



# **Savannah Harbor Expansion Project**

Evaluation of Juvenile Shortnose Sturgeon (Winter) Habitat Impacts with  
Proposed Mitigation Plan

*March 9, 2011*

This report and the subsequent tables and maps are an addendum to the report titled *Evaluation of Fishery Habitat Impacts with Proposed Mitigation Plan* dated January 2010 which was included in the Draft GRR and EIS documents released to the public in November 2010 (Appendix C of the GRR, Engineering Investigations Supplemental Materials 1.1.29).

This document provides habitat suitability impact predictions for juvenile Shortnose Sturgeon in January due harbor deepening and mitigation using the revised habitat suitability criteria suggested by NOAA and approved by the Fisheries Interagency Coordination Team in September 2009. The following table summarizes these habitat suitability criteria:

**Table 1: Habitat Criteria for Juvenile Shortnose Sturgeon (Winter)**

Species & Life Stage	Freshwater Flow Conditions	Simulation Period	Habitat Criteria
Juvenile Shortnose Sturgeon	50 percentile of Long Term	January	Suitable Habitat when D.O. is: >= 3.5 mg/L at 90% exceedance (10 percentile) >= 3.0 mg/L at 95% exceedance (5 percentile) >= 2.0 mg/L at 99% exceedance (1 percentile) and Suitable Habitat when 50% exceedance of the max Salinity is <= 14.9 ppt

These new criteria did not apply to habitat determinations for adult Shortnose Sturgeon (summer and winter).

Using the revised criteria, the Corps used the hydrodynamic and water quality models approved for this project (EFDC and WASP) to develop the impact predictions shown in Table 2. While impact predictions utilize the criteria specified above in Table 1, it should be noted that during the winter months D.O. levels (including the bottom layer) remain above the targets specified in the criteria. Therefore, habitat suitability for this period of analysis is strictly dependent on the salinity value specified in the criteria.

**Table 2: Habitat Suitability for Juvenile Shortnose Sturgeon (Winter)**

	Suitable Habitat				
Channel Depth (below MLLW)	No Deepening No Mitigation	With Deepening & Mitigation Plans 6a/6b		With Deepening & Mitigation Plans 6a/6b & Middle River Sill	
(ft)	(acres)	(acres)	(%) Change	(acres)	(%) Change
42 ft (Existing)	3282	-	-	-	-
44 ft		3062	-6.7%	3062	-6.7%
45 ft		3051	-7.0%	3056	-6.9%
46 ft		3044	-7.3%	3044	-7.3%
47 ft		3031	-7.6%	2956	-9.9%
48 ft		2906	-11.5%	2924	-10.9%

*Negative values indicate habitat lost, positive values indicated habitat gained.*

In addition to the flow conditions specified in Table 1 above, the point source discharges from 2004 were also used for the January simulation period. The point source discharge information was obtained from USEPA Region 4 and is based on the Discharge Monitoring Reports. Those discharges are shown in the following table (Table 3). Note that the values in this table reflect lbs/day of BOD loading (not Ultimate Oxygen Demand) and do not include the point source discharges near Augusta. EPA's April 2010 Revised Draft TMDL for D.O. requires a reduction in loading from about 600,000 lbs/day UOD to about 130,000 lbs/day. The use of the 2004 loadings in the impact analysis is conservative in light of this expected future reduction in UOD sources to the system.

**Table 3: Point Source Loads in Savannah Harbor (CBODu lbs/day)**

Facility	Model Grid Cell Location (I, J)	May-October 2004 Loads (lbs/day)	May-October 1999 Loads (lbs/day)	January 2004* Loads (lbs/day)
Beaufort-Jasper Water & Sewer Authority	14, 148	13.0	25.0	19.1
Georgia-Pacific	14, 171	5,873.0	3,810.5	7599.5
Weyerhaeuser Co., Port Wentworth	13, 95	6,797.0	809.9	10,142.9
Garden City Water Pollution Control Plant	13, 77	32.0	122.0	346.5
Savannah Water Pollution Control Plant Travis Field	13, 74	27.0	129.0	254.1
Savannah Water Pollution Control Plant President Street	13, 54	1,489.0	4,399.0	3,915.1
International Paper Co.	15, 70	143,448.0	86,669.8	102,170.9
TOTAL	-	157,679.0	95,965.2	124,448.1

*\*January 2004 loads were used in model simulations.*

Mitigation specified for the Savannah Harbor Deepening Project varies by depth. Components of the mitigation plans include a flow altering plan (plans 6a and 6b). Figures 1 and 2 shown below and on the following page include the details of the 2 flow altering plans. Mitigation for harbor deepening to 44 ft below MLLW includes plan 6b and mitigation for harbor deepening to 45 ft, 46 ft, 47 ft and 48 ft below MLLW include plan 6a.

Figure 1: Plan 6b (44 ft depth mitigation)

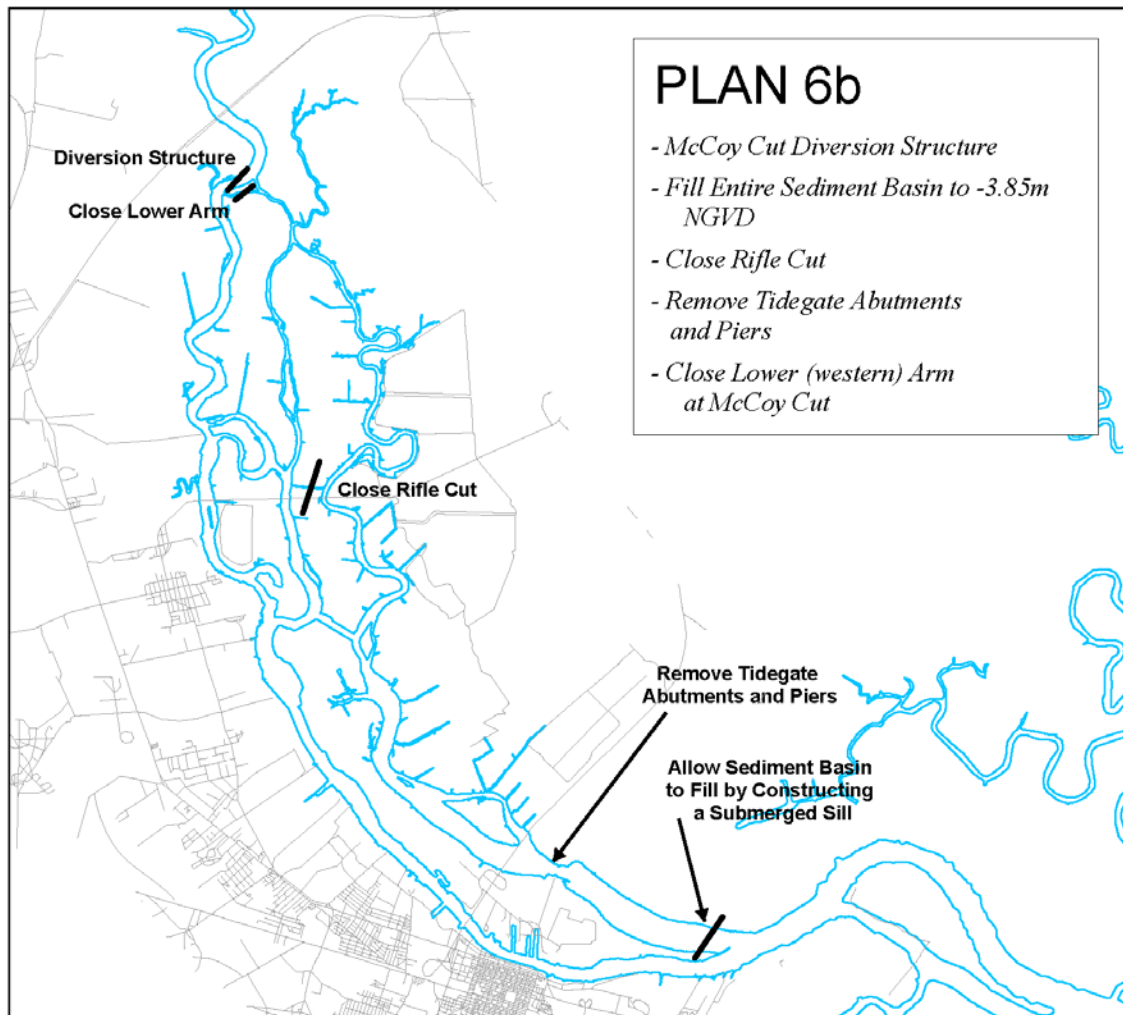
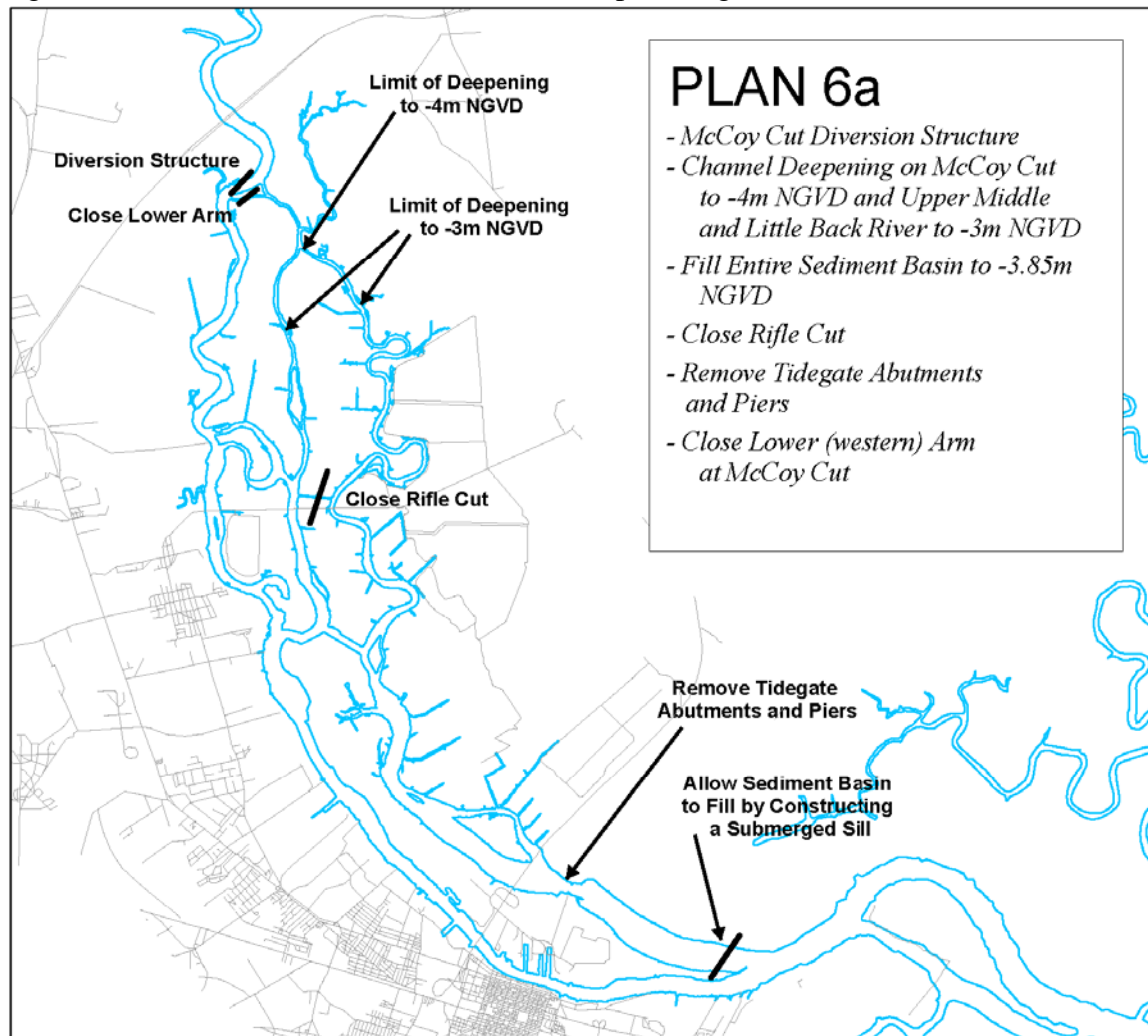
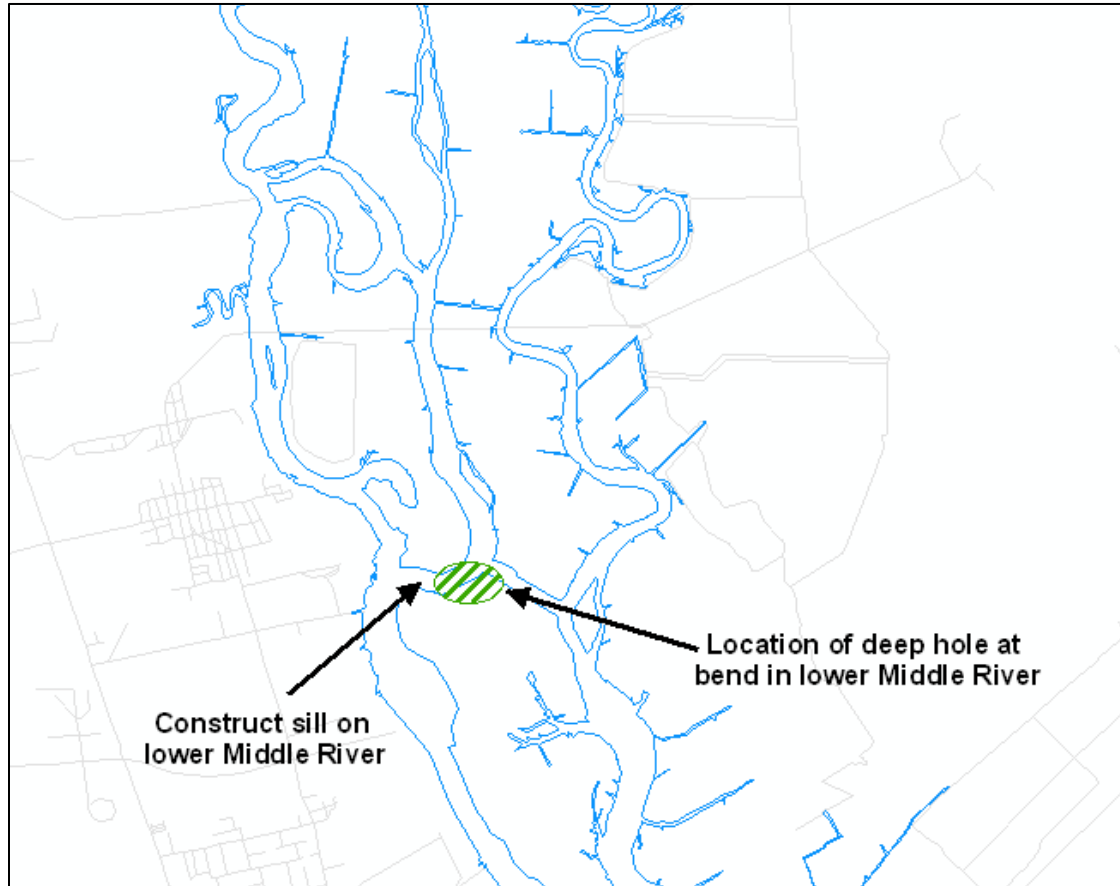


Figure 2: Plan 6a (45 ft, 46 ft, 47 ft, and 48 ft depth mitigation)



The Middle River Sill is a mitigation feature included in the project at all depth alternatives to protect a known habitat for shortnose sturgeons in a deep hole on Middle River. See Figure 3. This sill would produce a localized effect on salinity and hydrodynamics. It was designed to protect the deep hole at the bend in lower Middle River from salinity intrusion on Front River due to deepening the navigation channel. More details about the sill can be found in the report titled *Sensitivity Analysis of Proposed Sill on Middle River* dated September 2009. This report is included in the Draft GRR and EIS (Appendix C of the GRR, Engineering Investigations Supplemental Materials 1.1.35).

Figure 3: Middle River Sill location (mitigation feature included in all depth alternatives)



In addition to flow alteration of the river system, mitigation includes D.O. injection during warm summer months to address D.O. impacts within the harbor. Details of the D.O. injection plan can be found in the report titled *Oxygen Injection Design Report* dated October 15, 2010 prepared by Tetra Tech, Inc. This report is included in the Draft GRR and EIS (Appendix C of the GRR, Engineering Investigations Supplemental Materials 1.1.4). However, since D.O. injection is only necessary during warm summer months when D.O. levels in the harbor drop below state standards, it is not incorporated into the model runs during the January simulation period.

The following maps show where the changes in habitat suitability occur within the river system. These maps support the results shown in Table 2.




**Savannah Harbor Expansion  
Fishery Impacts**

**Habitat Suitability for  
Juvenile Shortnose Sturgeon**

Existing Conditions ONLY  
NO Deepening  
NO Mitigation

Analysis period is January with  
2004 point source discharges.

**Habitat Suitability**

-  n/a
-  Unsuitable Habitat (Fail)
-  Suitable Habitat (Pass)

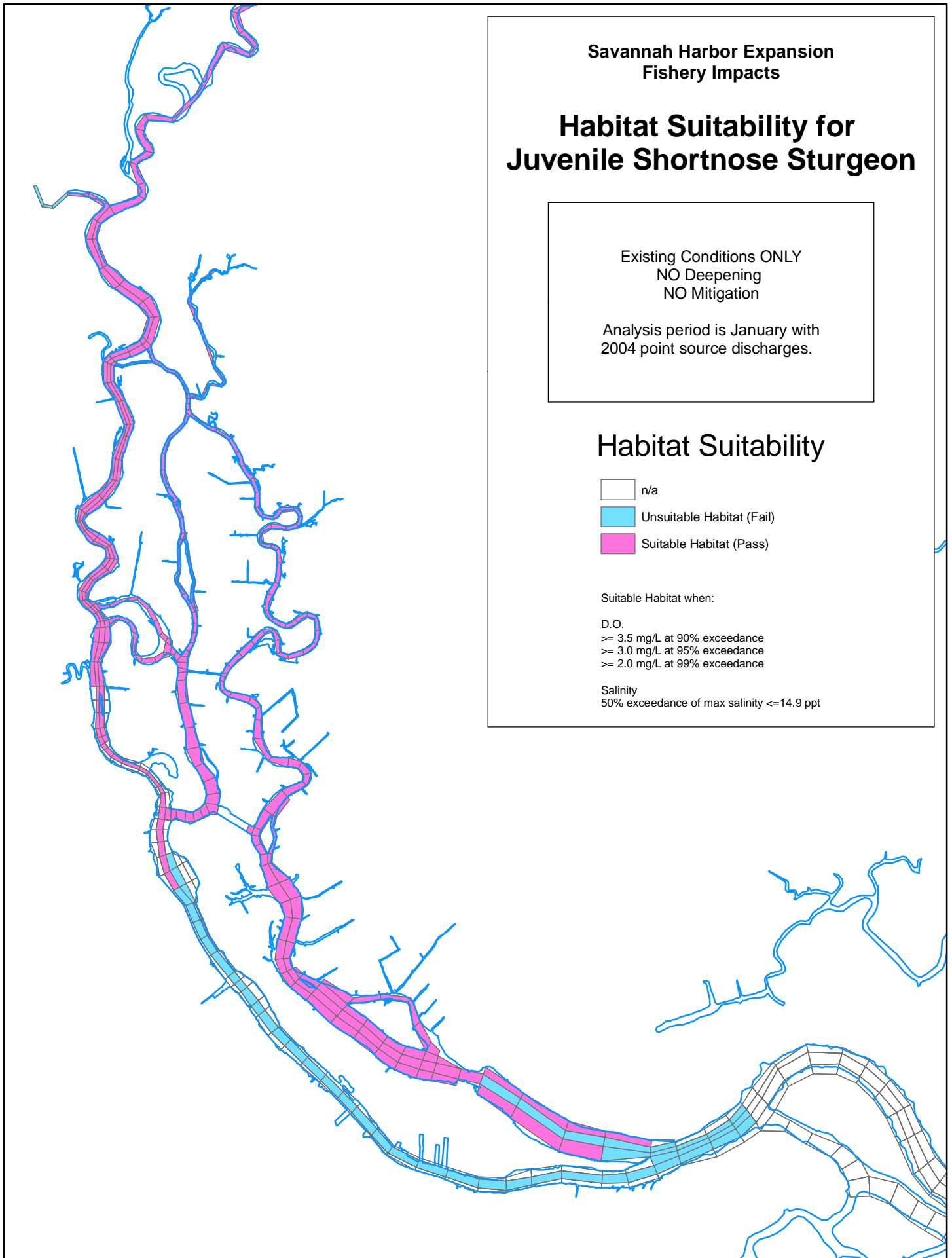
Suitable Habitat when:

D.O.

- $\geq 3.5$  mg/L at 90% exceedance
- $\geq 3.0$  mg/L at 95% exceedance
- $\geq 2.0$  mg/L at 99% exceedance

Salinity

50% exceedance of max salinity  $\leq 14.9$  ppt



**Savannah Harbor Expansion  
Fishery Impacts**

## **Habitat Suitability for Juvenile Shortnose Sturgeon**

Comparison between Existing Conditions  
and

Deepening to 44 ft below MLLW (2 ft)  
with Mitigation Plan 6b

Analysis period is January with  
2004 point source discharges.

### **Habitat Suitability**



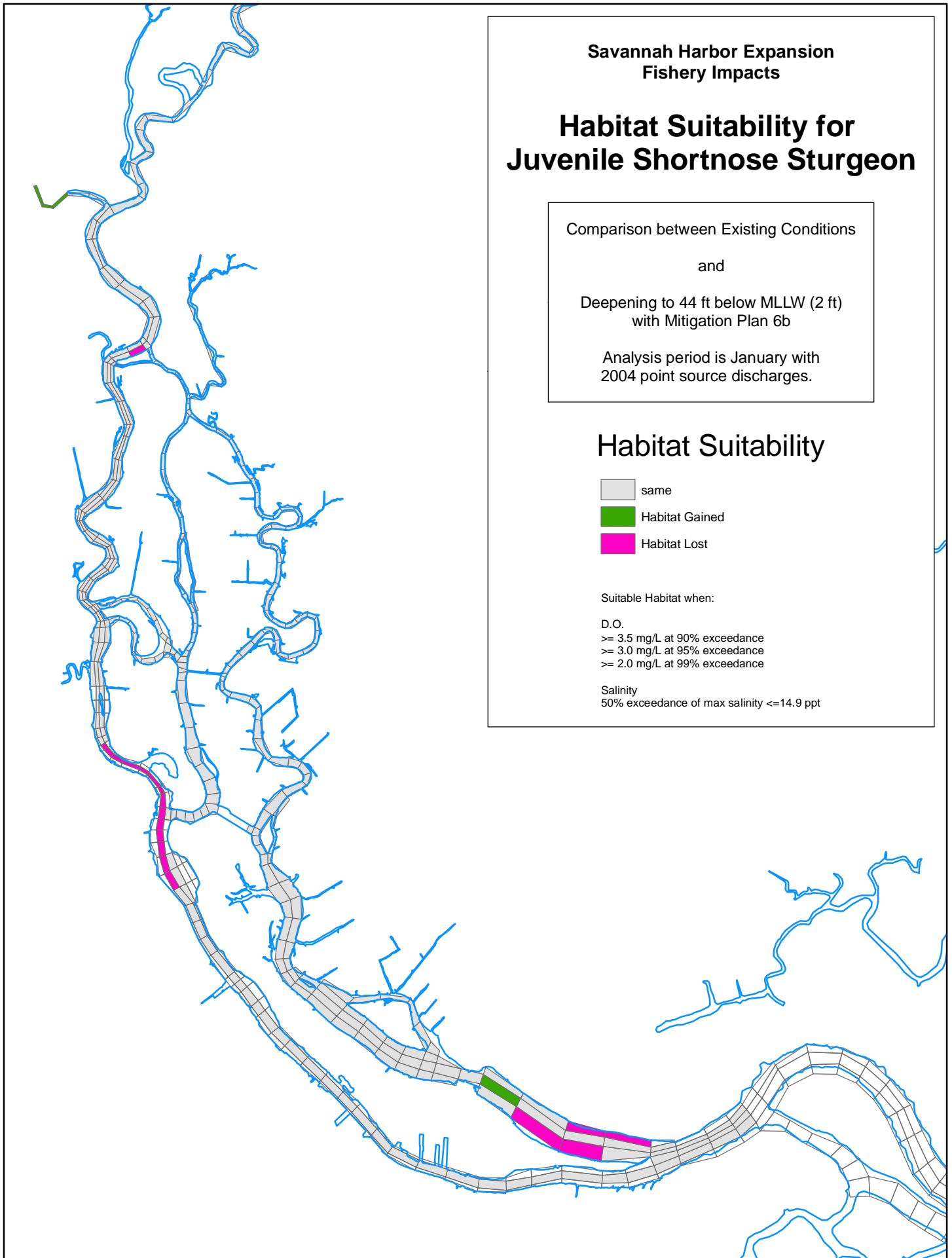
Suitable Habitat when:

D.O.

- $\geq 3.5$  mg/L at 90% exceedance
- $\geq 3.0$  mg/L at 95% exceedance
- $\geq 2.0$  mg/L at 99% exceedance

Salinity

50% exceedance of max salinity  $\leq 14.9$  ppt





**Savannah Harbor Expansion  
Fishery Impacts**

## **Habitat Suitability for Juvenile Shortnose Sturgeon**

Comparison between Existing Conditions

and

Deepening to 44 ft below MLLW (2 ft)  
with Mitigation Plan 6b and  
Middle River Sill

Analysis period is January with  
2004 point source discharges.

### **Habitat Suitability**



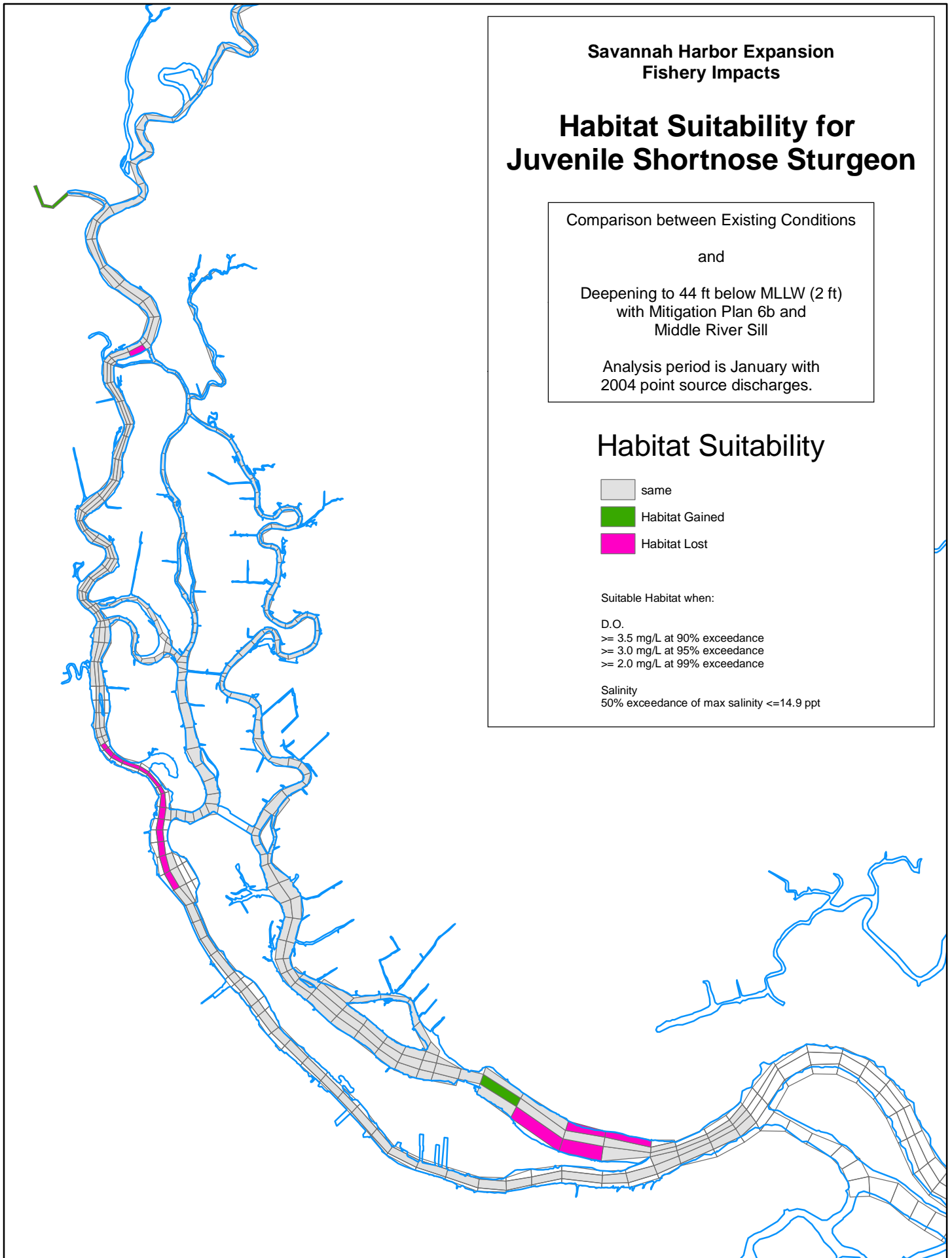
Suitable Habitat when:

D.O.

- $\geq 3.5$  mg/L at 90% exceedance
- $\geq 3.0$  mg/L at 95% exceedance
- $\geq 2.0$  mg/L at 99% exceedance

Salinity

50% exceedance of max salinity  $\leq 14.9$  ppt



**Savannah Harbor Expansion  
Fishery Impacts**

**Habitat Suitability for  
Juvenile Shortnose Sturgeon**

Comparison between Existing Conditions  
and

Deepening to 45 ft below MLLW (3 ft)  
with Mitigation Plan 6a

Analysis period is January with  
2004 point source discharges.

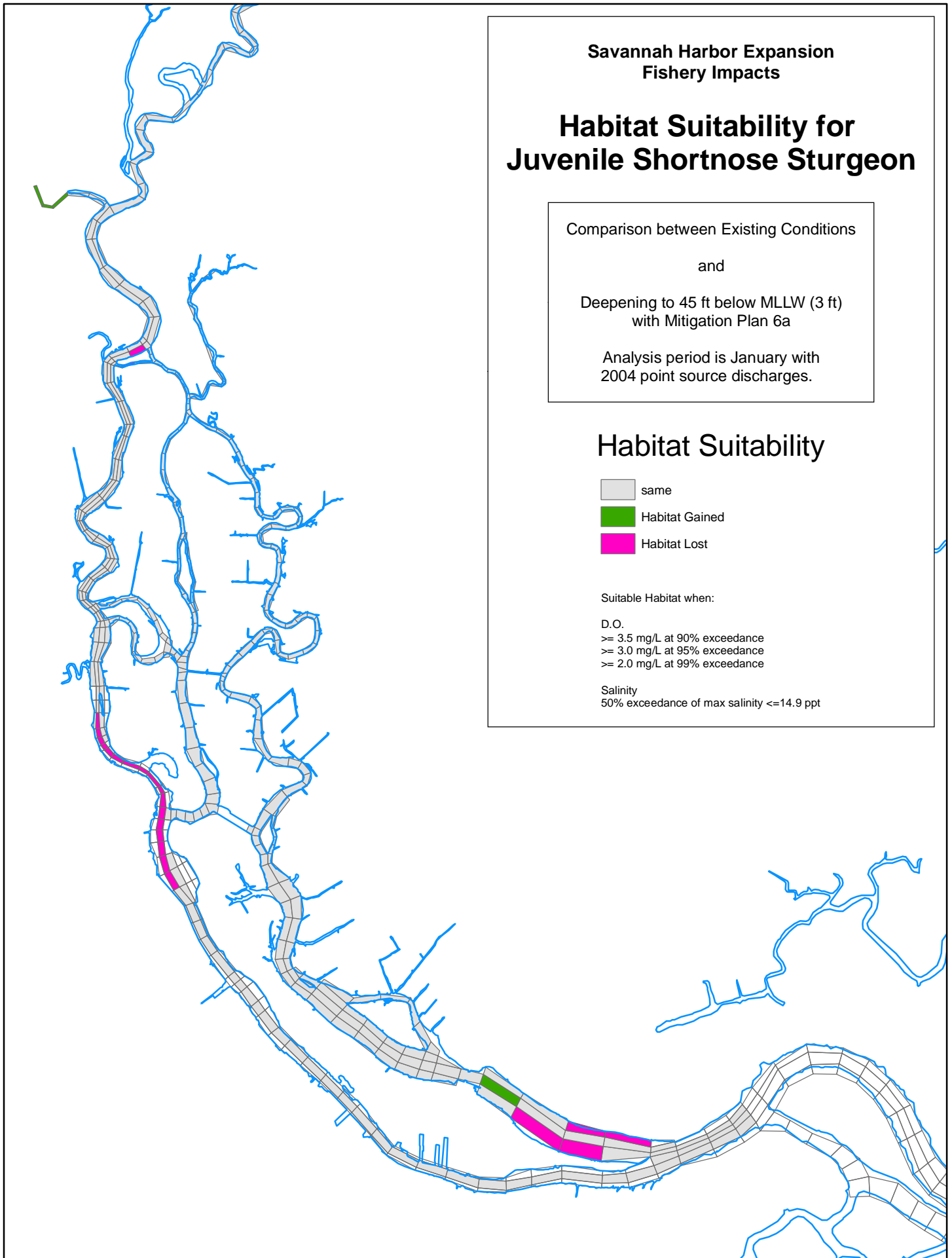
**Habitat Suitability**



Suitable Habitat when:

D.O.  
≥ 3.5 mg/L at 90% exceedance  
≥ 3.0 mg/L at 95% exceedance  
≥ 2.0 mg/L at 99% exceedance

Salinity  
50% exceedance of max salinity ≤ 14.9 ppt



**Savannah Harbor Expansion  
Fishery Impacts**

**Habitat Suitability for  
Juvenile Shortnose Sturgeon**

Comparison between Existing Conditions

and

Deepening to 45 ft below MLLW (3 ft)  
with Mitigation Plan 6a and  
Middle River Sill

Analysis period is January with  
2004 point source discharges.

**Habitat Suitability**



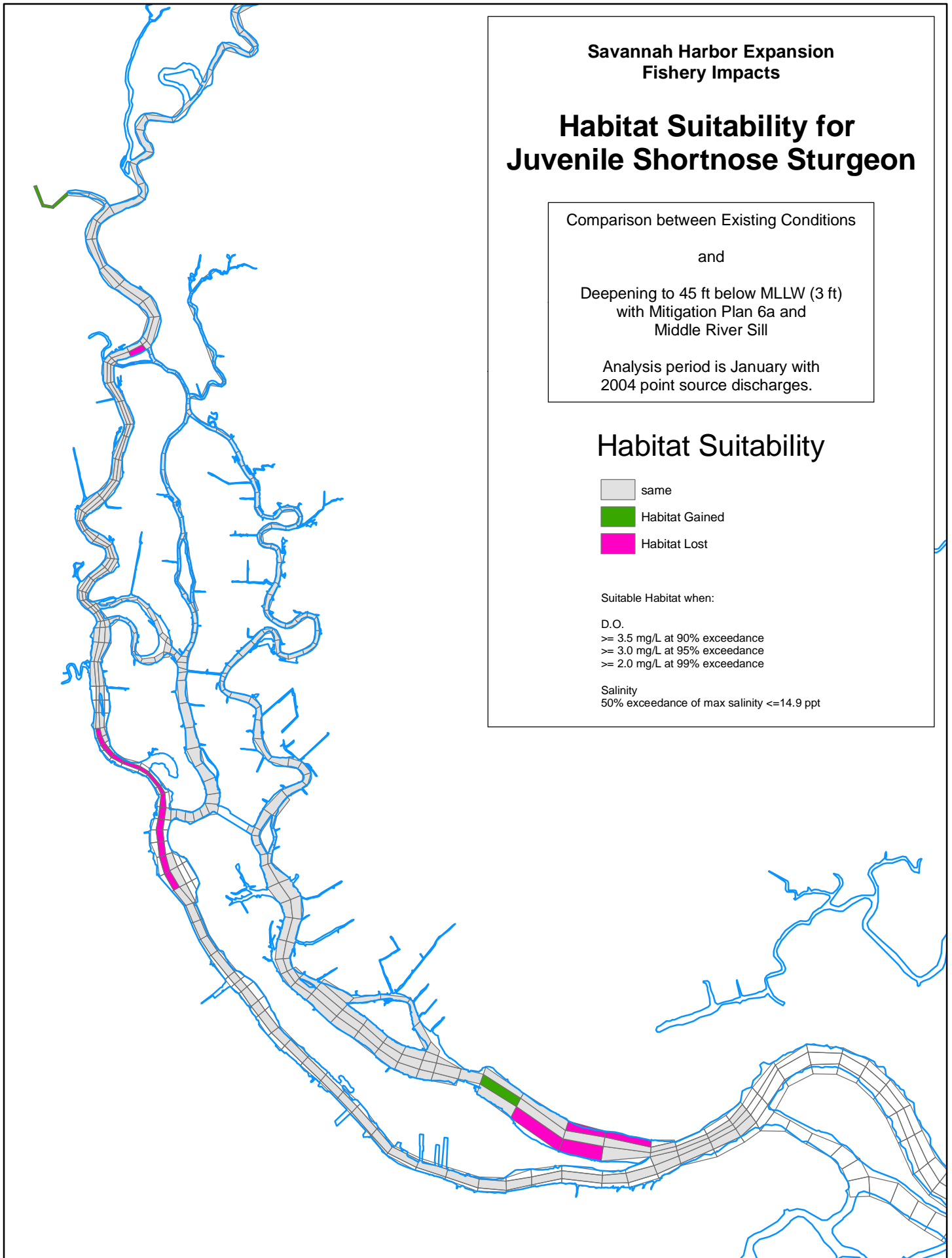
Suitable Habitat when:

D.O.

- $\geq 3.5$  mg/L at 90% exceedance
- $\geq 3.0$  mg/L at 95% exceedance
- $\geq 2.0$  mg/L at 99% exceedance

Salinity

50% exceedance of max salinity  $\leq 14.9$  ppt



**Savannah Harbor Expansion  
Fishery Impacts**

**Habitat Suitability for  
Juvenile Shortnose Sturgeon**

Comparison between Existing Conditions  
and

Deepening to 46 ft below MLLW (4 ft)  
with Mitigation Plan 6a

Analysis period is January with  
2004 point source discharges.

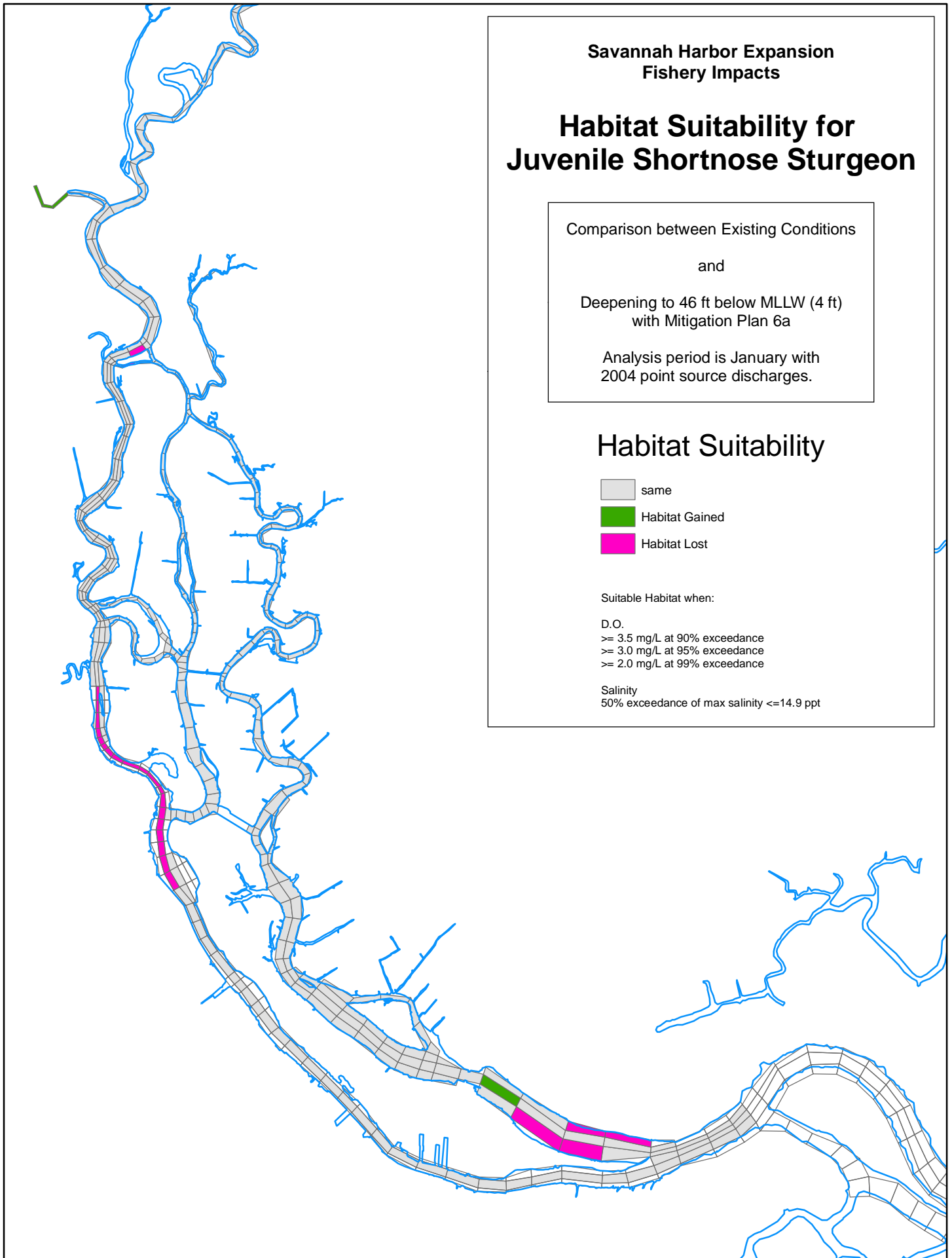
**Habitat Suitability**



Suitable Habitat when:

D.O.  
≥ 3.5 mg/L at 90% exceedance  
≥ 3.0 mg/L at 95% exceedance  
≥ 2.0 mg/L at 99% exceedance

Salinity  
50% exceedance of max salinity ≤ 14.9 ppt



**Savannah Harbor Expansion  
Fishery Impacts**

**Habitat Suitability for  
Juvenile Shortnose Sturgeon**

Comparison between Existing Conditions

and

Deepening to 46 ft below MLLW (4 ft)  
with Mitigation Plan 6a and  
Middle River Sill

Analysis period is January with  
2004 point source discharges.

**Habitat Suitability**



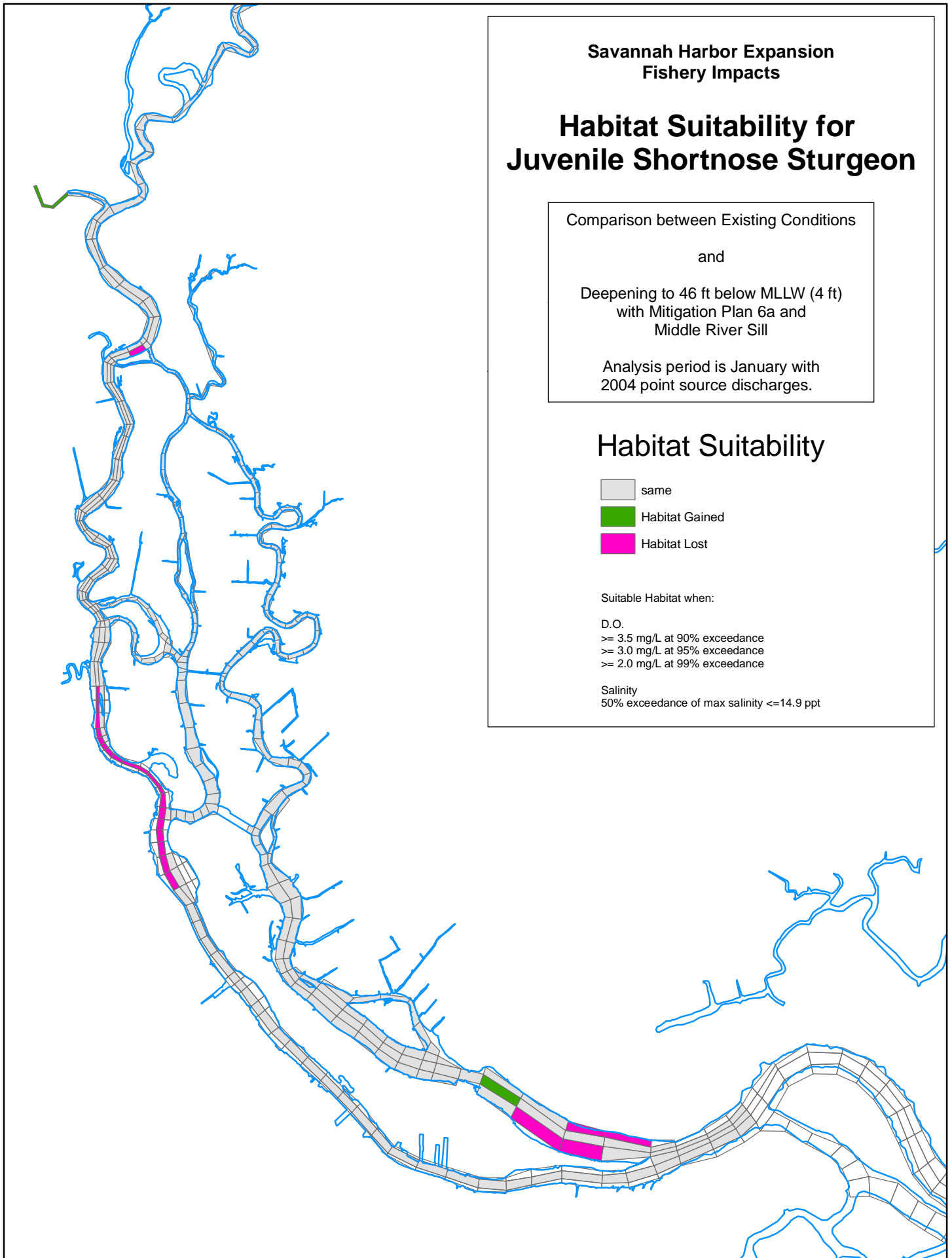
Suitable Habitat when:

D.O.

- $\geq 3.5$  mg/L at 90% exceedance
- $\geq 3.0$  mg/L at 95% exceedance
- $\geq 2.0$  mg/L at 99% exceedance

Salinity

50% exceedance of max salinity  $\leq 14.9$  ppt



**Savannah Harbor Expansion  
Fishery Impacts**

# Habitat Suitability for Juvenile Shortnose Sturgeon

Comparison between Existing Conditions  
and

Deepening to 47 ft below MLLW (5 ft)  
with Mitigation Plan 6a

Analysis period is January with  
2004 point source discharges.

## Habitat Suitability



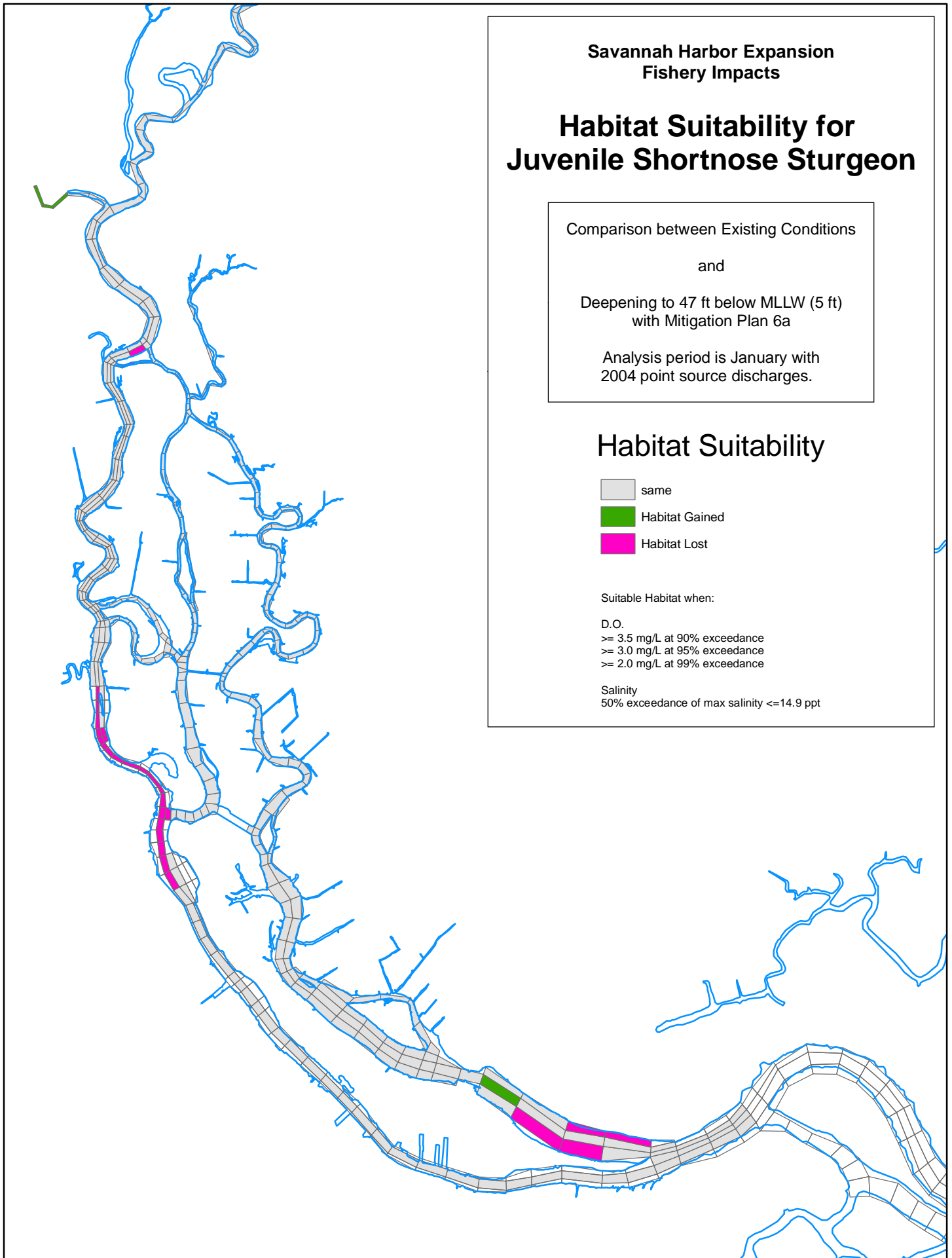
Suitable Habitat when:

D.O.

- $\geq 3.5$  mg/L at 90% exceedance
- $\geq 3.0$  mg/L at 95% exceedance
- $\geq 2.0$  mg/L at 99% exceedance

Salinity

50% exceedance of max salinity  $\leq 14.9$  ppt



**Savannah Harbor Expansion  
Fishery Impacts**

## **Habitat Suitability for Juvenile Shortnose Sturgeon**

Comparison between Existing Conditions

and

Deepening to 47 ft below MLLW (5 ft)  
with Mitigation Plan 6a and  
Middle River Sill

Analysis period is January with  
2004 point source discharges.

### **Habitat Suitability**

-  same
-  Habitat Gained
-  Habitat Lost

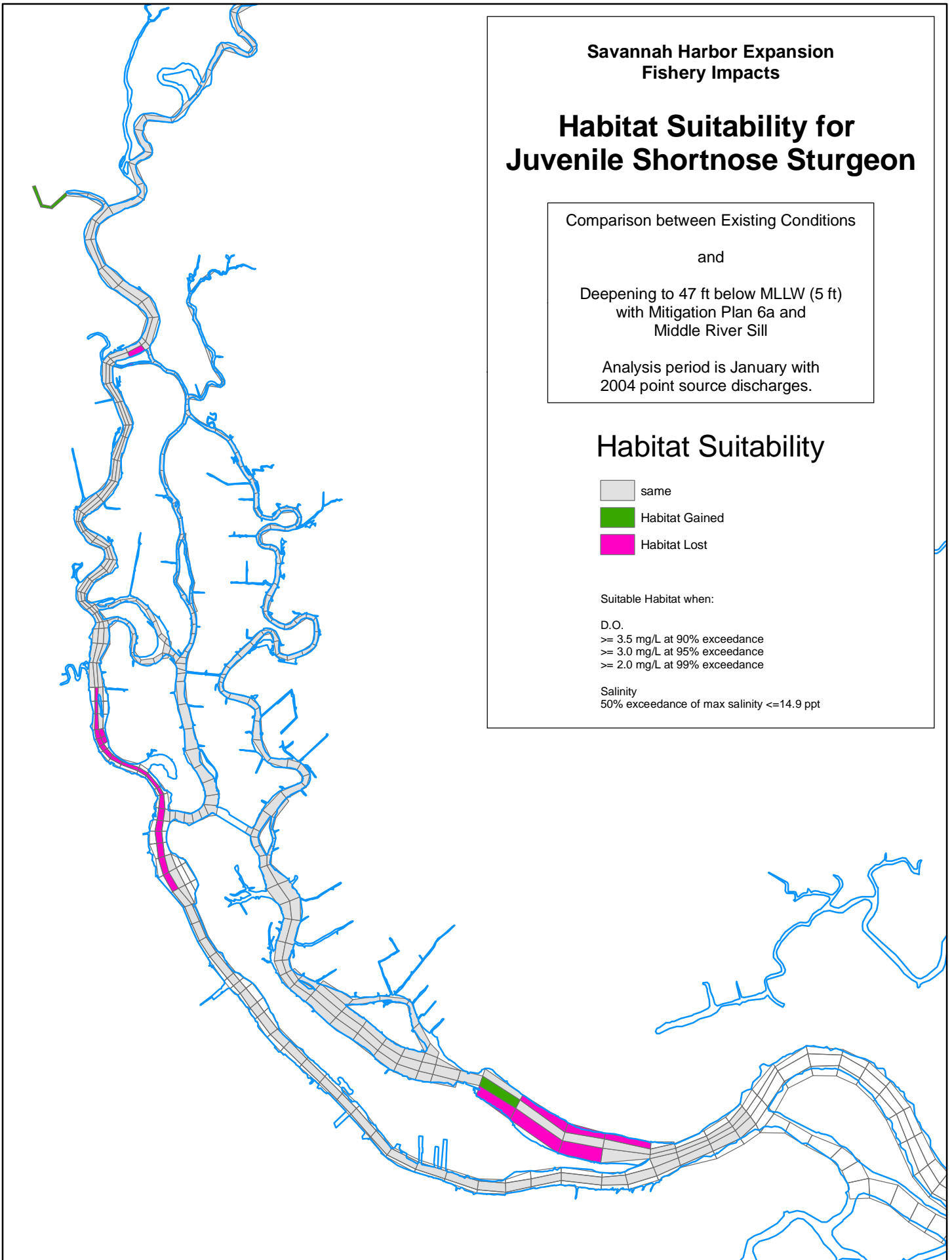
Suitable Habitat when:

D.O.

- $\geq 3.5$  mg/L at 90% exceedance
- $\geq 3.0$  mg/L at 95% exceedance
- $\geq 2.0$  mg/L at 99% exceedance

Salinity

50% exceedance of max salinity  $\leq 14.9$  ppt





**Savannah Harbor Expansion  
Fishery Impacts**

## **Habitat Suitability for Juvenile Shortnose Sturgeon**

Comparison between Existing Conditions  
and

Deepening to 48 ft below MLLW (6 ft)  
with Mitigation Plan 6a

Analysis period is January with  
2004 point source discharges.

### **Habitat Suitability**



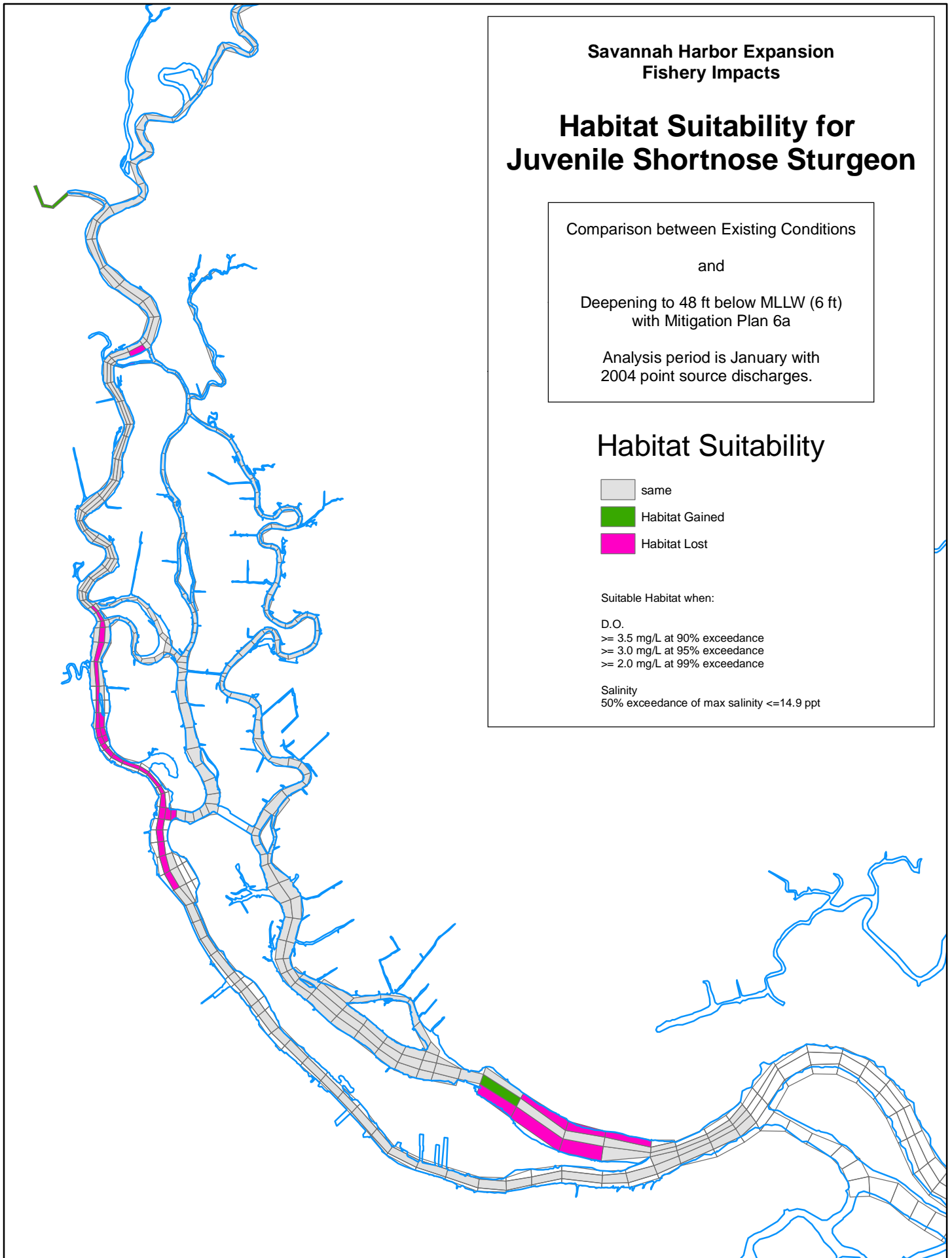
Suitable Habitat when:

D.O.

- $\geq 3.5$  mg/L at 90% exceedance
- $\geq 3.0$  mg/L at 95% exceedance
- $\geq 2.0$  mg/L at 99% exceedance

Salinity

50% exceedance of max salinity  $\leq 14.9$  ppt





**Savannah Harbor Expansion  
Fishery Impacts**

## **Habitat Suitability for Juvenile Shortnose Sturgeon**

Comparison between Existing Conditions

and

Deepening to 48 ft below MLLW (6 ft)  
with Mitigation Plan 6a and  
Middle River Sill

Analysis period is January with  
2004 point source discharges.

### **Habitat Suitability**



Suitable Habitat when:

D.O.

- $\geq 3.5$  mg/L at 90% exceedance
- $\geq 3.0$  mg/L at 95% exceedance
- $\geq 2.0$  mg/L at 99% exceedance

Salinity

50% exceedance of max salinity  $\leq 14.9$  ppt

