline Detail

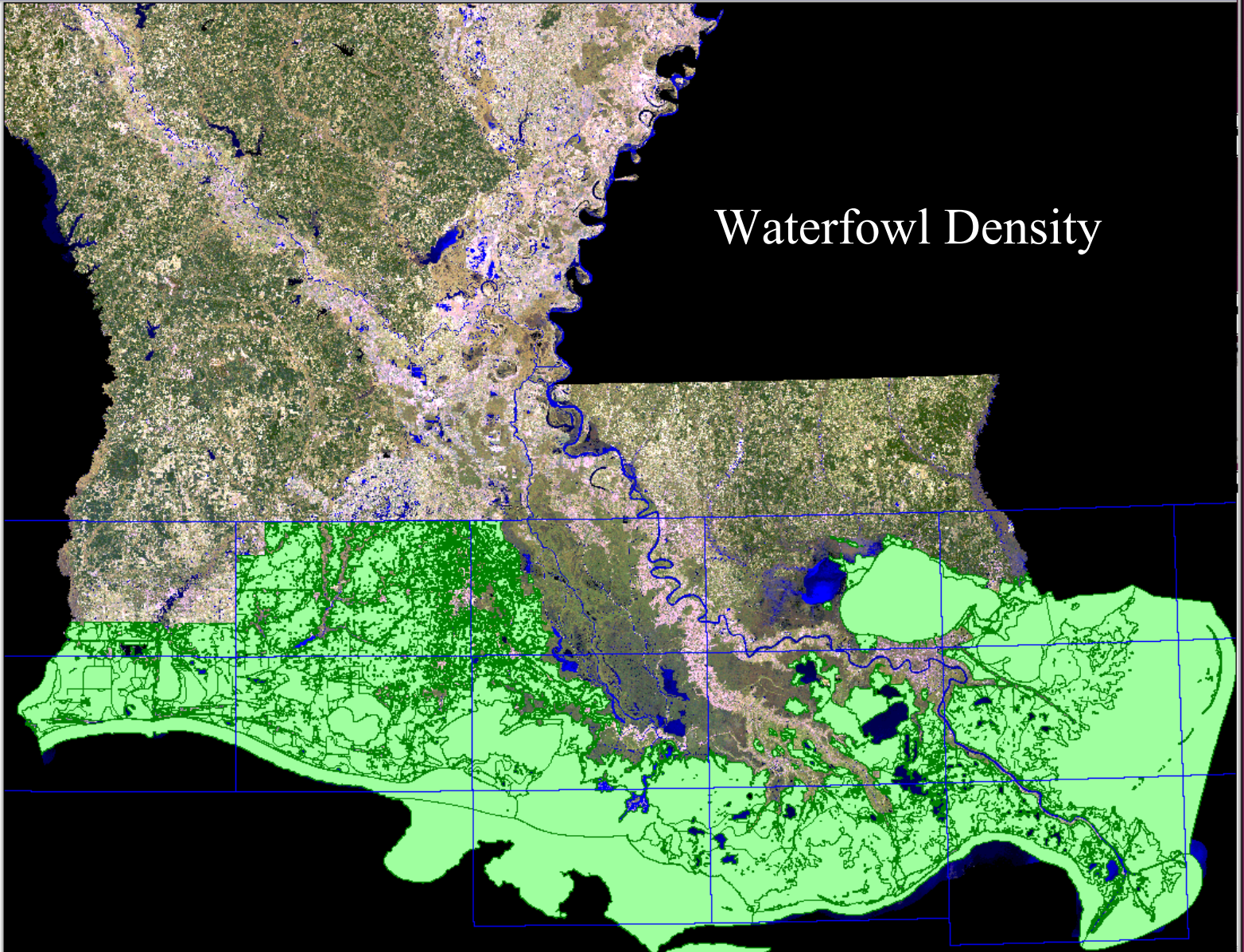




Habitats (detail)

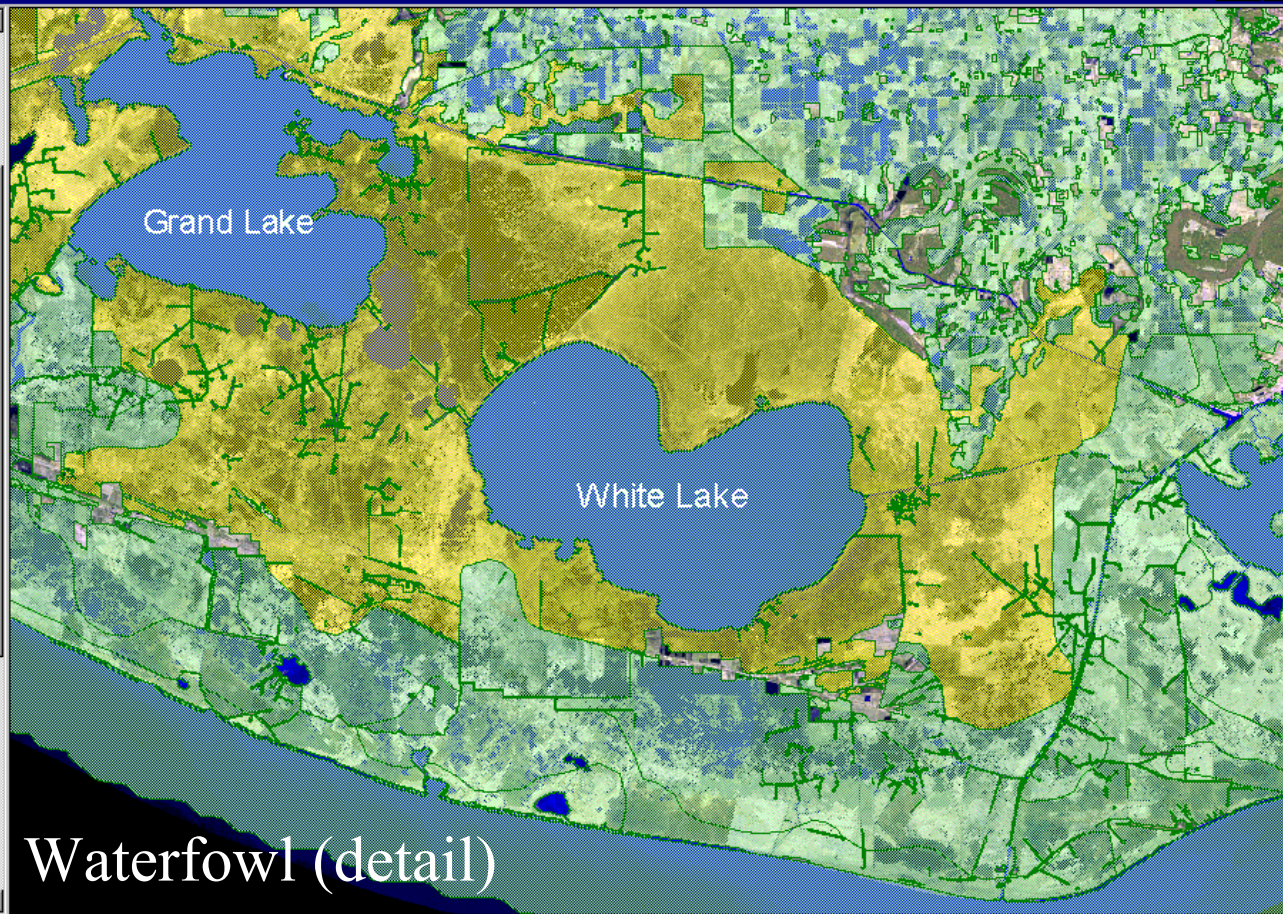


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Waterfowl Density

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activity.dbf

Month	Abundance	EL
1	52	
2	-99	
3	-99	
4	-99	
9	0	
10	10	
11	31	
12	45	
1	18	
2	-99	
3	-99	
4	-99	
9	0	
10	3	
11	5	

breed2.dbf

EL	spe	sea	Month	Breed	Bre
B0001812			1	N	
B0001812			2	N	
B0001812			3	N	
B0001812			4	N	
B0001812			9	N	
B0001812			10	N	
B0001812			11	N	
B0001812			12	N	
B0001813			1	N	
B0001813			2	N	
B0001813			3	N	
B0001813			4	N	
B0001813			9	N	
B0001813			10	N	
B0001813			11	N	
B0001813			12	N	
B0001814			1	N	
B0001814			2	N	

species.dbf

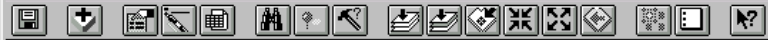
Species_id	Name	Gen_spec	State
18	Green-winged teal	Anas crecca	
20	Northern shoveler	Anas clypeata	
21	Canvasback	Aythya valisineria	
23	Lesser scaup	Aythya affinis	
34	American coot	Fulica americana	
162	Gadwall	Anas strepera	
163	American wigeon	Anas americana	

biores.dbf

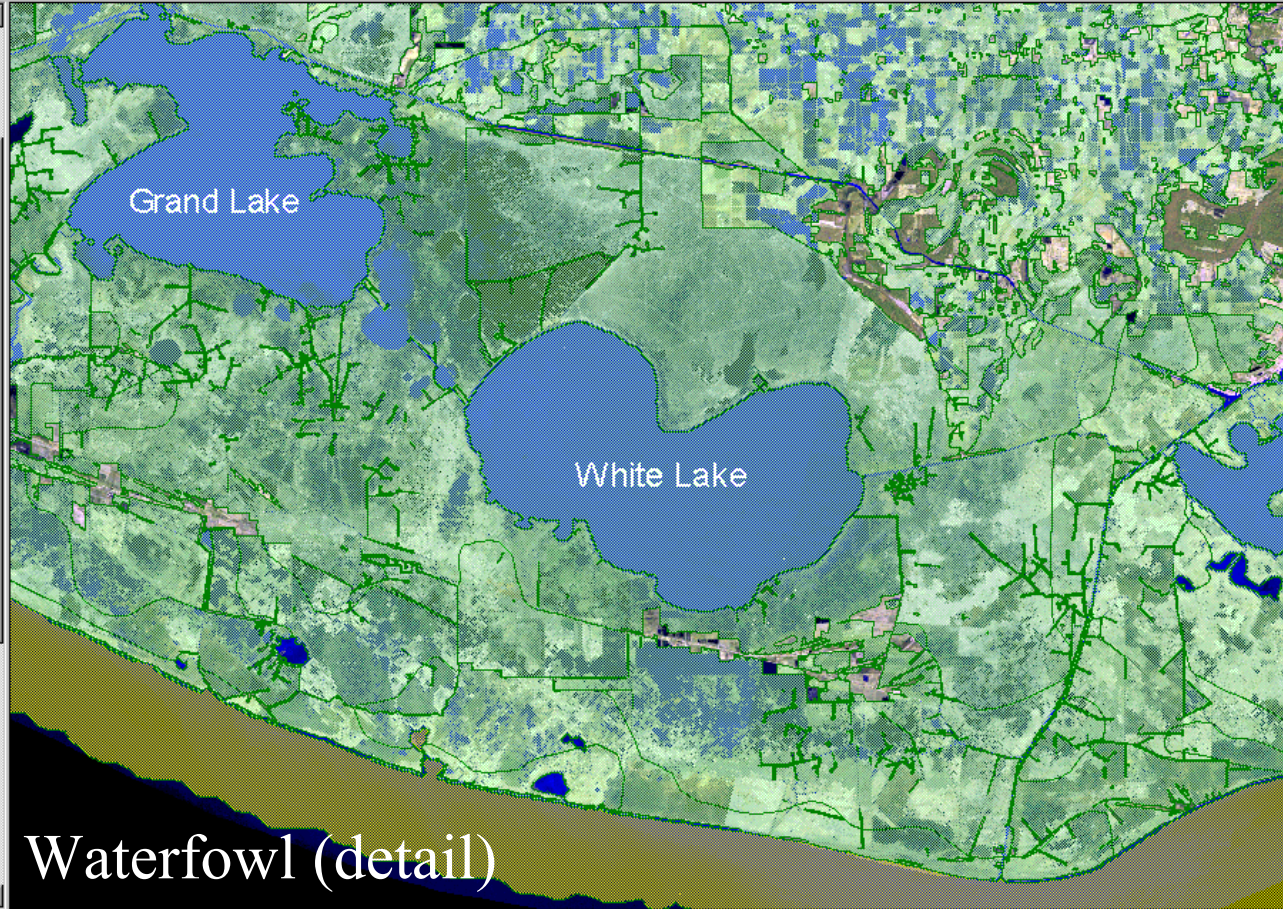
Flamm	Species_id	Contc	Season_id	G_source	S_source	E
756	18		12	3	10	
756	16		12	3	10	
756	17		12	3	10	
756	20		12	3	10	
756	21		12	3	10	
756	23		12	3	10	
756	34		12	3	11	

seasonal2.dbf

Species_id	Season_id	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	EL
18	12	X	X	X	X					X	X	X	X	
20	1	X	X	X	X					X	X	X	X	
20	2	X	X	X	X					X	X	X	X	
20	3	X	X	X	X					X	X	X	X	
20	4	X	X	X	X					X	X	X	X	
20	5	X	X	X	X					X	X	X	X	
20	6	X	X	X	X					X	X	X	X	



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activity.dbf

Month	Abundance
1	-99
2	-99
3	-99
10	-99
11	-99
12	-99
1	-99
2	-99
3	-99
10	-99
11	-99
12	-99
1	-99
2	-99
3	-99

breed2.dbf

EL_spe_sed	Month	Breed
B0002329	1	N
B0002329	2	N
B0002329	3	N
B0002329	10	N
B0002329	11	N
B0002329	12	N
B0003401	1	N
B0003401	2	N
B0003401	3	N
B0003401	10	N
B0003401	11	N
B0003401	12	N
B0003402	1	N
B0003402	2	N
B0003402	3	N
B0003402	10	N
B0003402	11	N
B0003402	12	N

species.dbf

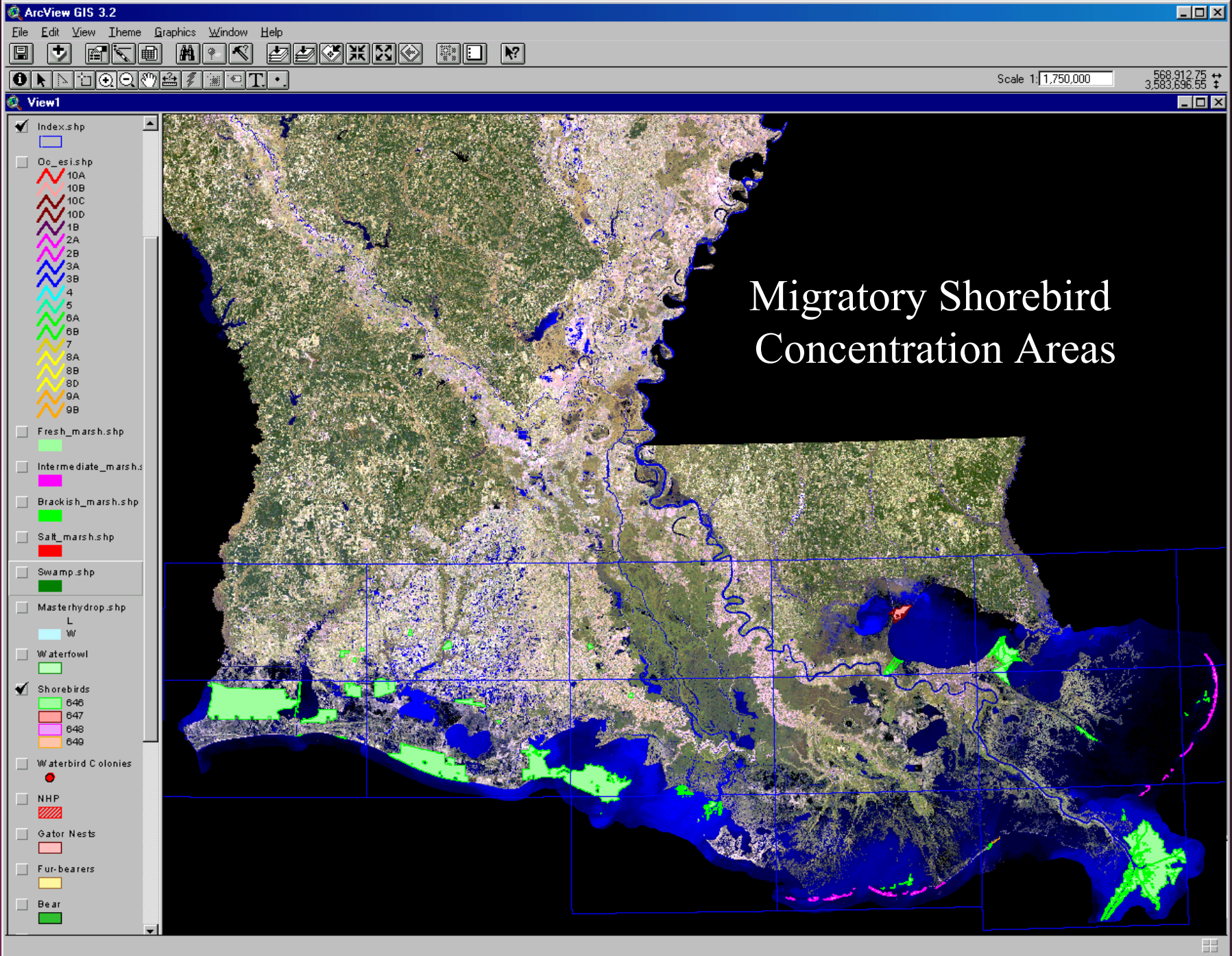
Species_id	Name	Gen_spec
23	Lesser scaup	Aythya affinis
34	American coot	Fulica americana
34	Rare lizard	
35	Threatened turtle	
37	Rare snake	
37	Muskrat	Ondatra zibethicus
38	Mink	Mustela vison

biores.dbf

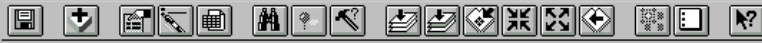
Farmid	Species_id	Conc	Season_id	G_source	S_source
733	23	52 IND/SQ MI	29	18	10
734	23	49 IND/SQ MI	29	18	10
735	280	HIGH	2	8	12
736	280		2	8	12
737	16		21	3	10
737	17		21	3	10
737	18		21	3	10

seasonal2.dbf

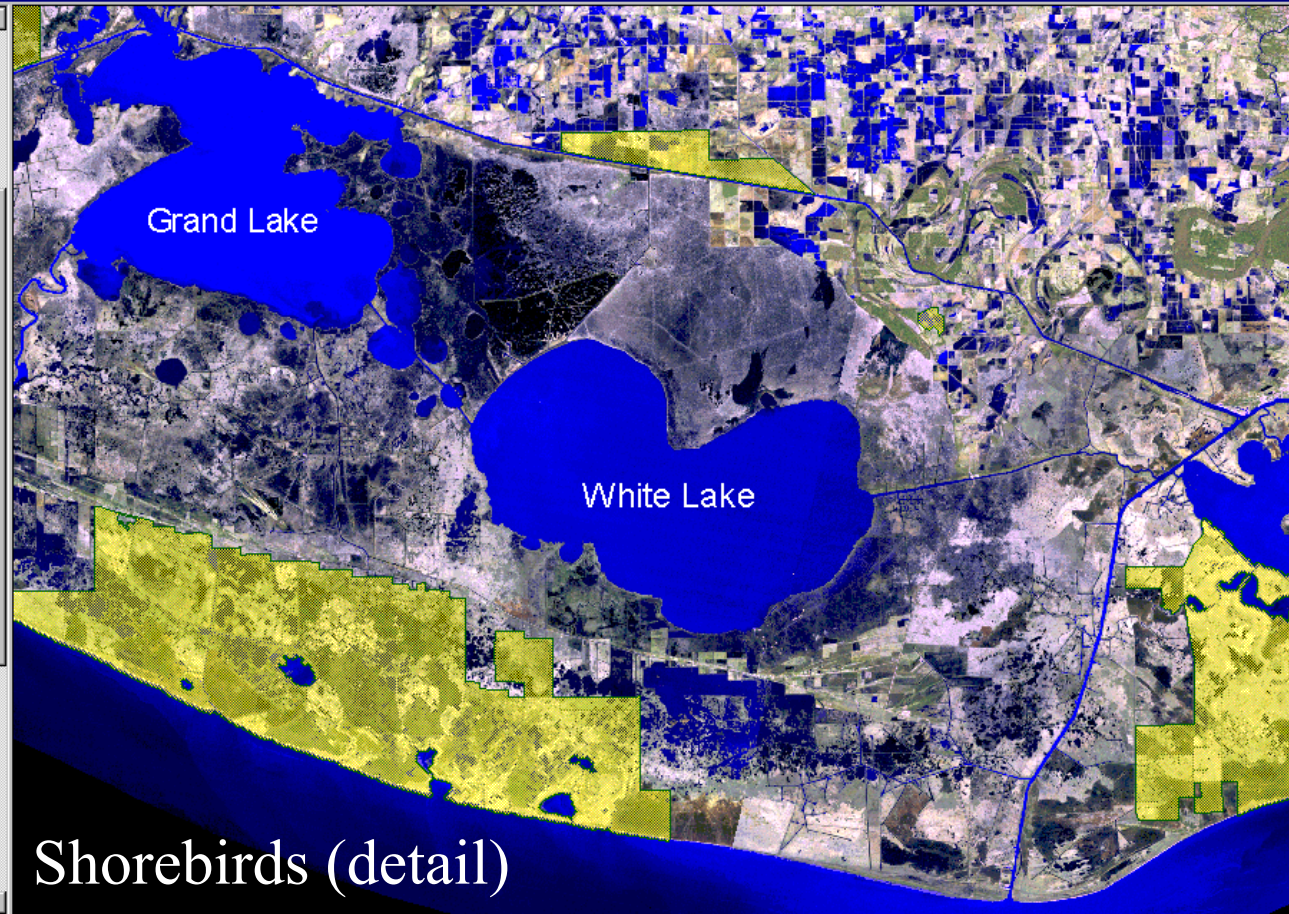
Species_id	Season_id	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
23	29	X	X	X							X	X	X
34	1	X	X	X							X	X	X
34	2	X	X	X							X	X	X
34	3	X	X	X							X	X	X
34	4	X	X	X							X	X	X
34	5	X	X	X							X	X	X
34	6	X	X	X							X	X	X



Migratory Shorebird Concentration Areas



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activity.dbf

Month	Abundance	EL
3	0	
4	0	
5	0	
7	0	
8	0	
9	0	
10	0	
9	0	
10	0	
11	0	
12	0	
1	0	
2	0	
3	0	
4	0	

breed2.dbf

EL	spe	sea	Month	Breed	Ere
B0100201	3	N			
B0100201	4	N			
B0100201	5	N			
B0100201	7	N			
B0100201	8	N			
B0100201	9	N			
B0100201	10	N			
B0100301	1	N			
B0100301	2	N			
B0100301	3	N			
B0100301	4	N			
B0100301	5	N			
B0100301	9	N			
B0100301	10	N			
B0100301	11	N			
B0100301	12	N			
B0100702	1	Y			
B0100702	2	Y			

species.dbf

Species_id	Name	Gen_spec	State
1002	Shorebirds		
16	Mallard	Anas platyrhynchos	
17	Northern pintail	Anas acuta	
18	Green-winged teal	Anas crecca	
20	Northern shoveler	Anas clypeata	
21	Canvasback	Aythya valisineria	
23	Lesser scaup	Aythya affinis	

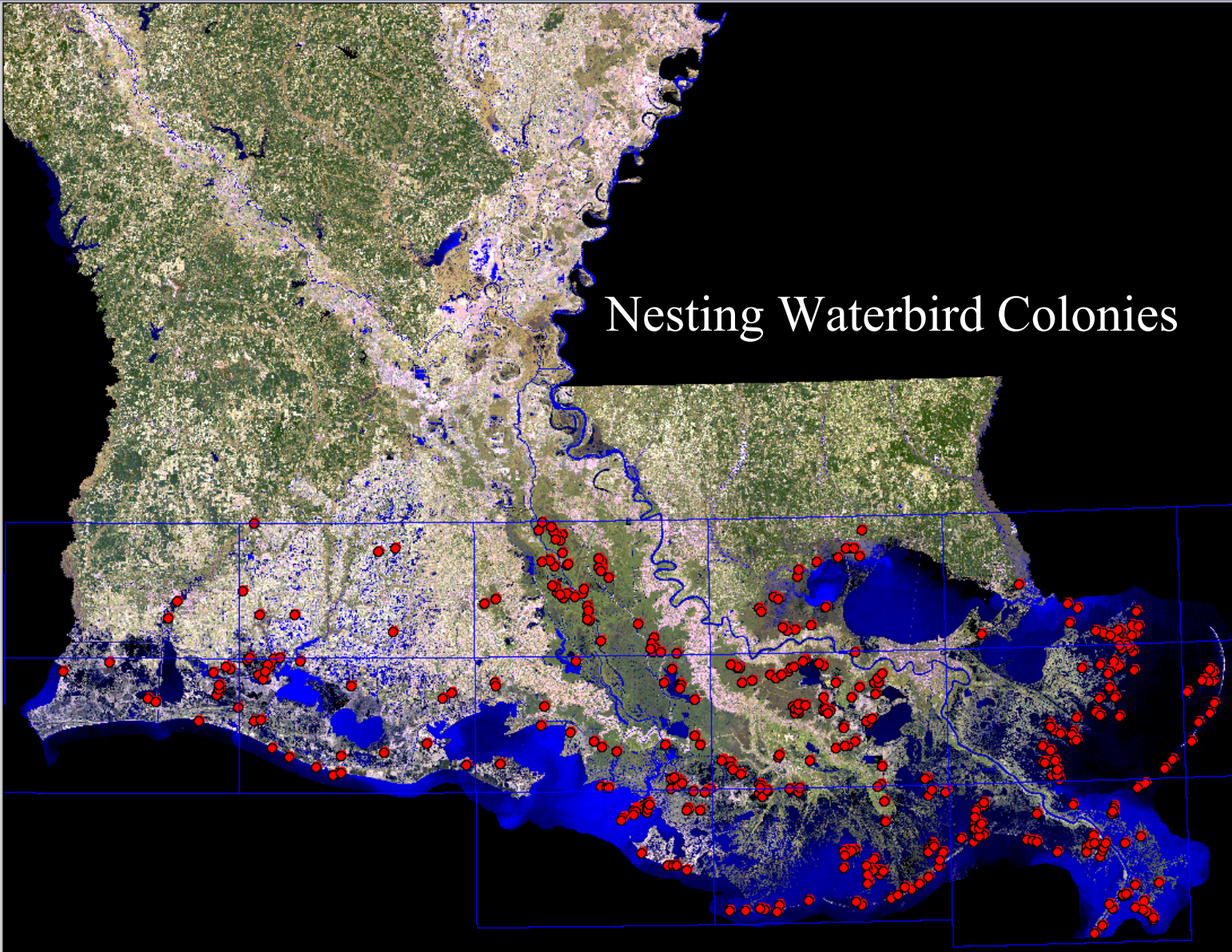
biores.dbf

Platum	Species_id	Contc	Season_id	G_source	S_source	E
646	1002		1	8	8	
756	18		12	3	10	
756	16		12	3	10	
756	17		12	3	10	
756	20		12	3	10	
756	21		12	3	10	
756	23		12	3	10	

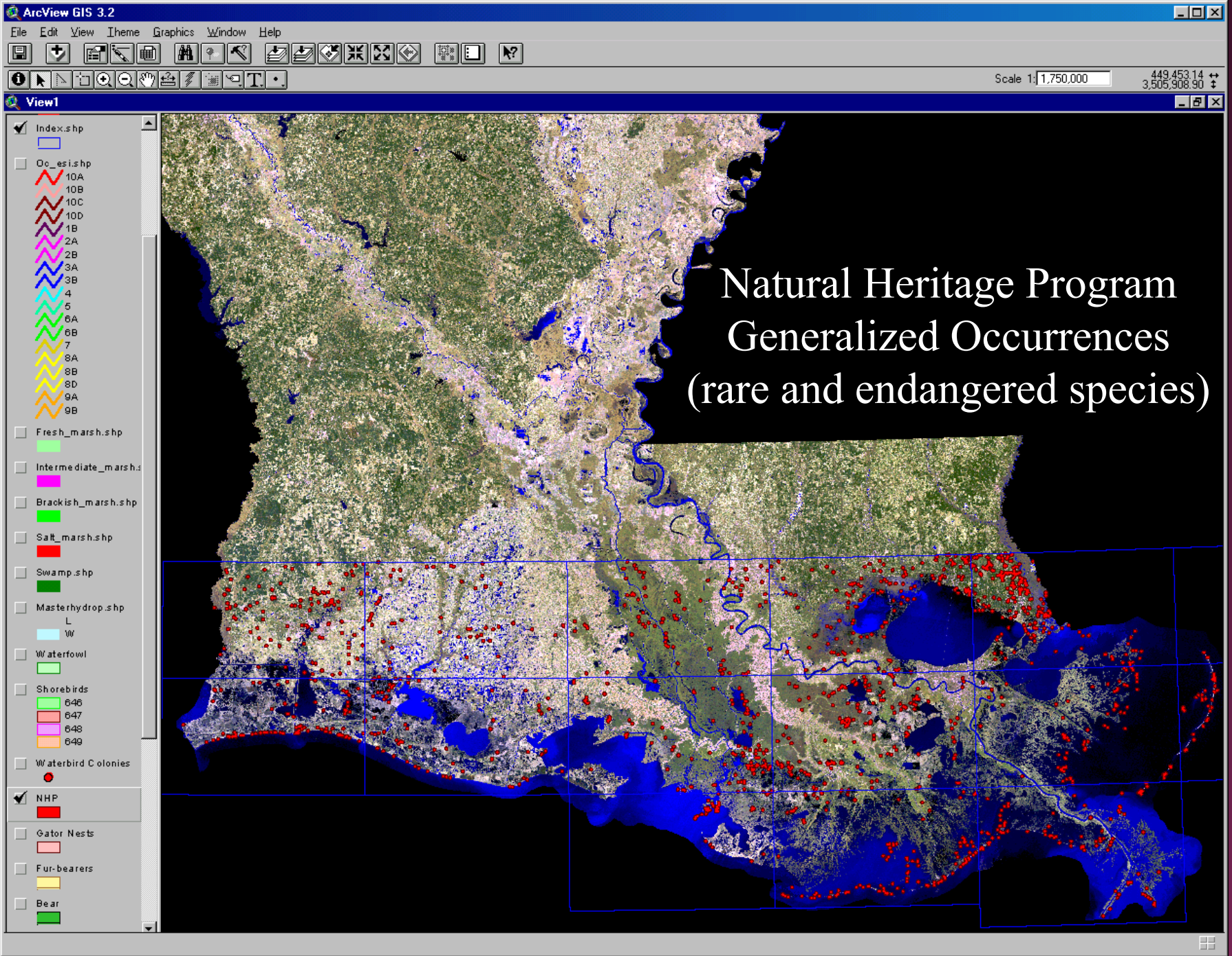
seasonal2.dbf

Species_id	Season_id	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	EL
1002	1			X	X	X		X	X	X	X			
1003	1	X	X	X	X	X					X	X	X	
1007	2	X	X	X	X	X	X	X	X	X	X	X	X	
1022	1	X	X	X	X	X					X	X	X	
1022	2	X	X	X	X	X	X	X	X	X	X	X	X	
1022	4	X	X	X	X	X	X	X	X	X	X	X	X	
1022	6				X	X	X	X	X	X				

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 - 649
- Waterbird Colonies
 - NHP
 - Gator Nests
 - Fur-bearers
 - Bear



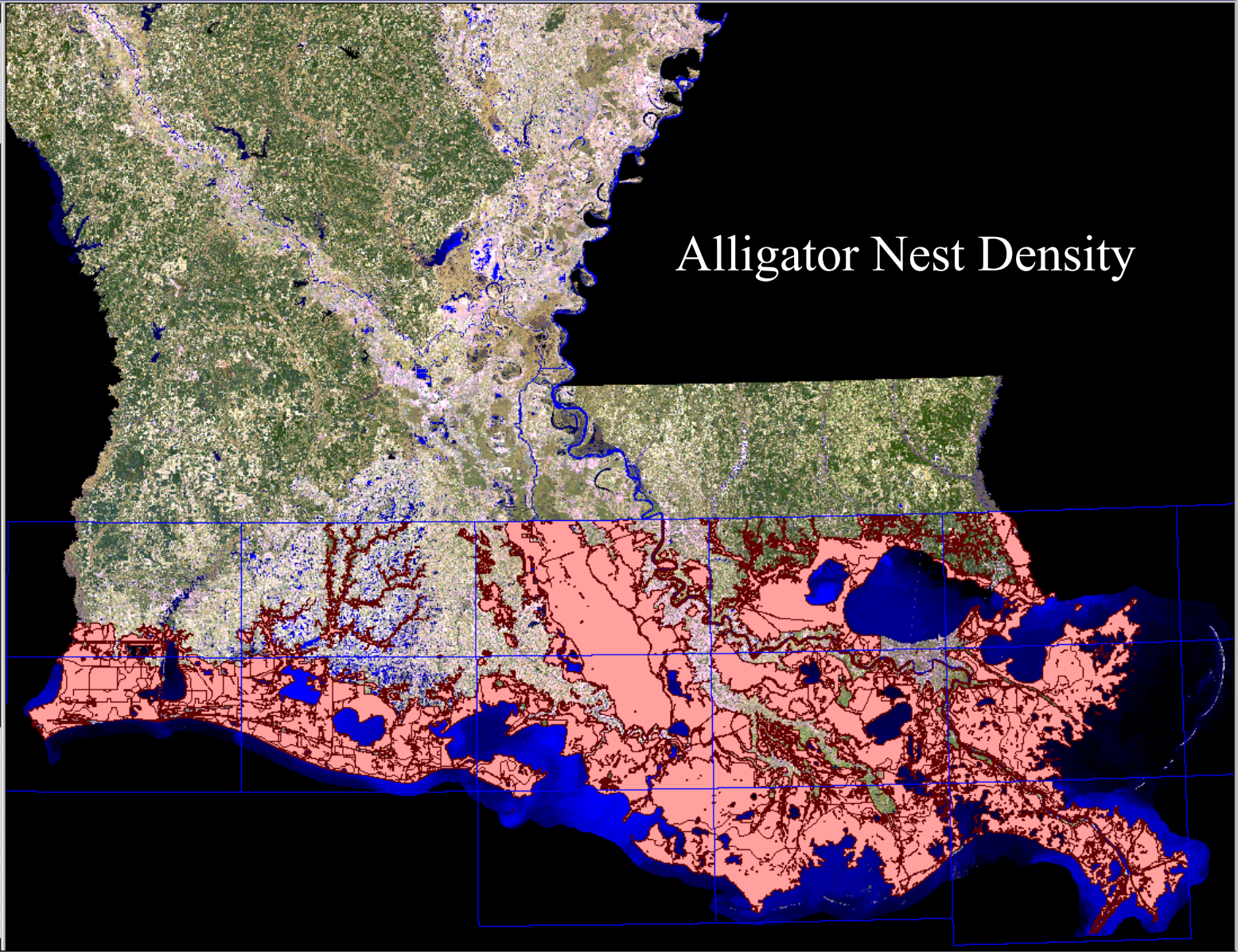
Nesting Waterbird Colonies



Natural Heritage Program Generalized Occurrences (rare and endangered species)

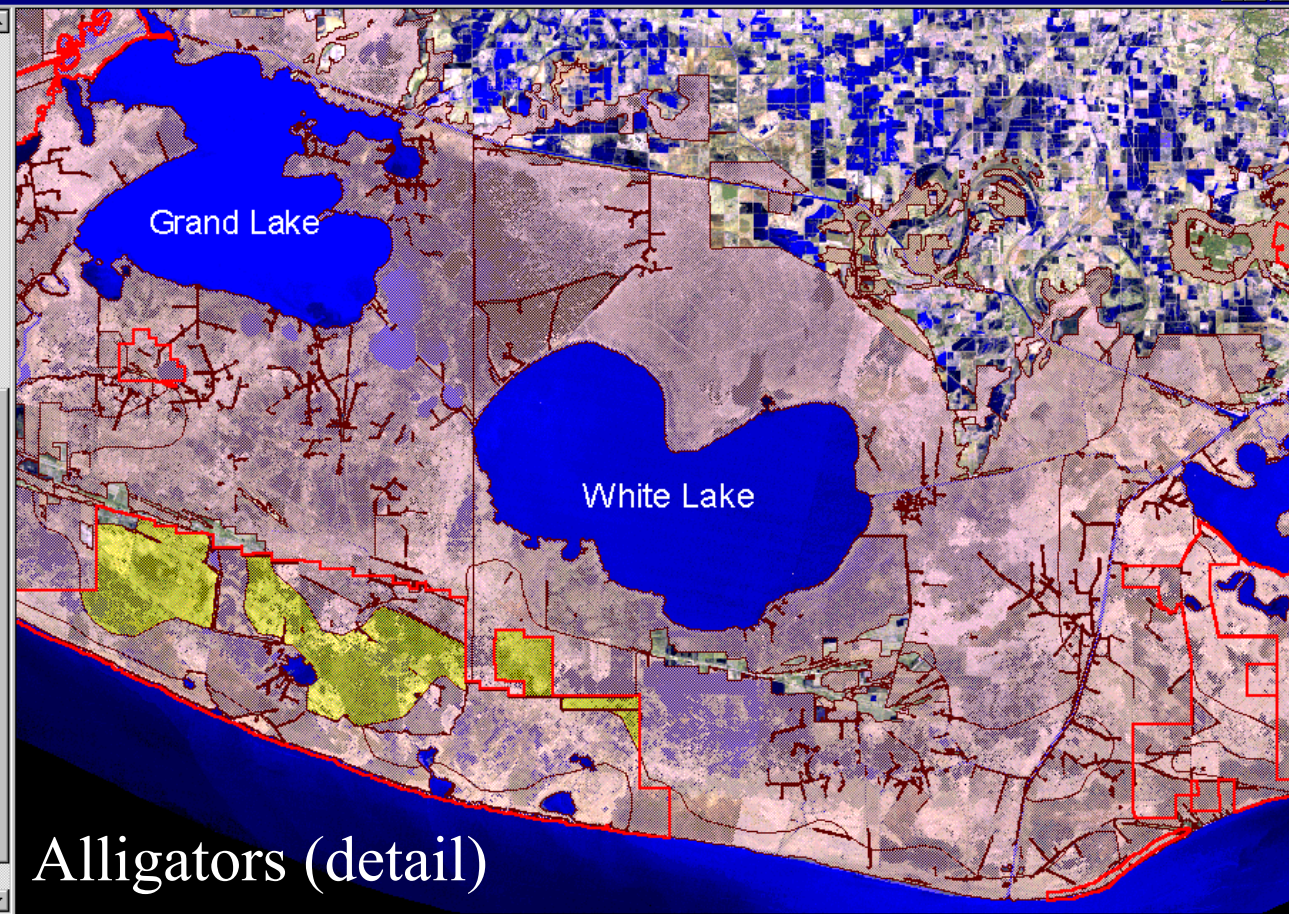


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Alligator Nest Density

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- Gator Nests
- Fur-bearers
- Bear
- Inland Finfish
- Inland Shellfish
- Master_shoreline.shp



Month	Abundance	EL
1	0	
1	0	
2	0	
2	0	
3	0	
3	0	
4	0	
4	0	
5	0	
5	0	
6	0	
6	0	
7	0	
7	0	
8	0	

Month	Breed1	Breed2	Brc
1	N	N	
2	N	N	
3	N	N	
4	N	N	
5	N	N	
6	Y	N	
7	Y	N	
8	Y	Y	
9	N	Y	
10	N	N	
11	N	N	
12	N	N	
1	N	N	
1	N	N	
1	N	N	
1	N	N	
1	N	N	
1	N	N	

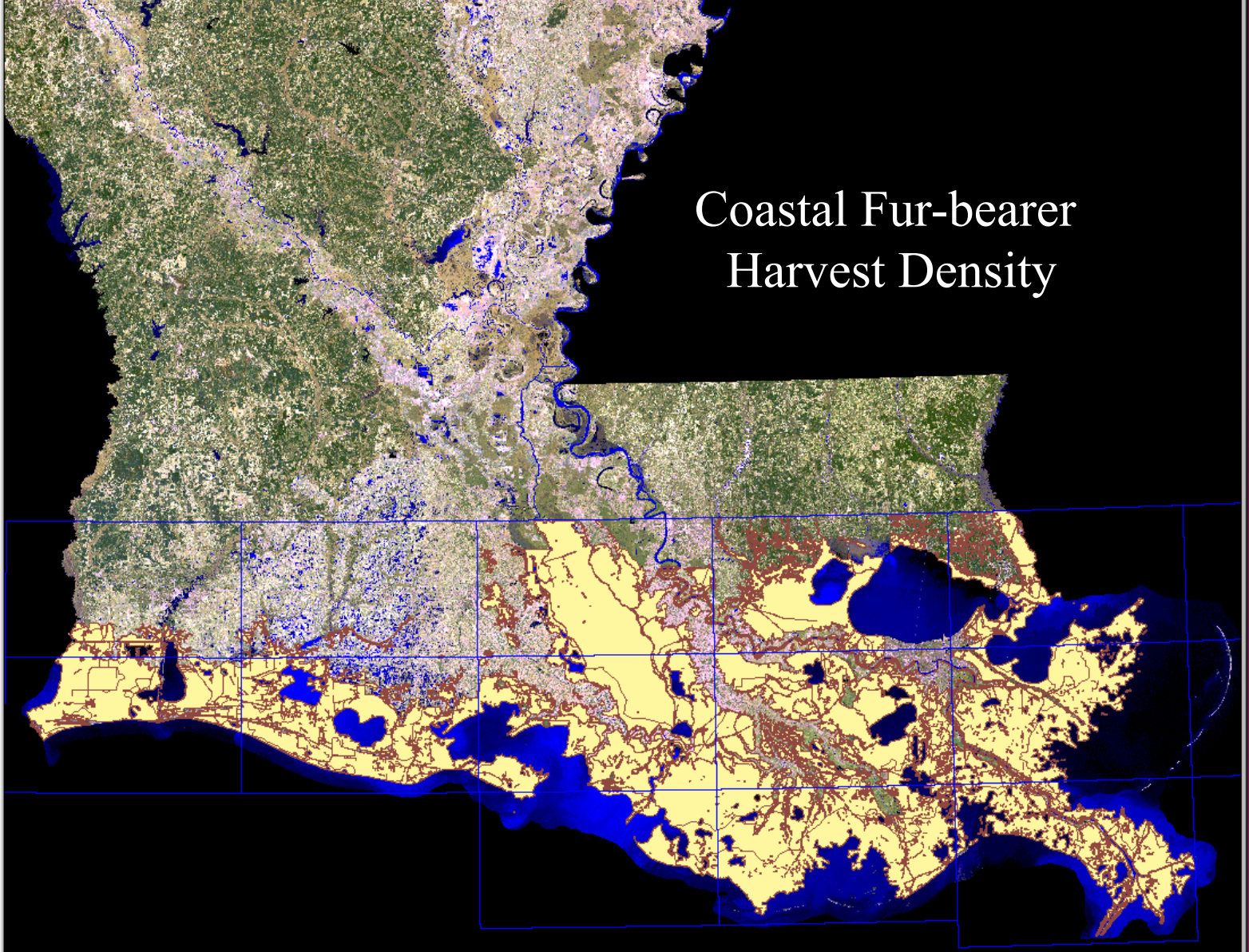
Species_id	Name	Gen2_spec
3	American alligator	Alligator mississippiensis
8	Northern river otter	Lutra canadensis
10	West Indian manatee	Trichechus manatus
16	Mallard	Anas platyrhynchos
17	Northern pintail	Anas acuta
18	Green-winged teal	Anas crecca
20	Northern shoveler	Anas clypeata

Flannum	Species_id	Cont	Season_id	G_source	S_source	E
477	3	38 AC/NEST (HIGH)	2	13	13	
478	3	164 AC/NEST (MED)	2	13	13	
479	3	136 AC/NEST (MED)	2	13	13	
480	3	184 AC/NEST (MED)	2	13	13	
481	3	152 AC/NEST (MED)	2	13	13	
482	3	2257 AC/NEST (LOW)	2	13	13	
483	3	21 AC/NEST (HIGH)	2	13	13	

Species_id	Season_id	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	EL
3	2	X	X	X	X	X	X	X	X	X	X	X	X	
3	1	X	X	X	X	X	X	X	X	X	X	X	X	
8	1	X	X	X	X	X	X	X	X	X	X	X	X	
10	1			X	X	X	X	X	X	X	X	X	X	
13	1	X	X	X	X	X	X	X	X	X	X	X	X	
16	6	X	X	X										
16	7	X	X	X							X	X	X	



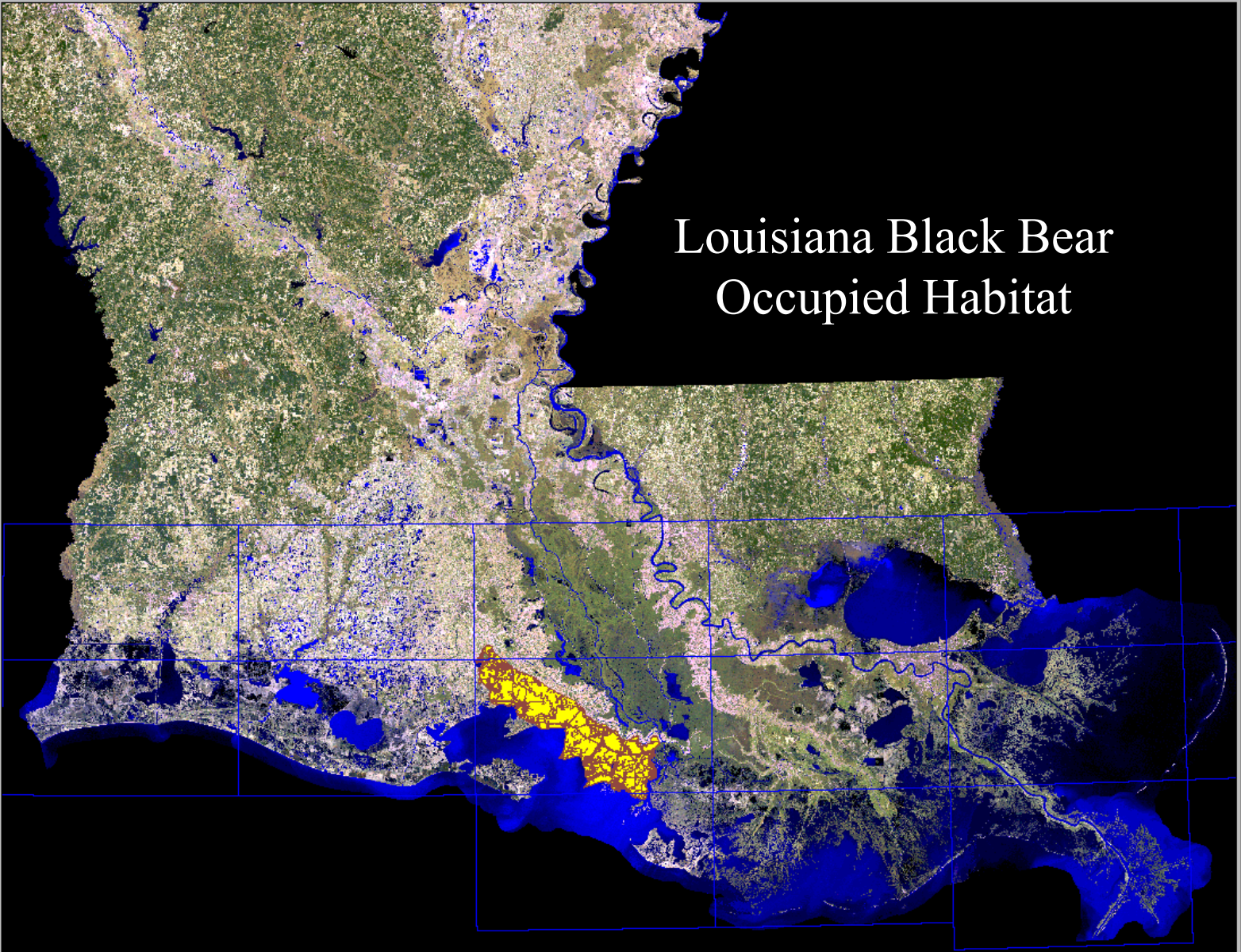
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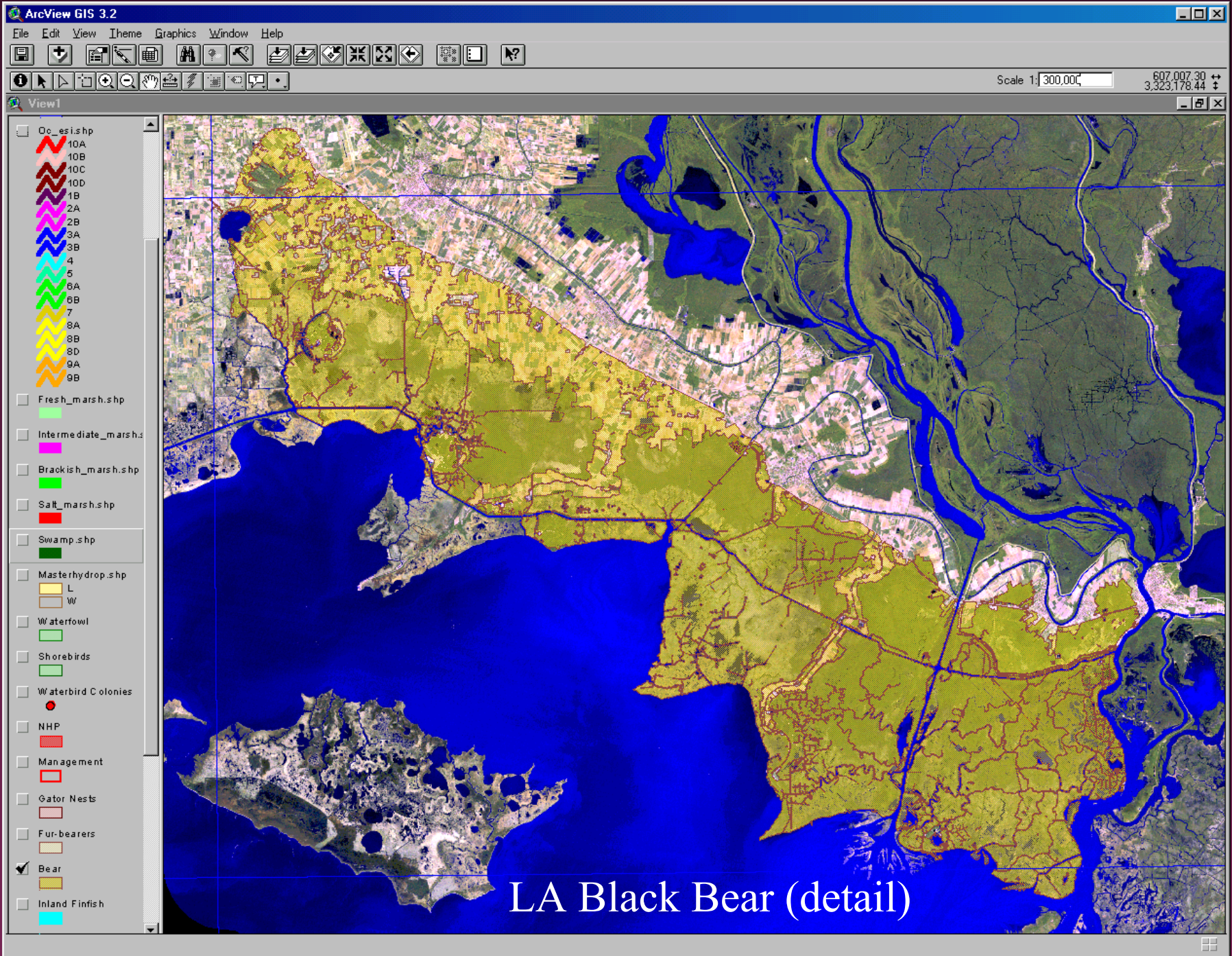
Coastal Fur-bearer Harvest Density



- Index.shp
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 - 10B
 - 10C
 - 10D
 - 1B
 - 2A
 - 2B
 - 3A
 - 3B
 - 4
 - 5
 - 6A
 - 6B
 - 7
 - 8A
 - 8B
 - 8D
 - 9A
 - 9B
- Fresh_marsh.shp
- Intermediate_marsh.s
- Braackish_marsh.shp
- Salt_marsh.shp
- Swamp.shp
- Masterhydrop.shp
 - L
 - W
- Waterfowl
- Shorebirds
 - 646
 - 647
 - 648
 - 649
- Waterbird Colonies
- NHP
- Gator Nests
- Fur-bearers
- Bear



Louisiana Black Bear Occupied Habitat

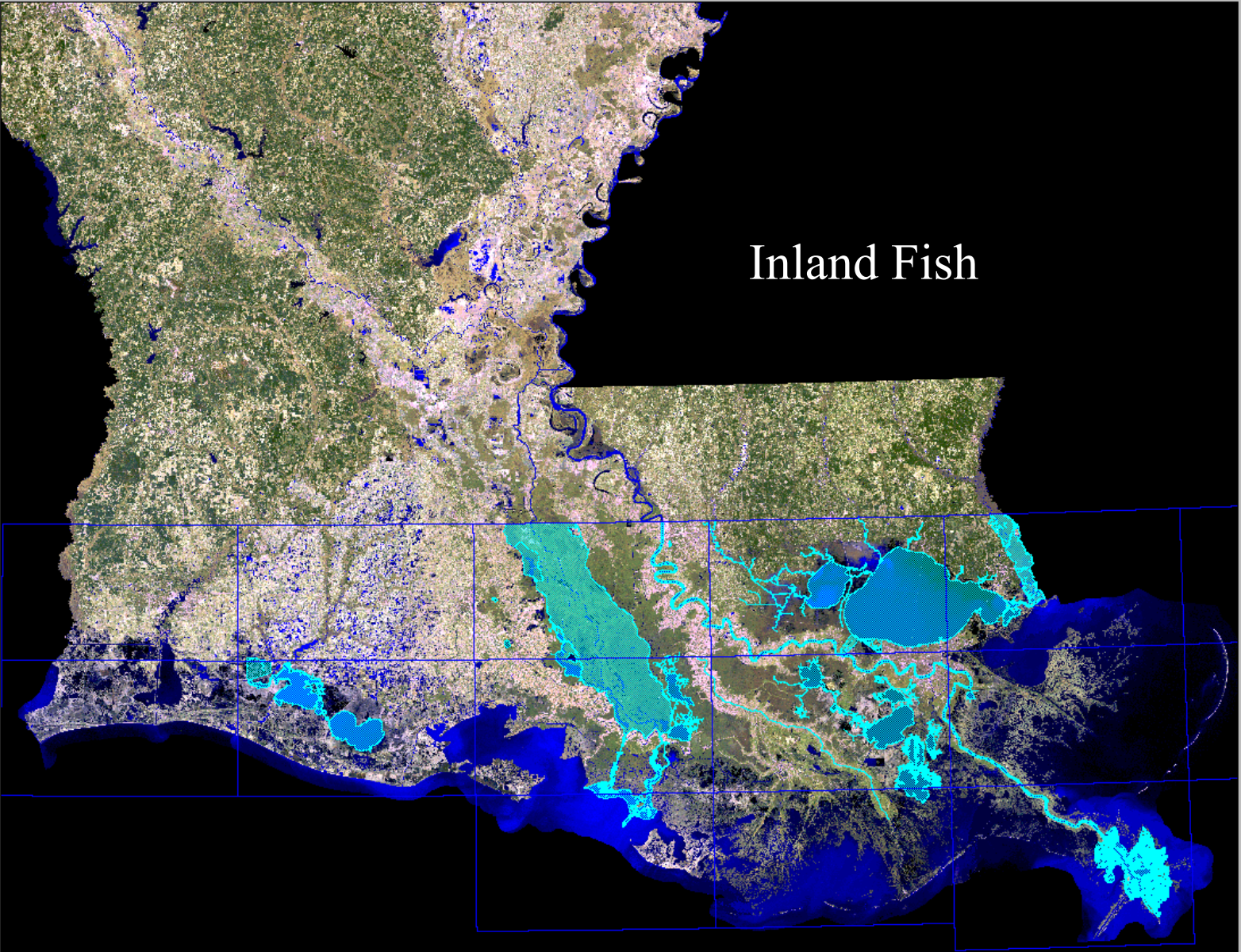


LA Black Bear (detail)

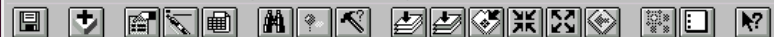


View1

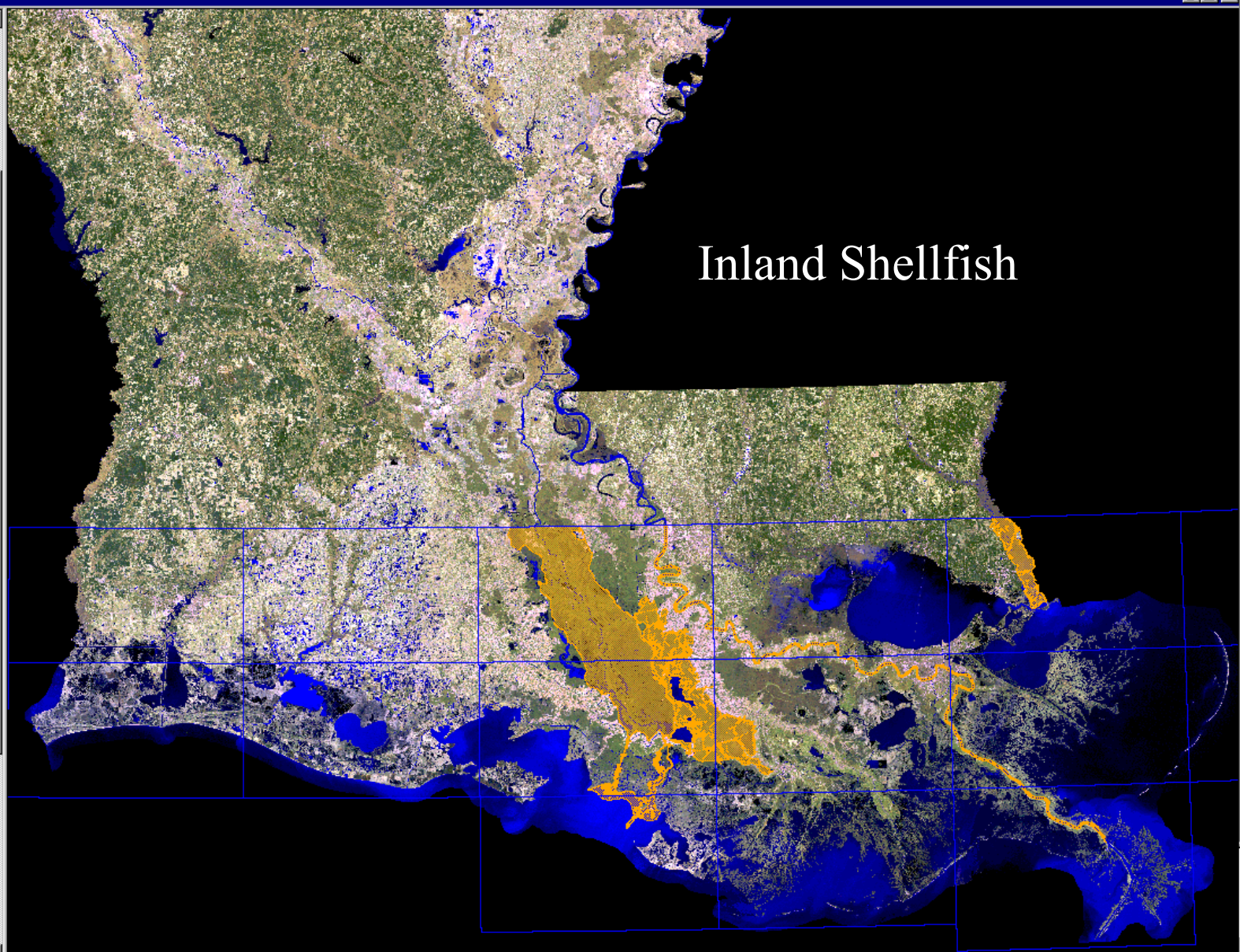
- Index.shp
- Oc_esi.shp
 - 10A
 - 10B
 - 10C
 - 10D
 - 1B
 - 2A
 - 2B
 - 3A
 - 3B
 - 4
 - 5
 - 6A
 - 6B
 - 7
 - 8A
 - 8B
 - 8D
 - 9A
 - 9B
- Fresh_marsh.shp
- Intermediate_marsh.s
- Brackish_marsh.shp
- Salt_marsh.shp
- Swamp.shp
- Masterhydrop.shp
 - L
 - W
- Waterfowl
- Shorebirds
- Waterbird Colonies
- NHP
- Gator Nests
- Fur-bearers
- Bear
- Inland Finfish



Inland Fish



- Oc_es1.shp
 - 10A
 - 10B
 - 10C
 - 10D
 - 1B
 - 2A
 - 2B
 - 3A
 - 3B
 - 4
 - 5
 - 6A
 - 6B
 - 7
 - 8A
 - 8B
 - 8D
 - 9A
 - 9B
- Fresh_marsh.shp
- Intermediate_marsh.shp
- Brackish_marsh.shp
- Salt_marsh.shp
- Swamp.shp
- Masterhydrog.shp
 - L
 - W
- Waterfowl
- Shorebirds
- Waterbird Colonies
- NHP
- Gator Nests
- Fur-bearers
- Bear
- Inland Finfish
- Inland Shellfish



Inland Shellfish

Project Status

- Final project was delivered to MMS and LSU in UTM NAD 27 in June 2001
- Shorebird layer was updated and all data converted to Geographic and NAD 83 in October 2001
- Data may be available for downloading in multiple formats on LSU web site in the near future (<http://lagic.lsu.edu/>)
- Proposed extension of the ESI shoreline classification inland using remote sensing techniques

Acknowledgements

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- LSU, LAGIC and LGS
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- USGS NWRC
- USCG