
ENVIRONMENTAL IMPACT STATEMENT

APPENDIX P: Fishery Habitat Maps

SAVANNAH HARBOR EXPANSION PROJECT

Chatham County, Georgia and Jasper County, South Carolina

January 2012



**US Army Corps
of Engineers**
*Savannah District
South Atlantic Division*

This page intentionally blank

Model Input Conditions & Habitat Criteria

SPECIES & LIFE STAGE	FRESHWATER FLOW CONDITIONS	SIMULATION PERIOD	HABITAT CRITERIA
Striped Bass (spawning)	20%-tile of Long Term	April	Suitable habitat when (1) 90th percentile salinity \leq 1 ppt, and (2) Mean velocity \geq 30 cm/s
	50%-tile of Long Term	April	
	80%-tile of Long Term	April	
Striped Bass (eggs)	20%-tile of Long Term	April	Suitable habitat when (1) Mean 50th percentile salinity \leq 9 ppt, (2) Mean velocity \geq 30 cm/s, and (3) 10th percentile D.O. \geq 4.5 mg/l
	50%-tile of Long Term	April	
	80%-tile of Long Term	April	
Striped Bass (larvae)	20%-tile of Long Term	May	Suitable habitat when (1) Mean 50th percentile salinity between 3 and 9 ppt, and (2) Mean 10th percentile D.O. \geq 4.5 mg/l
	50%-tile of Long Term	May	
	80%-tile of Long Term	May	
Southern Flounder	50%-tile of Long Term	August*	Suitable habitat when DO \geq 4.0 mg/l at 90% exceedance (10th %ile)
American Shad	50%-tile of Long Term	January	Suitable habitat when D.O. \geq 4.0 mg/l at 90% exceedance (10th percentile)
	50%-tile of Long Term	May	
	50%-tile of Long Term	August*	
Shortnose Sturgeon (adult)	50%-tile of Long Term	January	Suitable habitat when DO \geq 3.5 mg/l at 90% exceedance (10 th %ile), \geq 3.0 at 95% (5th percentile), and \geq 2.0 at 99% (1 percentile) Suitable habitat when Max Salinity \leq 25 ppt
Shortnose Sturgeon (adult)	50%-tile of Long Term	August*	Suitable habitat when DO \geq 4.0 mg/l at 90% exceedance (10th %ile), \geq 3.0 at 95% (5th percentile), and \geq 2.0 at 99% (1 percentile) Suitable habitat when Max Salinity \leq 10 ppt
Shortnose Sturgeon (juvenile)	50%-tile of Long Term	January	Suitable habitat when DO \geq 3.5 mg/l at 90% exceedance (10th %ile), \geq 3.0 at 95% (5th percentile), and \geq 2.0 at 99% (1 percentile) Suitable habitat when Max Salinity \leq 4 ppt

This page intentionally blank

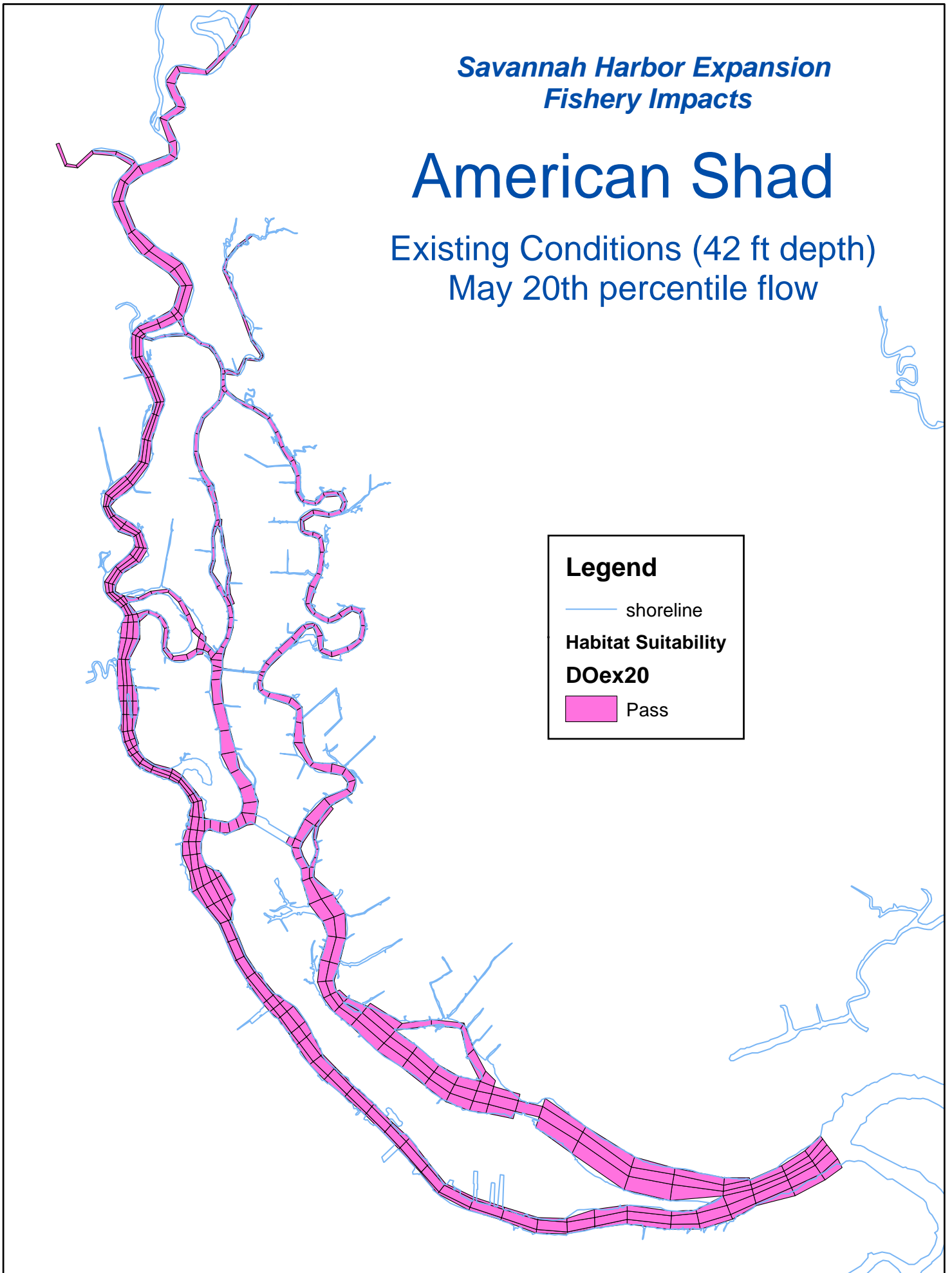
Existing Conditions

No Deepening No Mitigation

*Savannah Harbor Expansion
Fishery Impacts*

American Shad

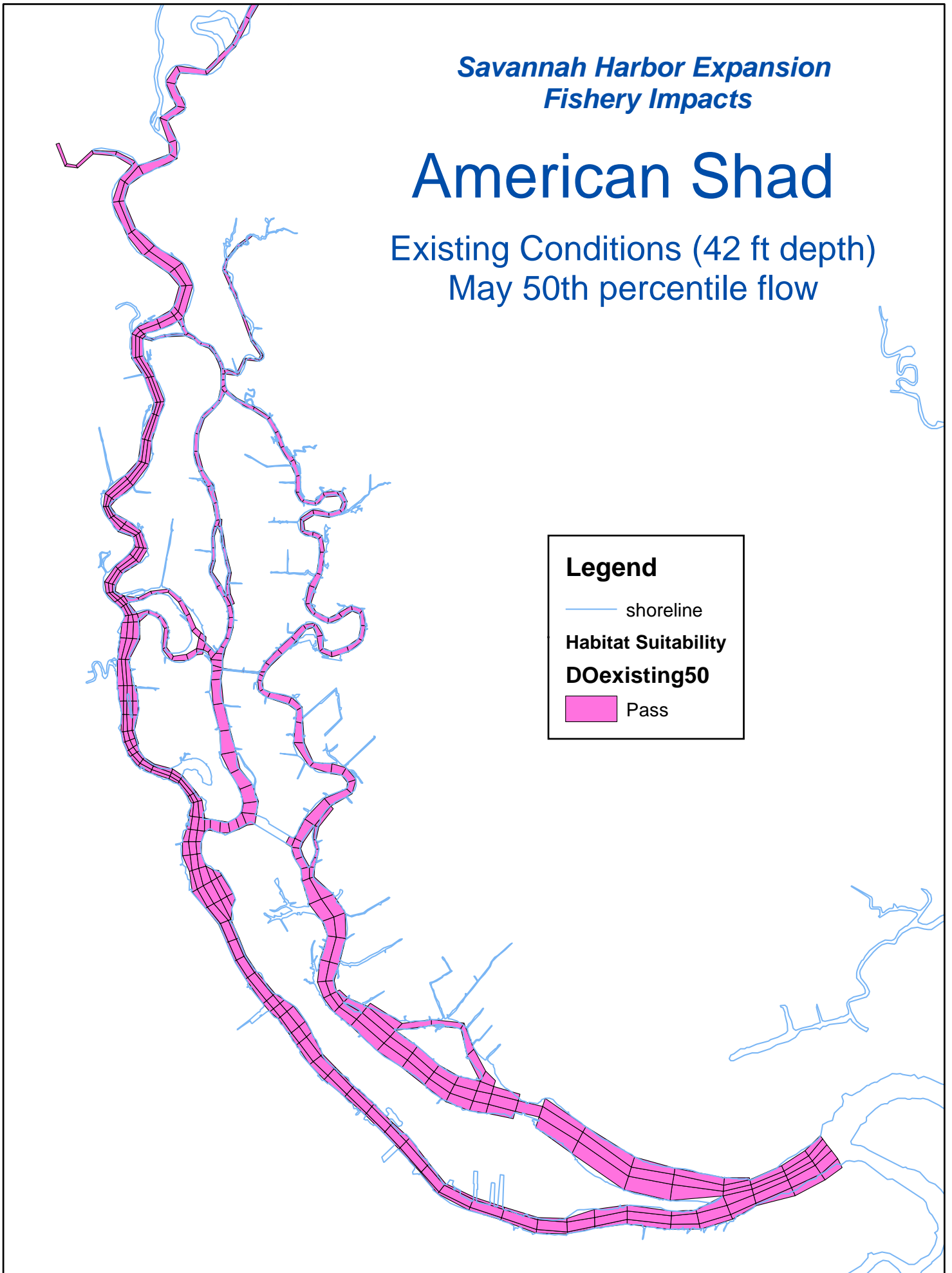
Existing Conditions (42 ft depth)
May 20th percentile flow



*Savannah Harbor Expansion
Fishery Impacts*

American Shad

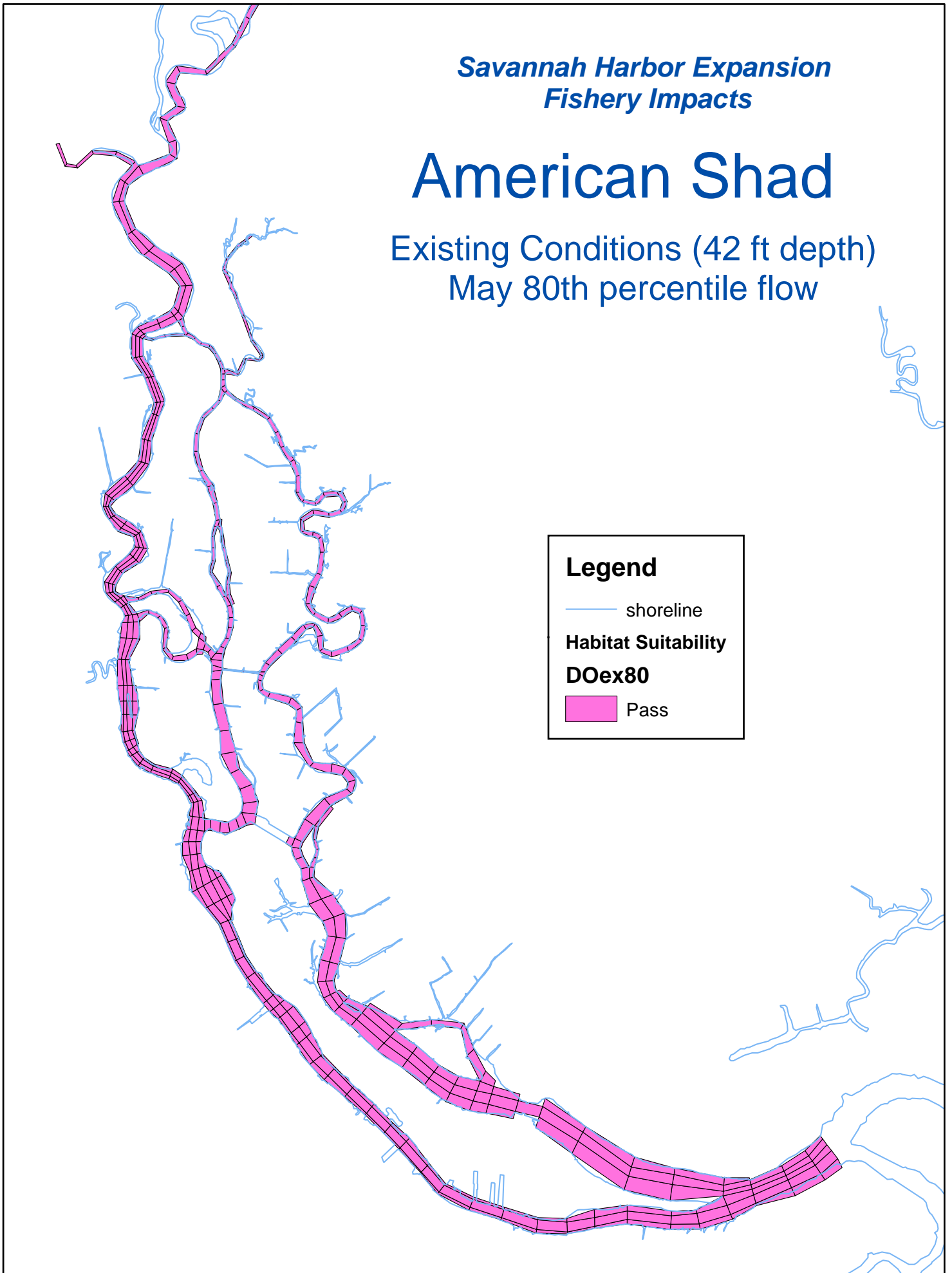
Existing Conditions (42 ft depth)
May 50th percentile flow



*Savannah Harbor Expansion
Fishery Impacts*

American Shad

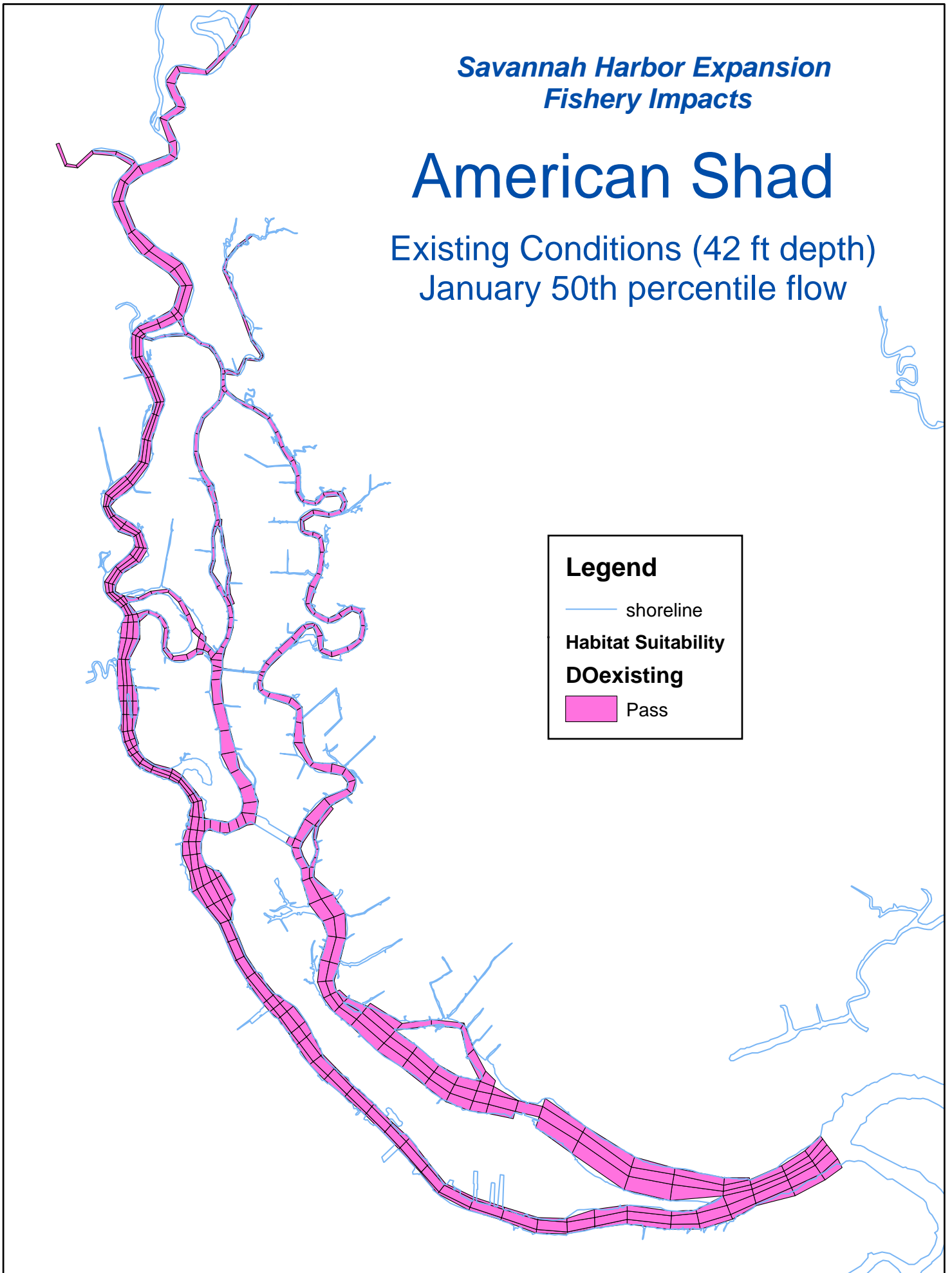
Existing Conditions (42 ft depth)
May 80th percentile flow



*Savannah Harbor Expansion
Fishery Impacts*

American Shad

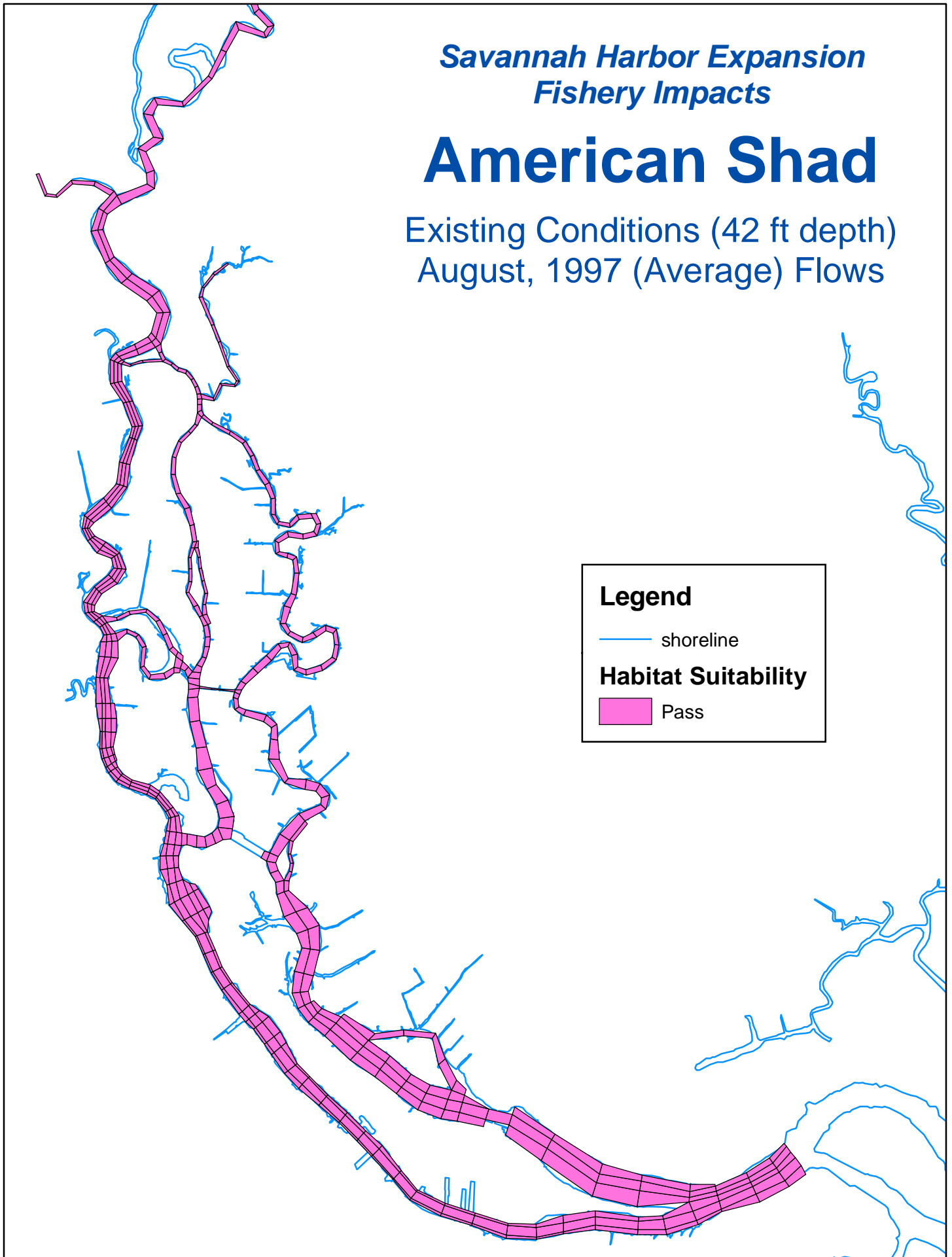
Existing Conditions (42 ft depth)
January 50th percentile flow



*Savannah Harbor Expansion
Fishery Impacts*

American Shad

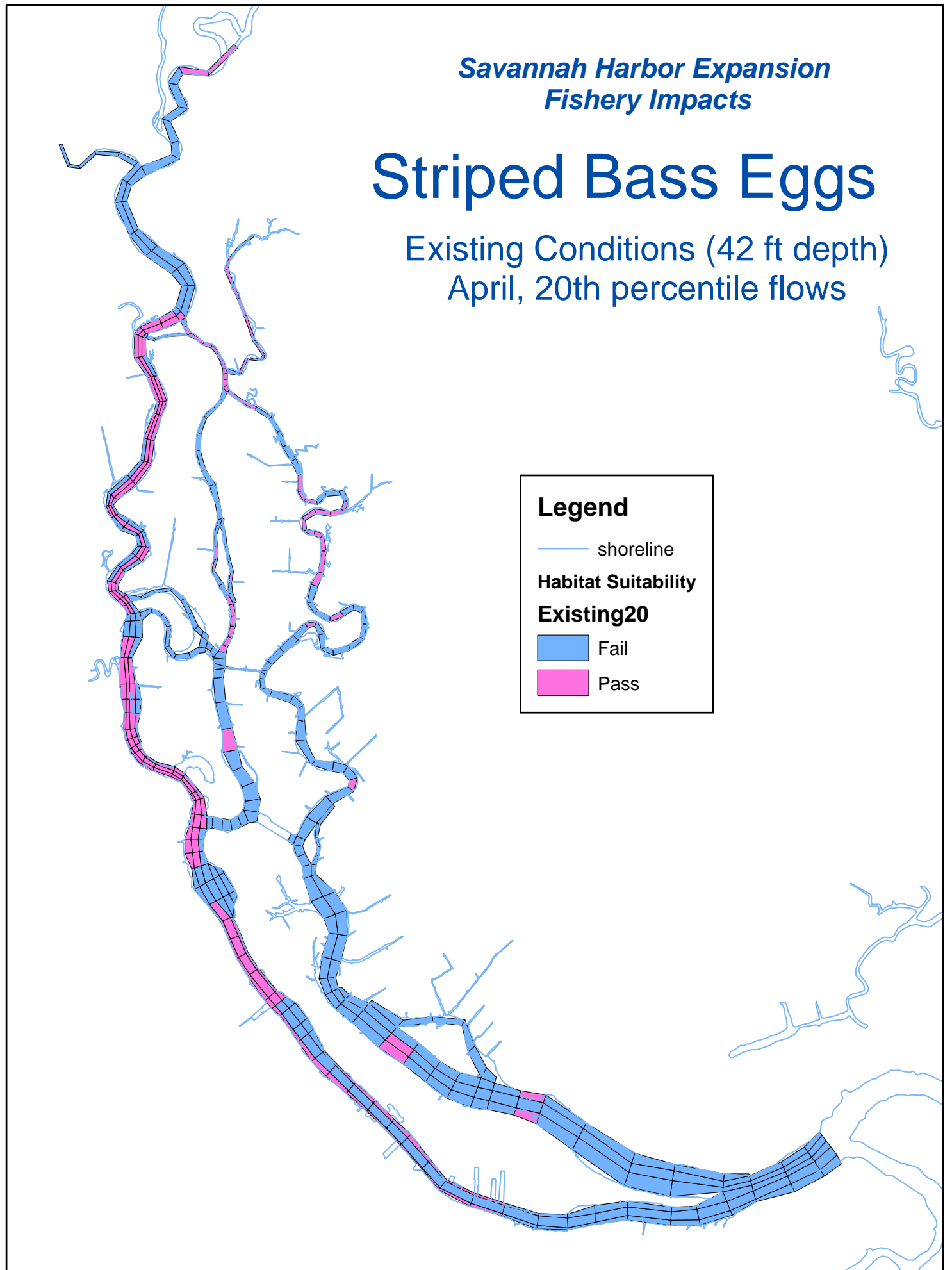
Existing Conditions (42 ft depth)
August, 1997 (Average) Flows



*Savannah Harbor Expansion
Fishery Impacts*

Striped Bass Eggs

Existing Conditions (42 ft depth)
April, 20th percentile flows



Legend

— shoreline

Habitat Suitability

Existing20

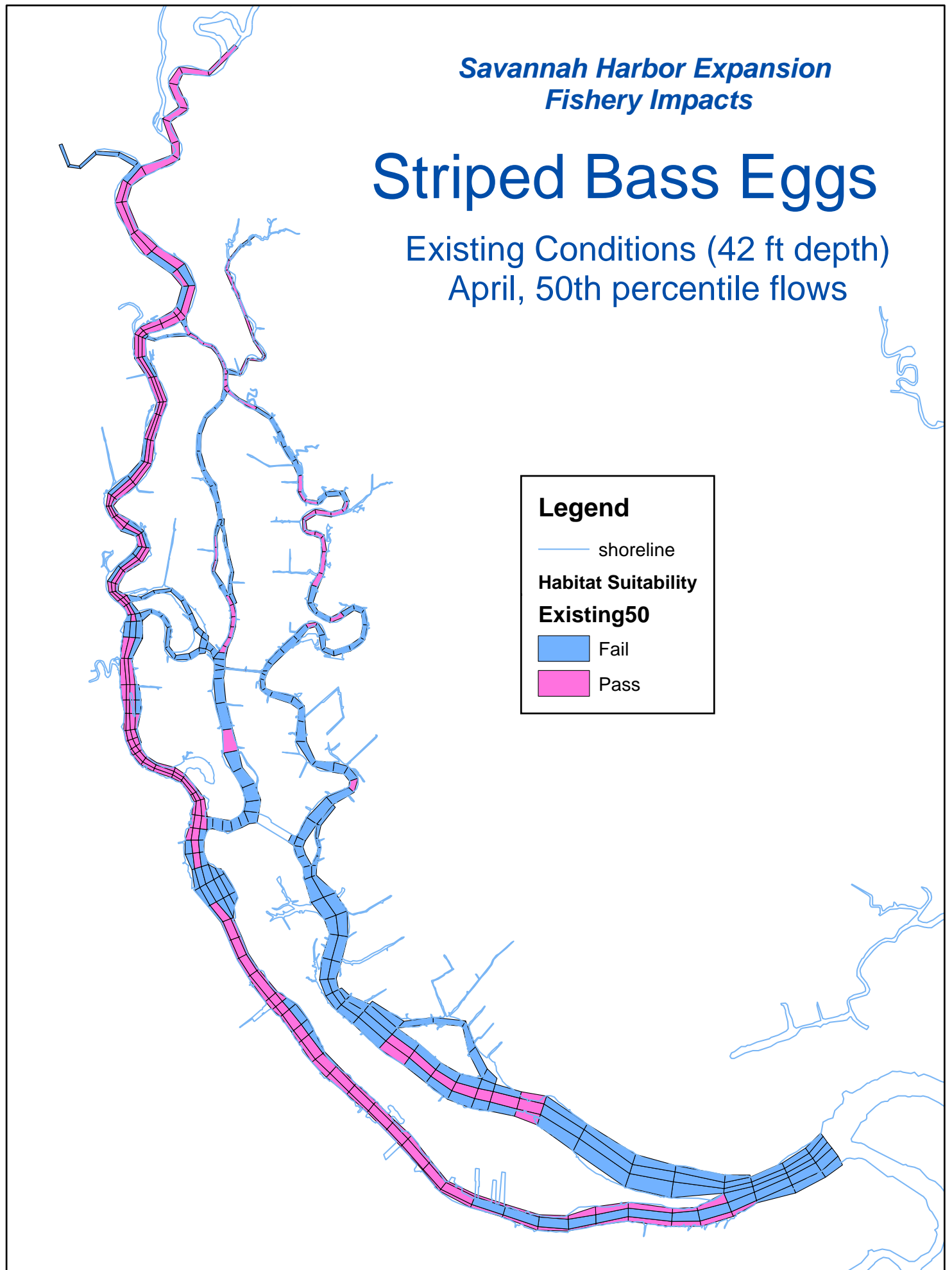
Fail

Pass

*Savannah Harbor Expansion
Fishery Impacts*

Striped Bass Eggs

Existing Conditions (42 ft depth)
April, 50th percentile flows



Legend

- shoreline

Habitat Suitability

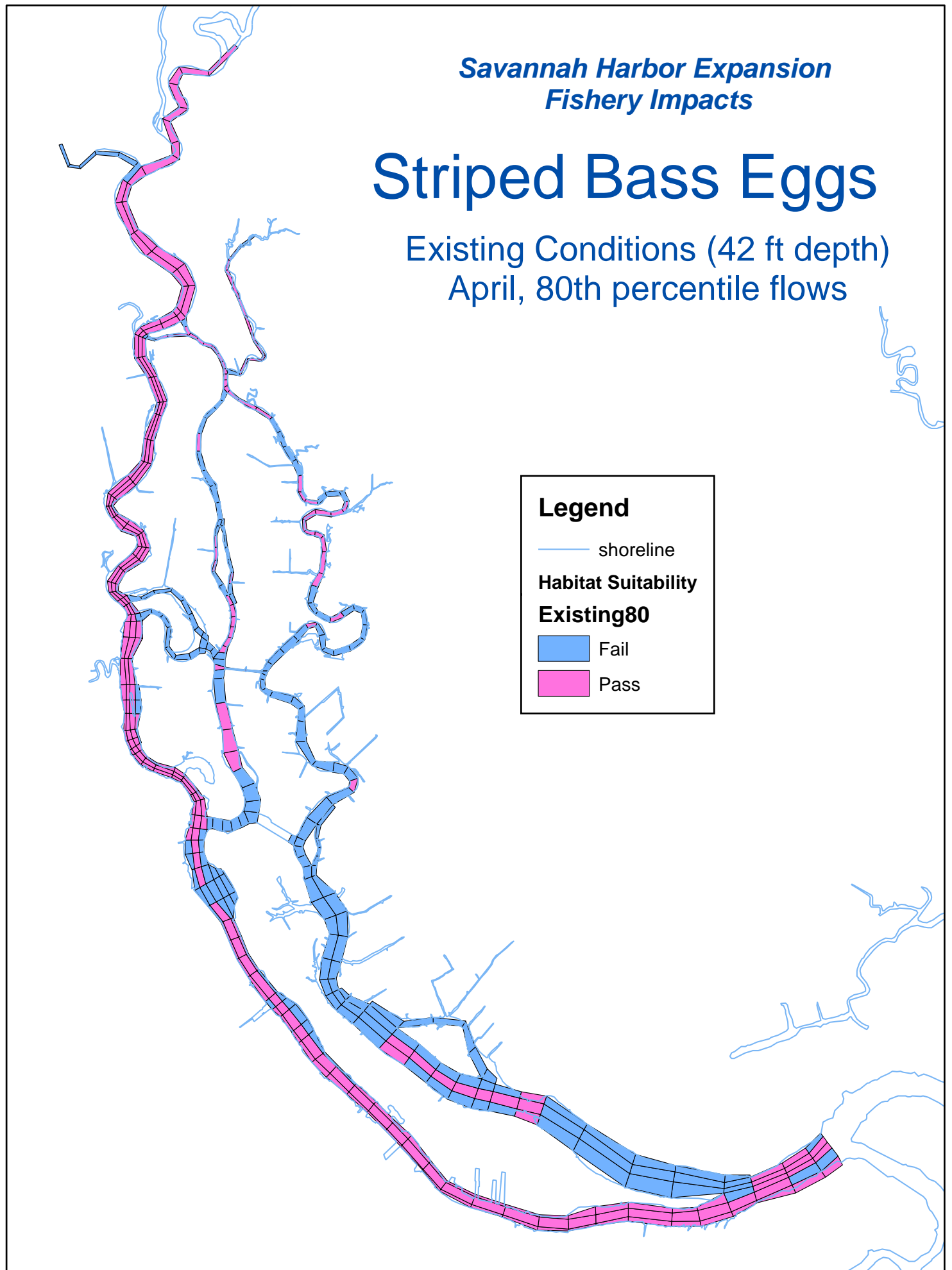
Existing50

- Fail
- Pass

*Savannah Harbor Expansion
Fishery Impacts*

Striped Bass Eggs

Existing Conditions (42 ft depth)
April, 80th percentile flows



Legend

- shoreline

Habitat Suitability

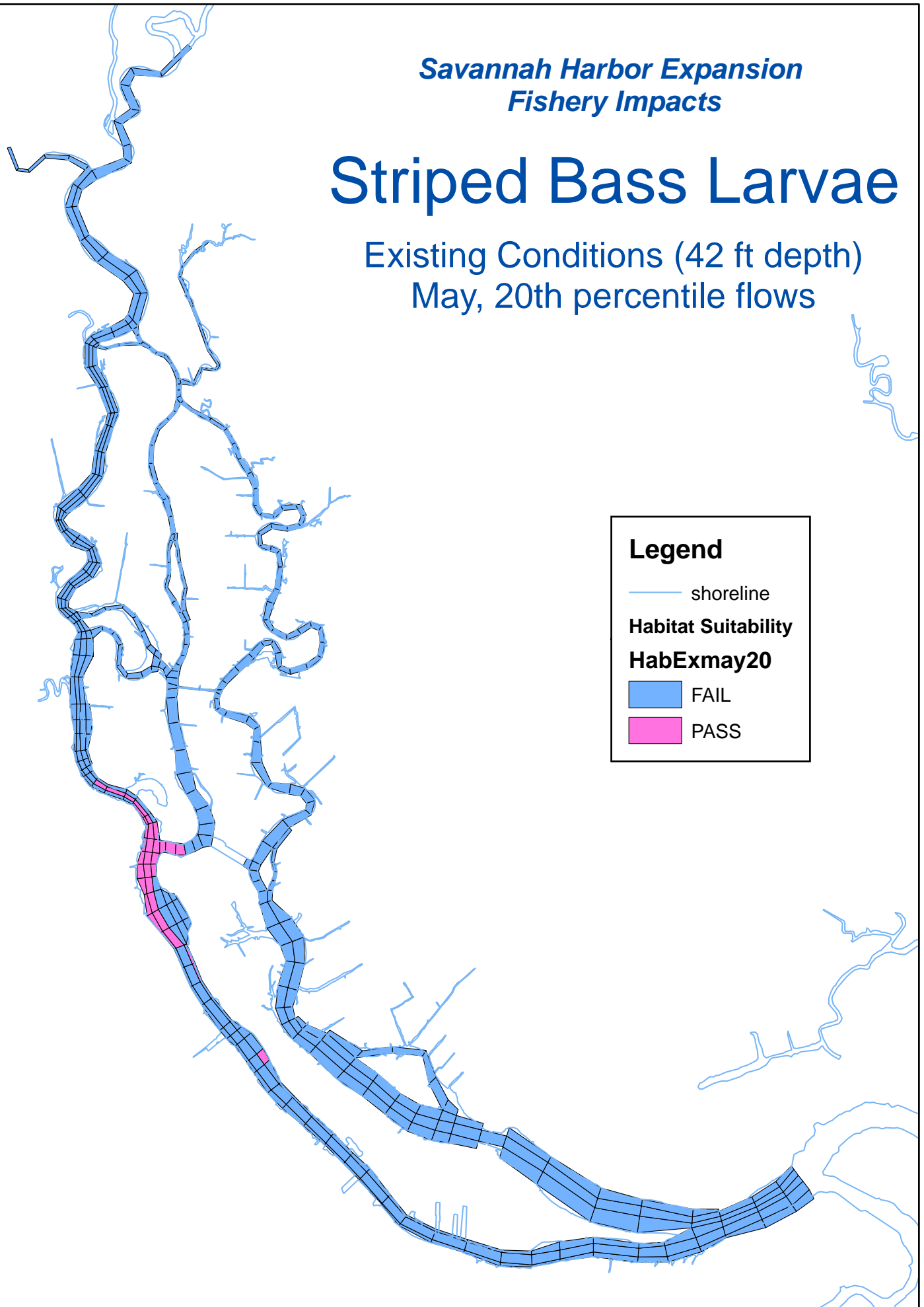
Existing80

- Fail
- Pass

*Savannah Harbor Expansion
Fishery Impacts*

Striped Bass Larvae

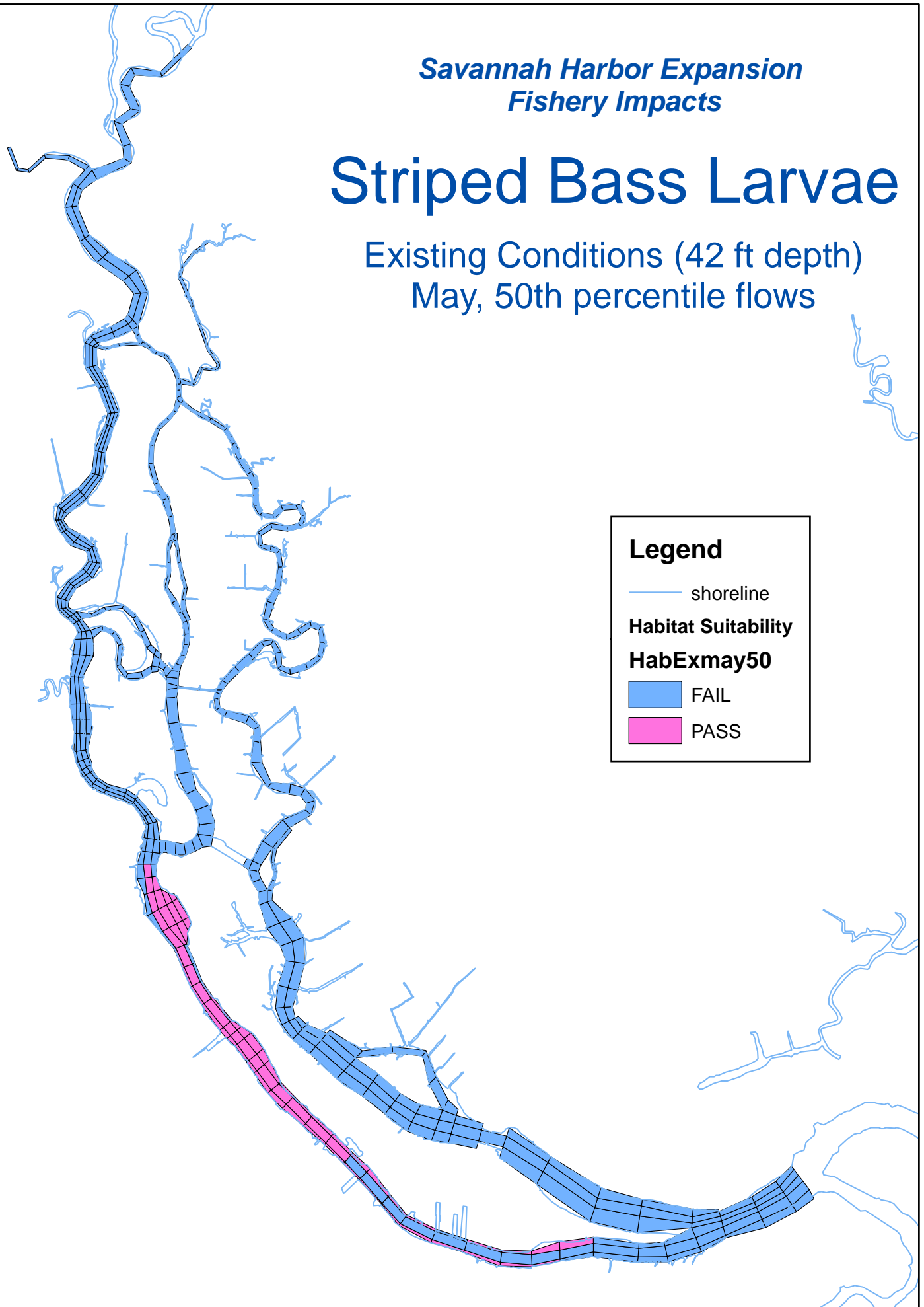
Existing Conditions (42 ft depth)
May, 20th percentile flows



*Savannah Harbor Expansion
Fishery Impacts*

Striped Bass Larvae

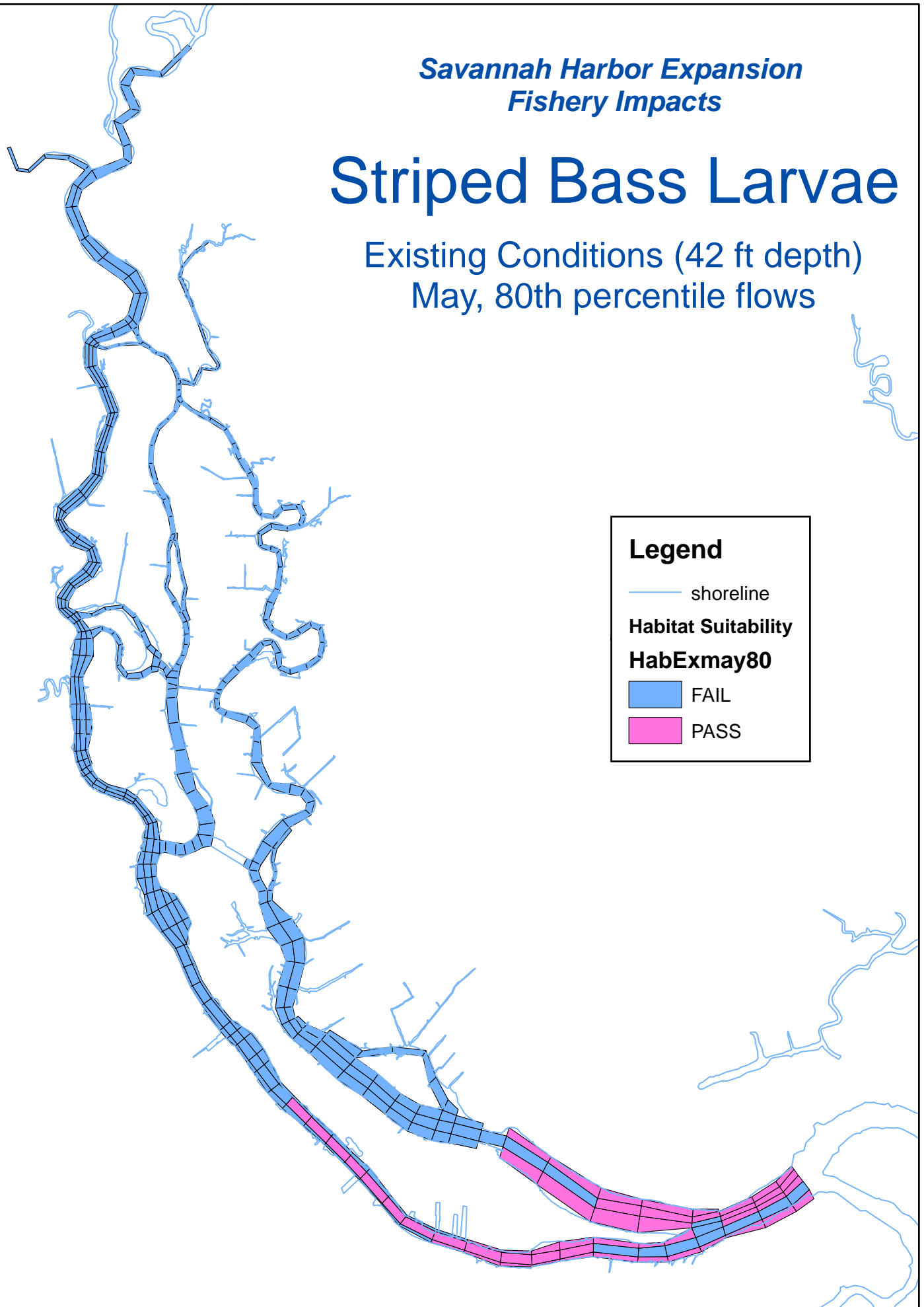
Existing Conditions (42 ft depth)
May, 50th percentile flows



*Savannah Harbor Expansion
Fishery Impacts*

Striped Bass Larvae

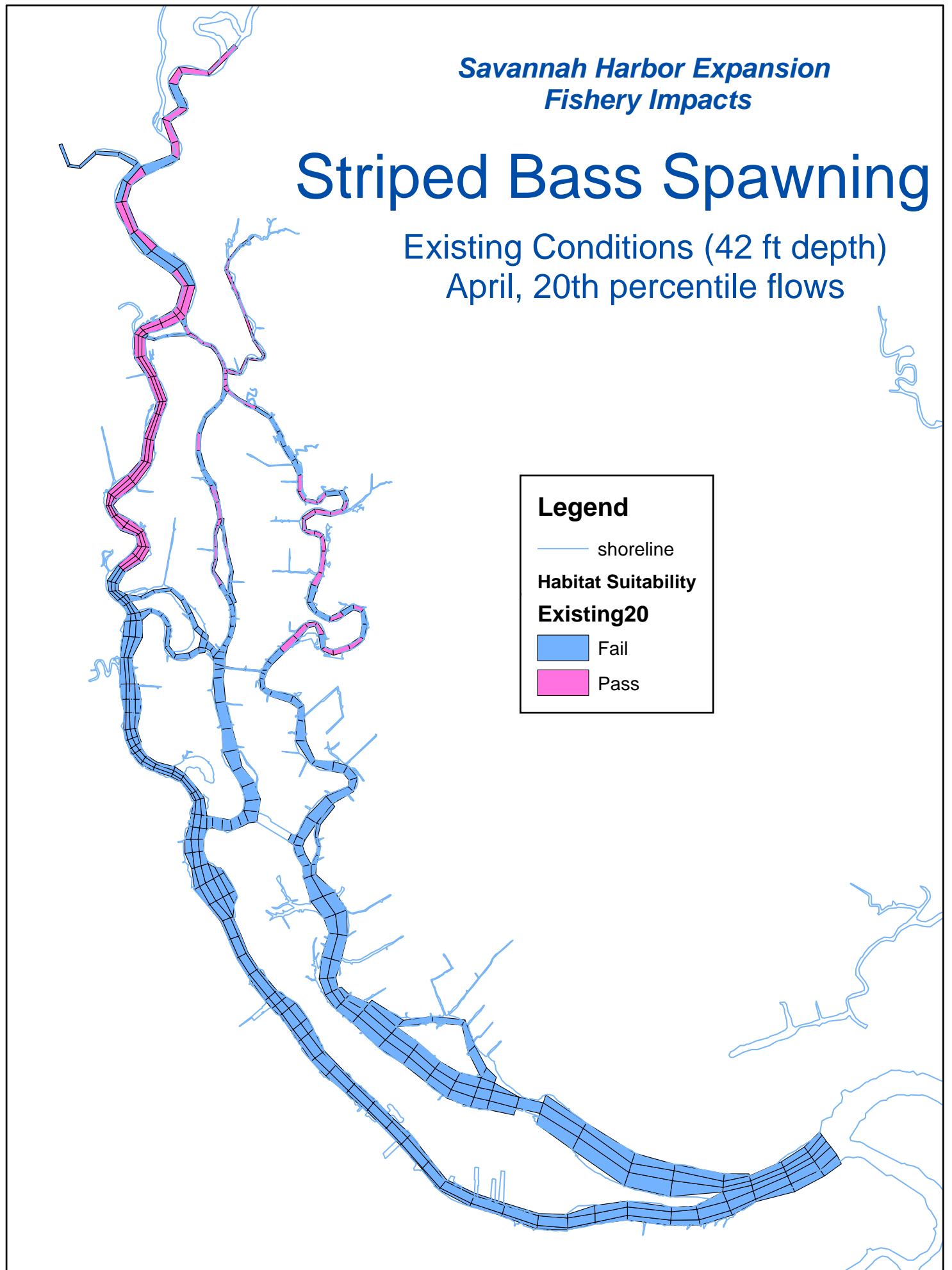
Existing Conditions (42 ft depth)
May, 80th percentile flows



*Savannah Harbor Expansion
Fishery Impacts*

Striped Bass Spawning

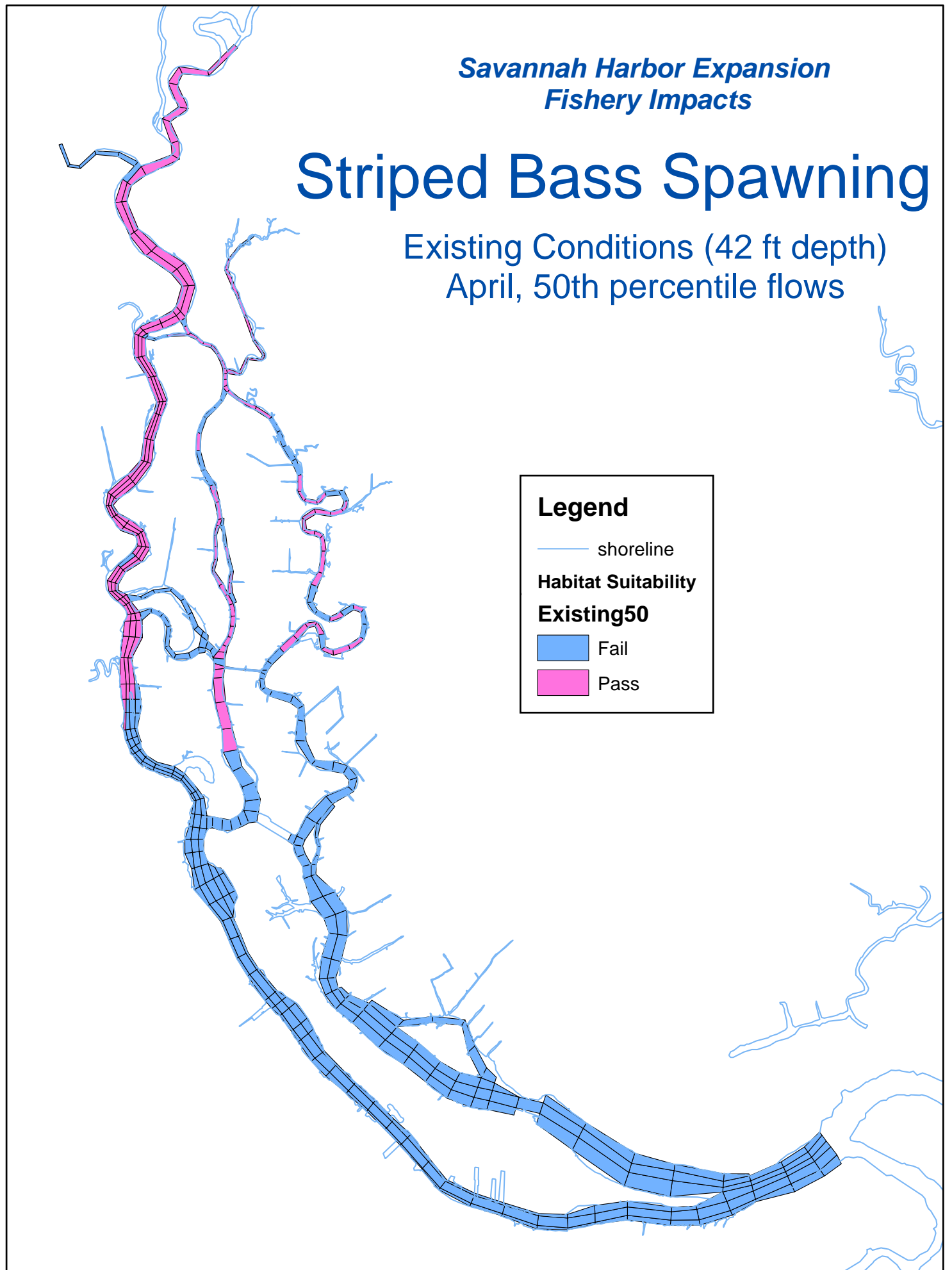
Existing Conditions (42 ft depth)
April, 20th percentile flows



*Savannah Harbor Expansion
Fishery Impacts*

Striped Bass Spawning

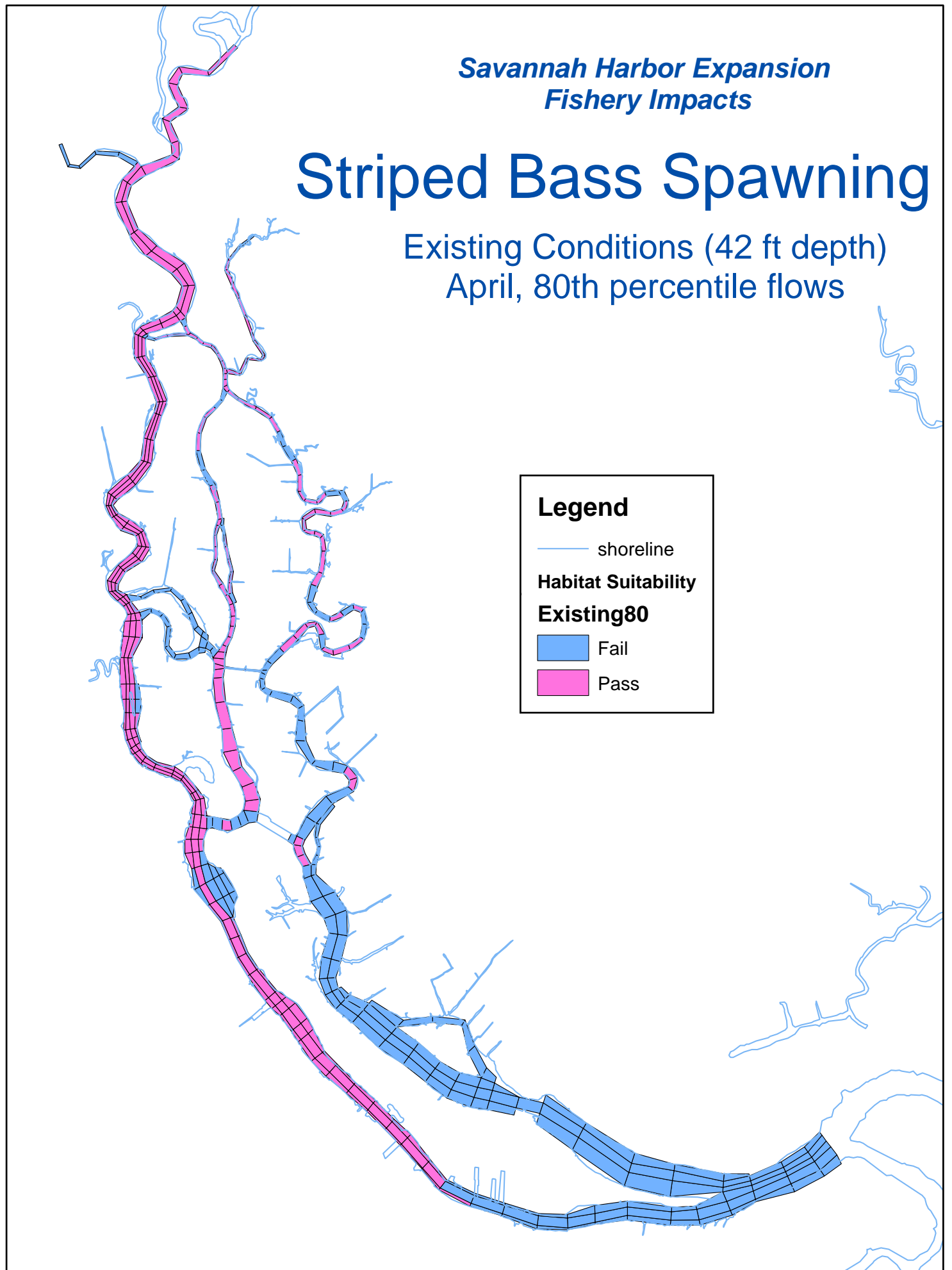
Existing Conditions (42 ft depth)
April, 50th percentile flows



*Savannah Harbor Expansion
Fishery Impacts*

Striped Bass Spawning

Existing Conditions (42 ft depth)
April, 80th percentile flows



Legend

- shoreline
- Habitat Suitability**
- Existing80**
- Fail
- Pass

*Savannah Harbor Expansion
Fishery Impacts*

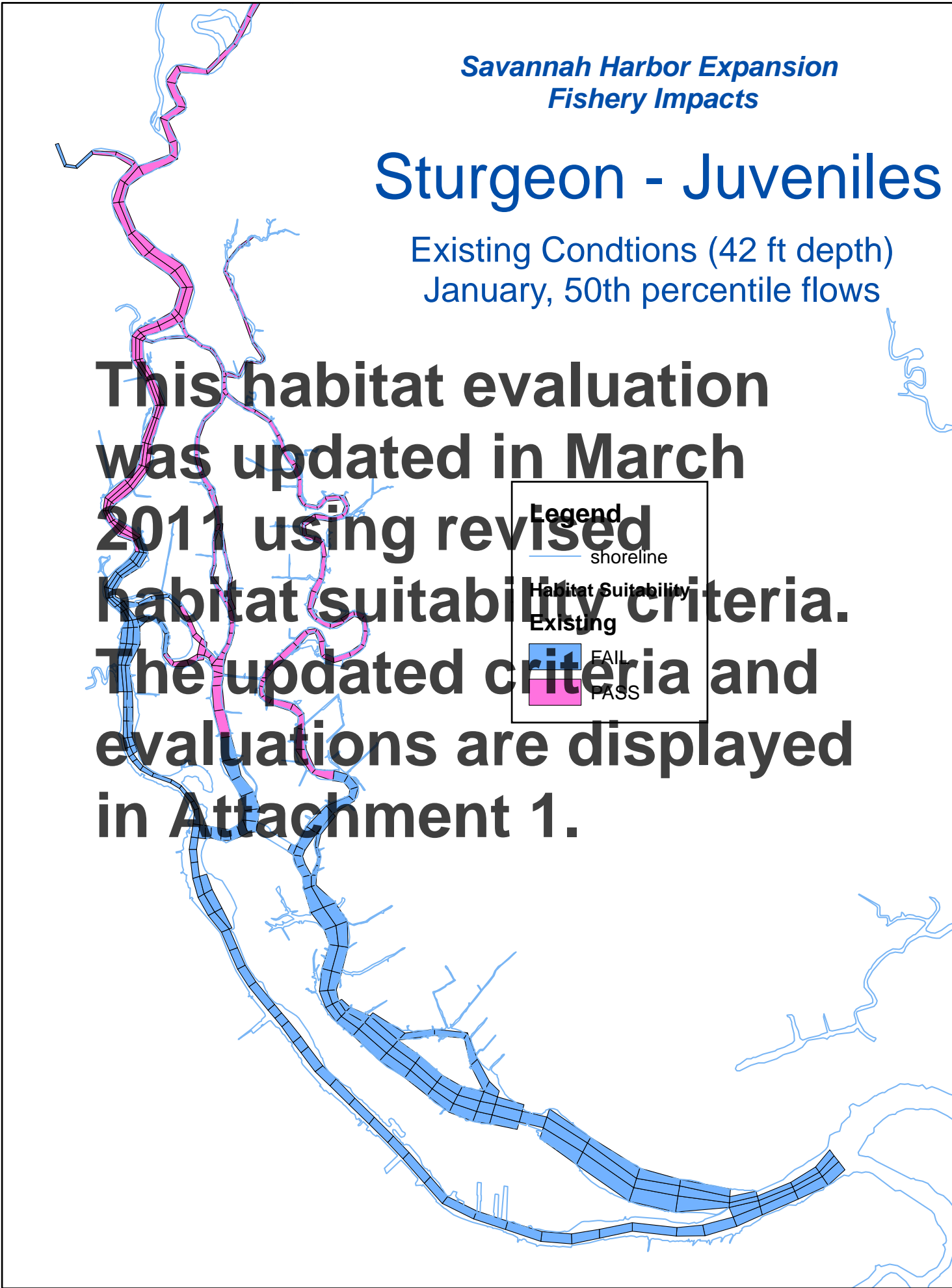
Sturgeon - Juveniles

Existing Conditions (42 ft depth)
January, 50th percentile flows

This habitat evaluation was updated in March 2011 using revised habitat suitability criteria. The updated criteria and evaluations are displayed in Attachment 1.

Legend

- shoreline
- Habitat Suitability Existing**
 - FAIL
 - PASS



*Savannah Harbor Expansion
Fishery Impacts*

Sturgeon - Adults

Existing Conditions (42 ft depth)
January, 50th percentile flows

This habitat evaluation was updated in March 2011 using revised habitat suitability criteria. The updated criteria and evaluations are displayed in Attachment 1.

Legend

- shoreline
- Habitat Suitability
- Existing
- Fall
- PASS

*Savannah Harbor Expansion
Fishery Impacts*

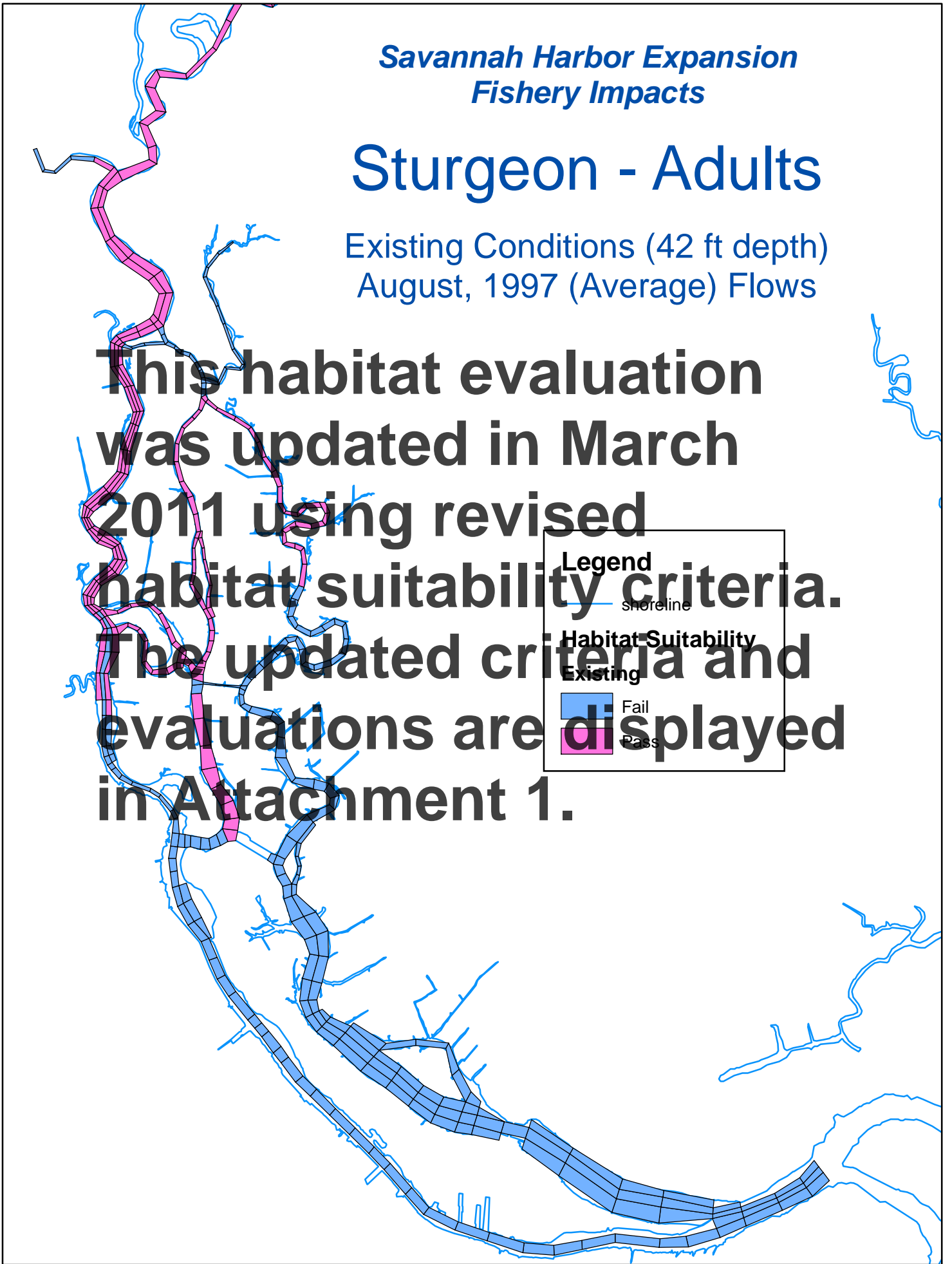
Sturgeon - Adults

Existing Conditions (42 ft depth)
August, 1997 (Average) Flows

This habitat evaluation was updated in March 2011 using revised habitat suitability criteria. The updated criteria and evaluations are displayed in Attachment 1.

Legend

- shoreline
- Habitat Suitability**
- Existing
- Fail
- Pass



*Savannah Harbor Expansion
Fishery Impacts*

Southern Flounder

**Existing Conditions (42 ft depth)
August, 1997 (Average) Flows**

Legend

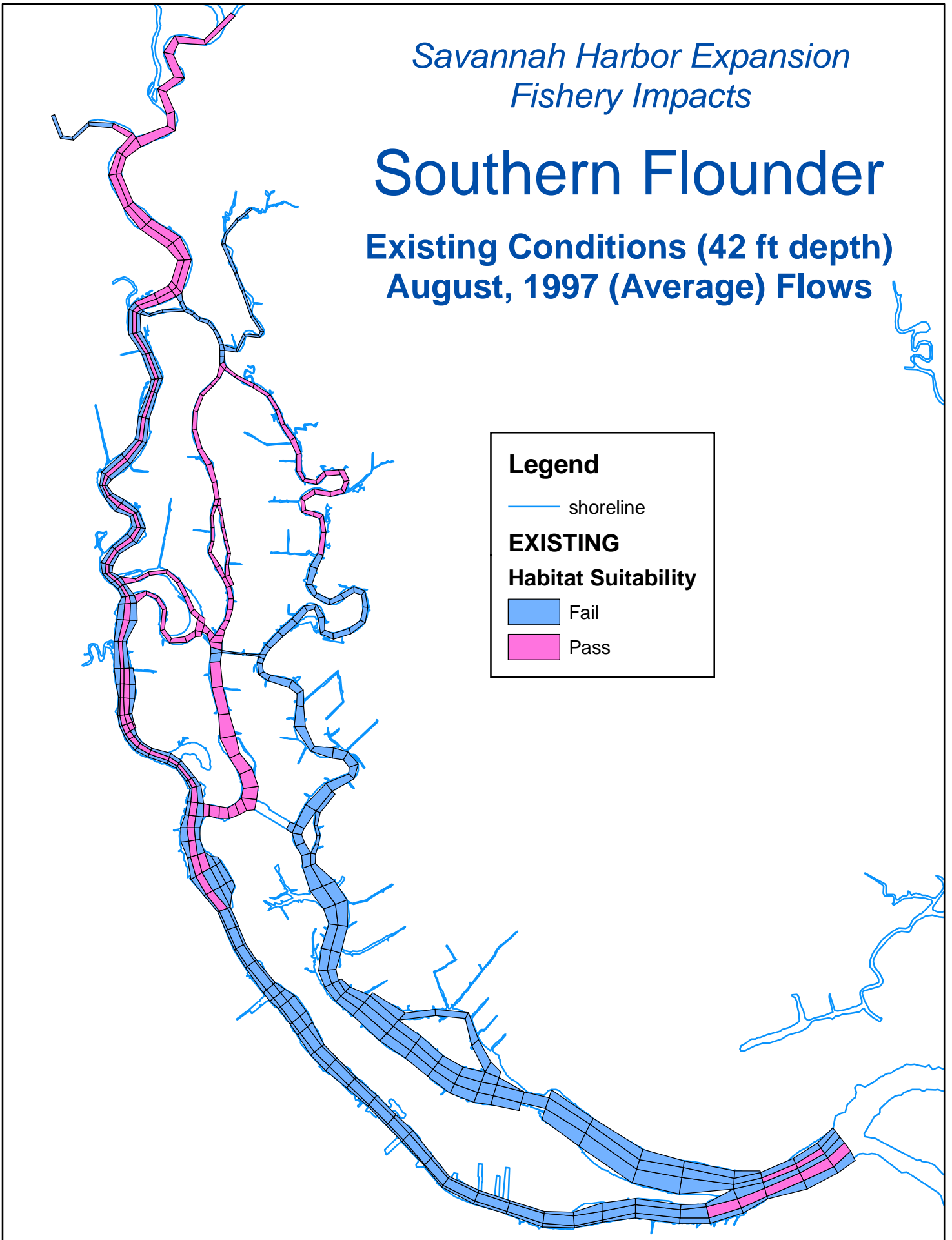
— shoreline

EXISTING

Habitat Suitability

Fail

Pass



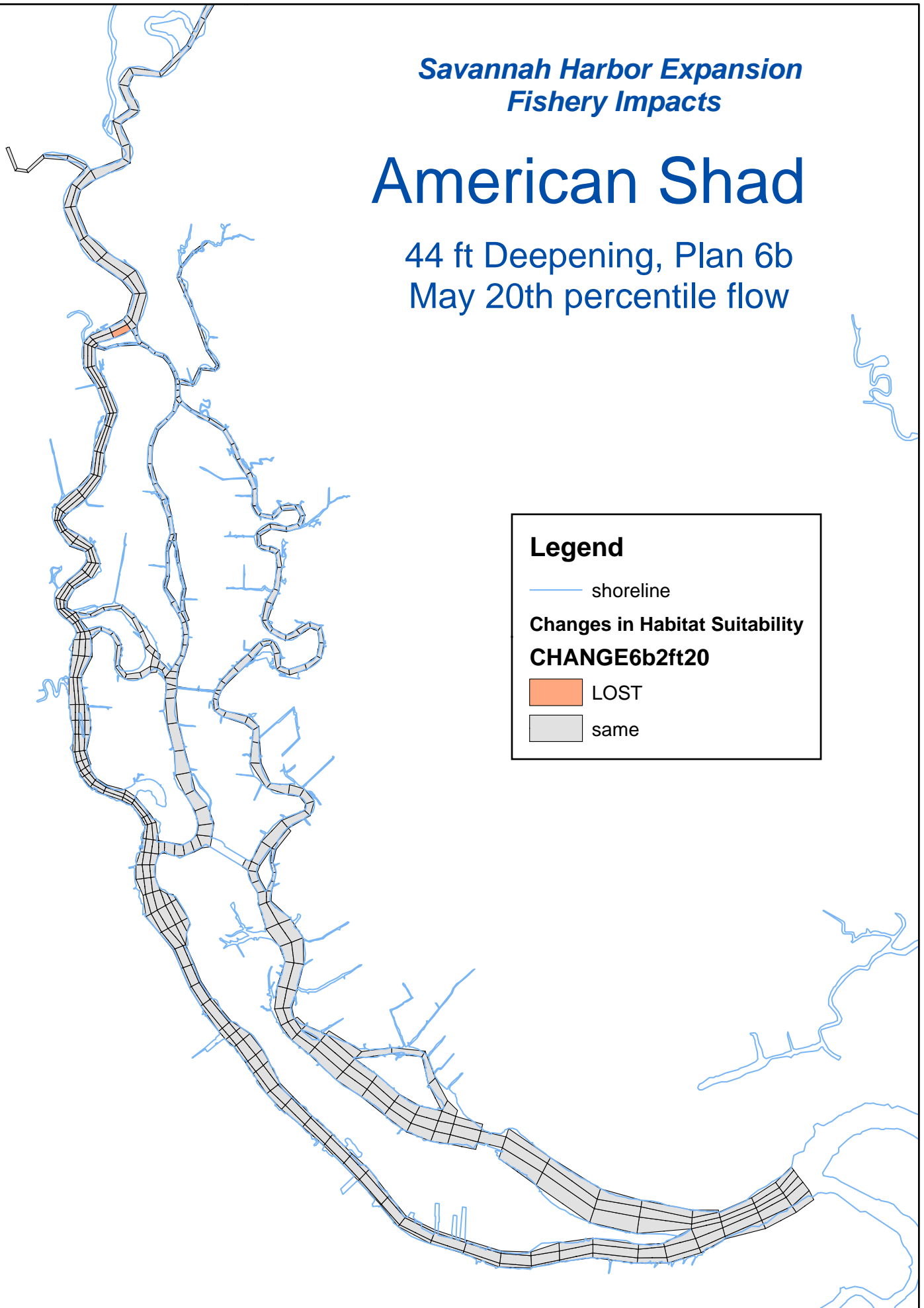
44 ft Channel Depth

Mitigation Plan 6b

*Savannah Harbor Expansion
Fishery Impacts*

American Shad

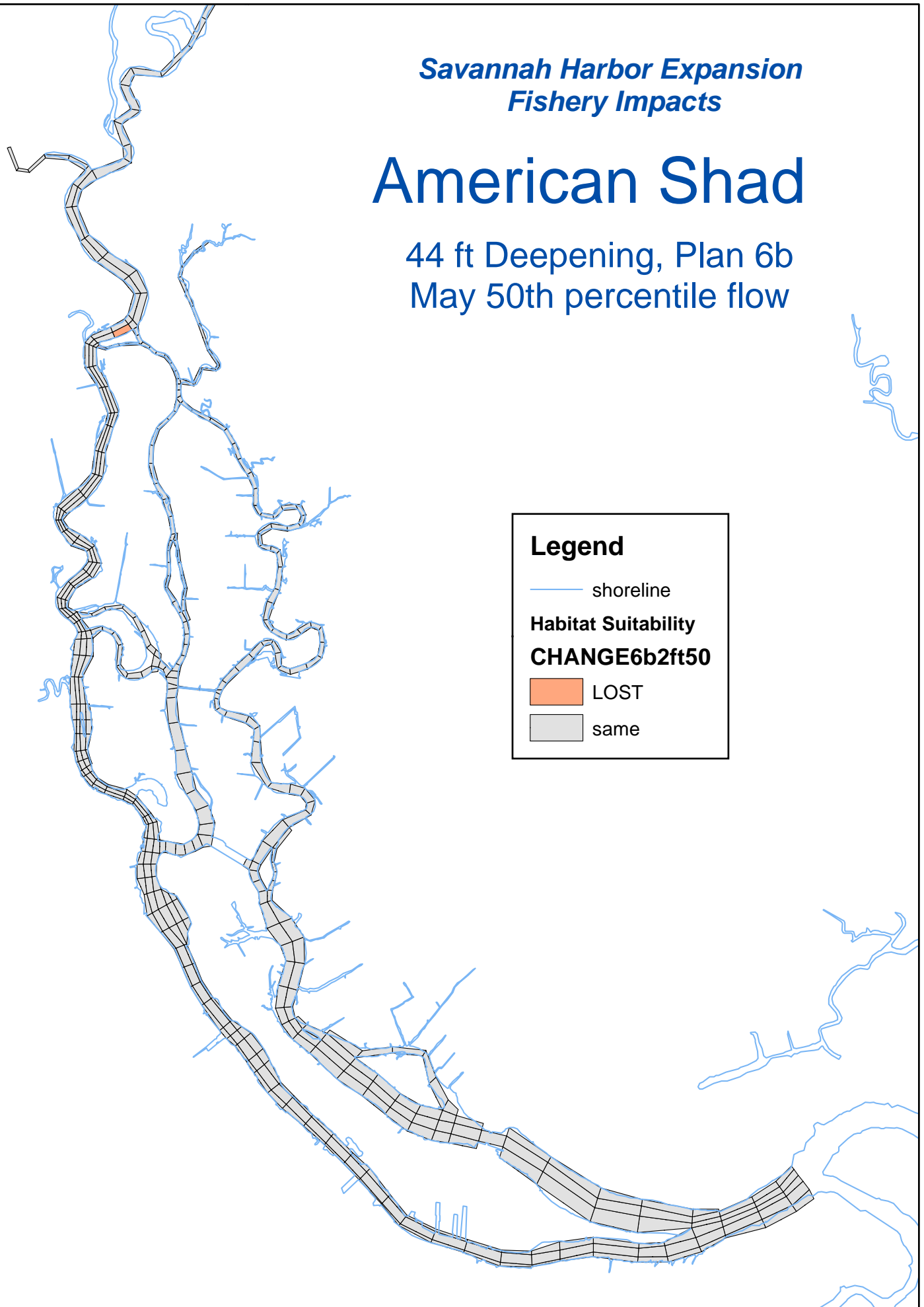
44 ft Deepening, Plan 6b
May 20th percentile flow



*Savannah Harbor Expansion
Fishery Impacts*

American Shad

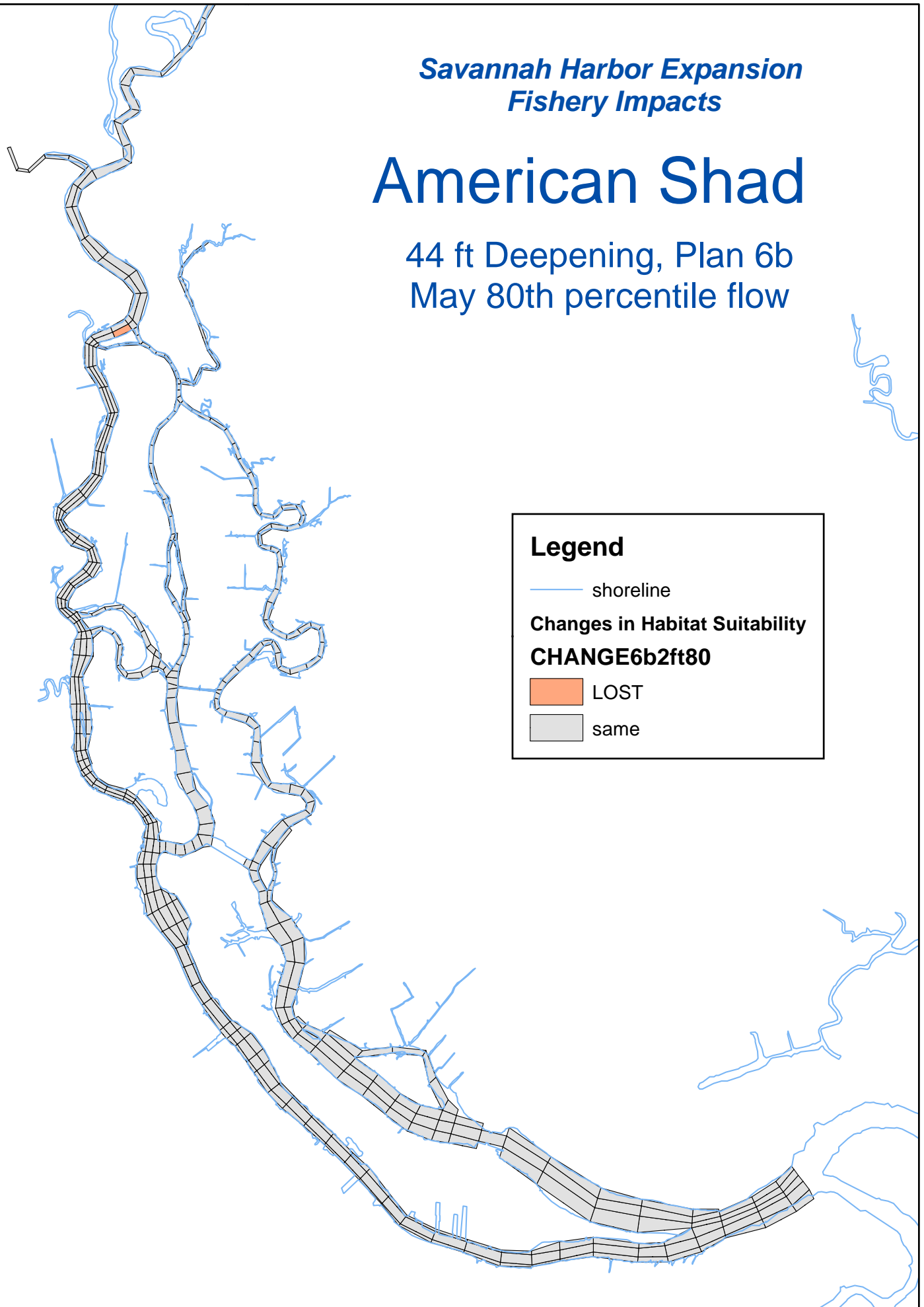
44 ft Deepening, Plan 6b
May 50th percentile flow



*Savannah Harbor Expansion
Fishery Impacts*

American Shad

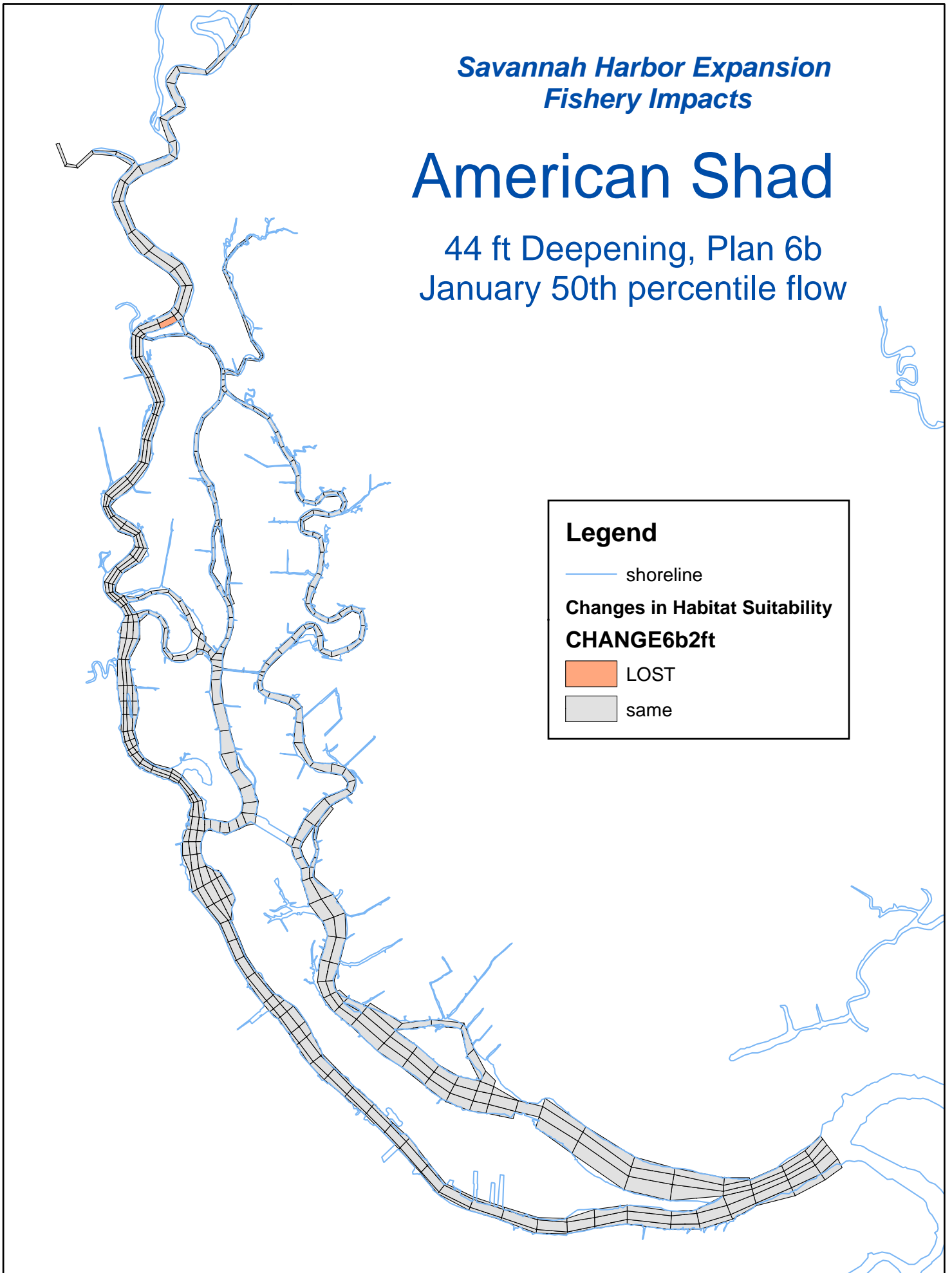
44 ft Deepening, Plan 6b
May 80th percentile flow



*Savannah Harbor Expansion
Fishery Impacts*

American Shad

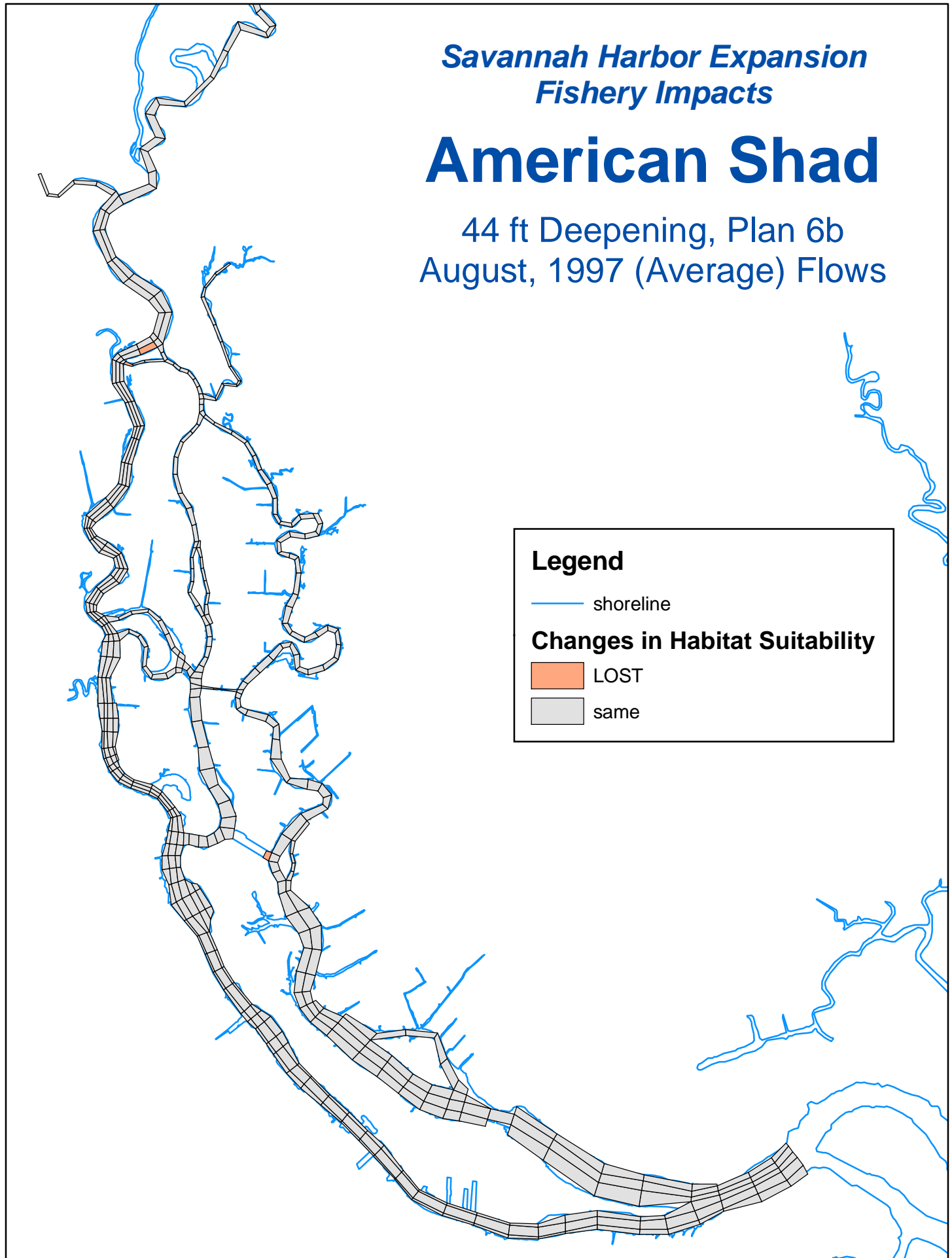
44 ft Deepening, Plan 6b
January 50th percentile flow



*Savannah Harbor Expansion
Fishery Impacts*

American Shad

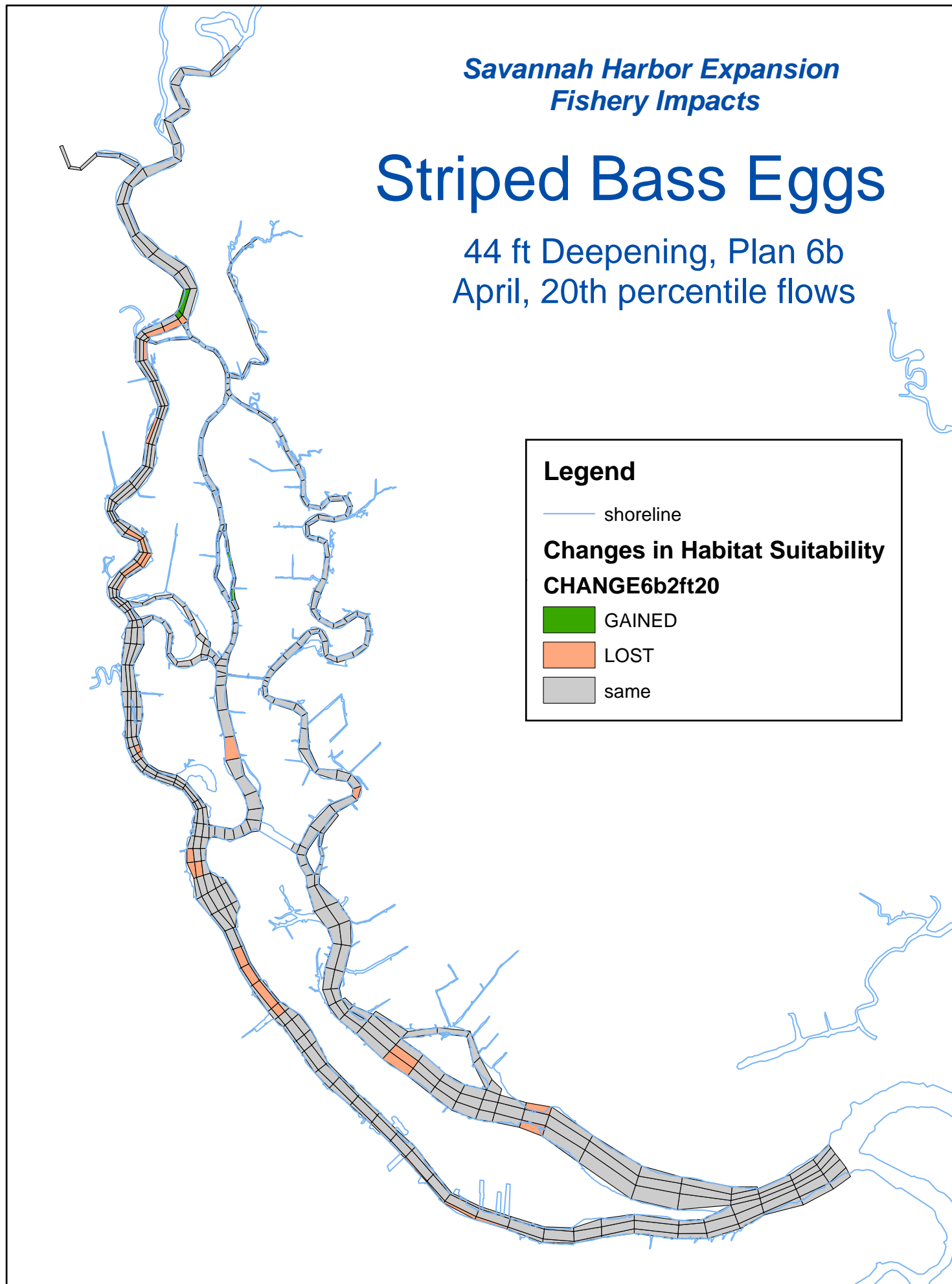
44 ft Deepening, Plan 6b
August, 1997 (Average) Flows



*Savannah Harbor Expansion
Fishery Impacts*

Striped Bass Eggs

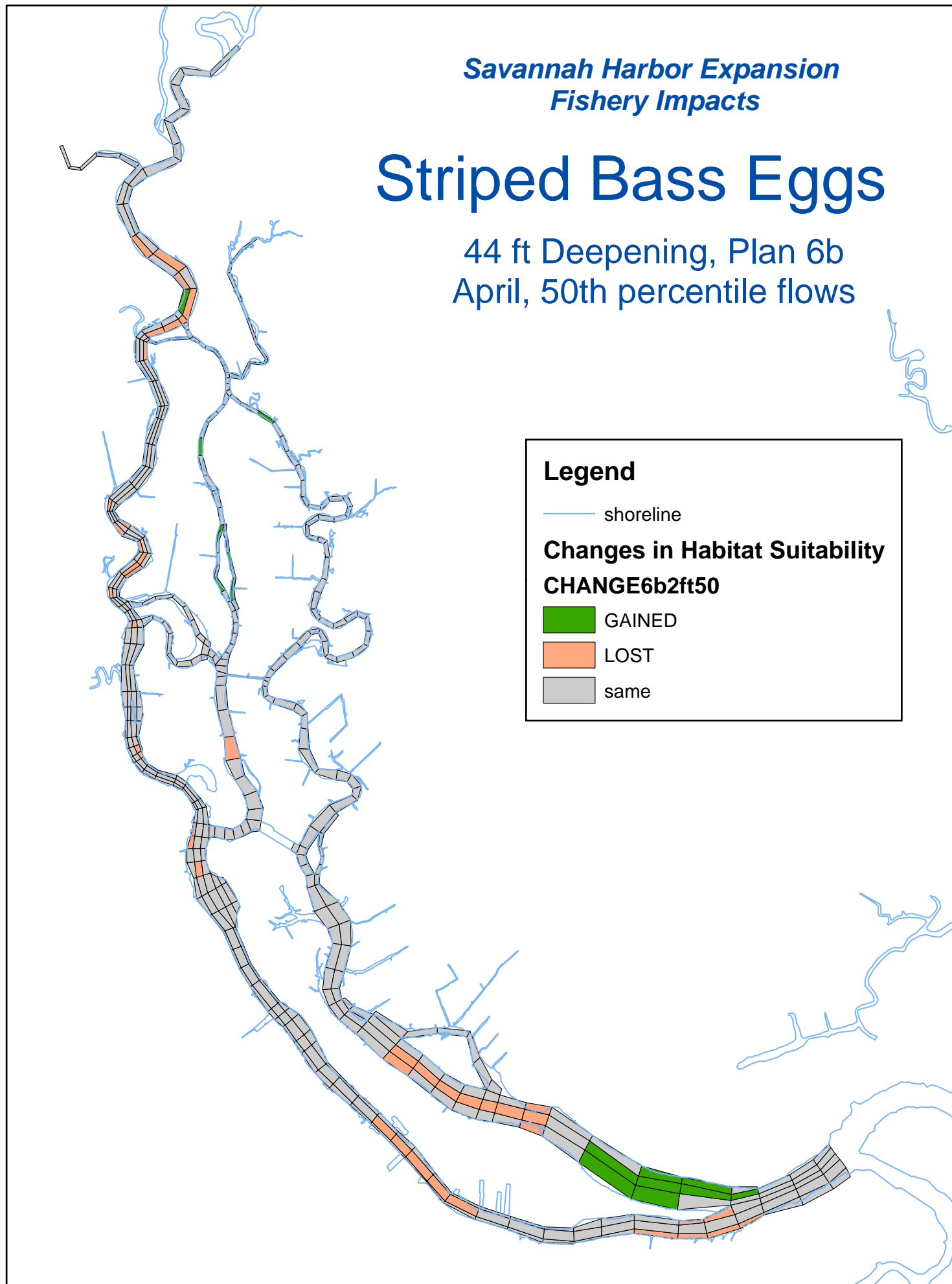
44 ft Deepening, Plan 6b
April, 20th percentile flows



*Savannah Harbor Expansion
Fishery Impacts*

Striped Bass Eggs

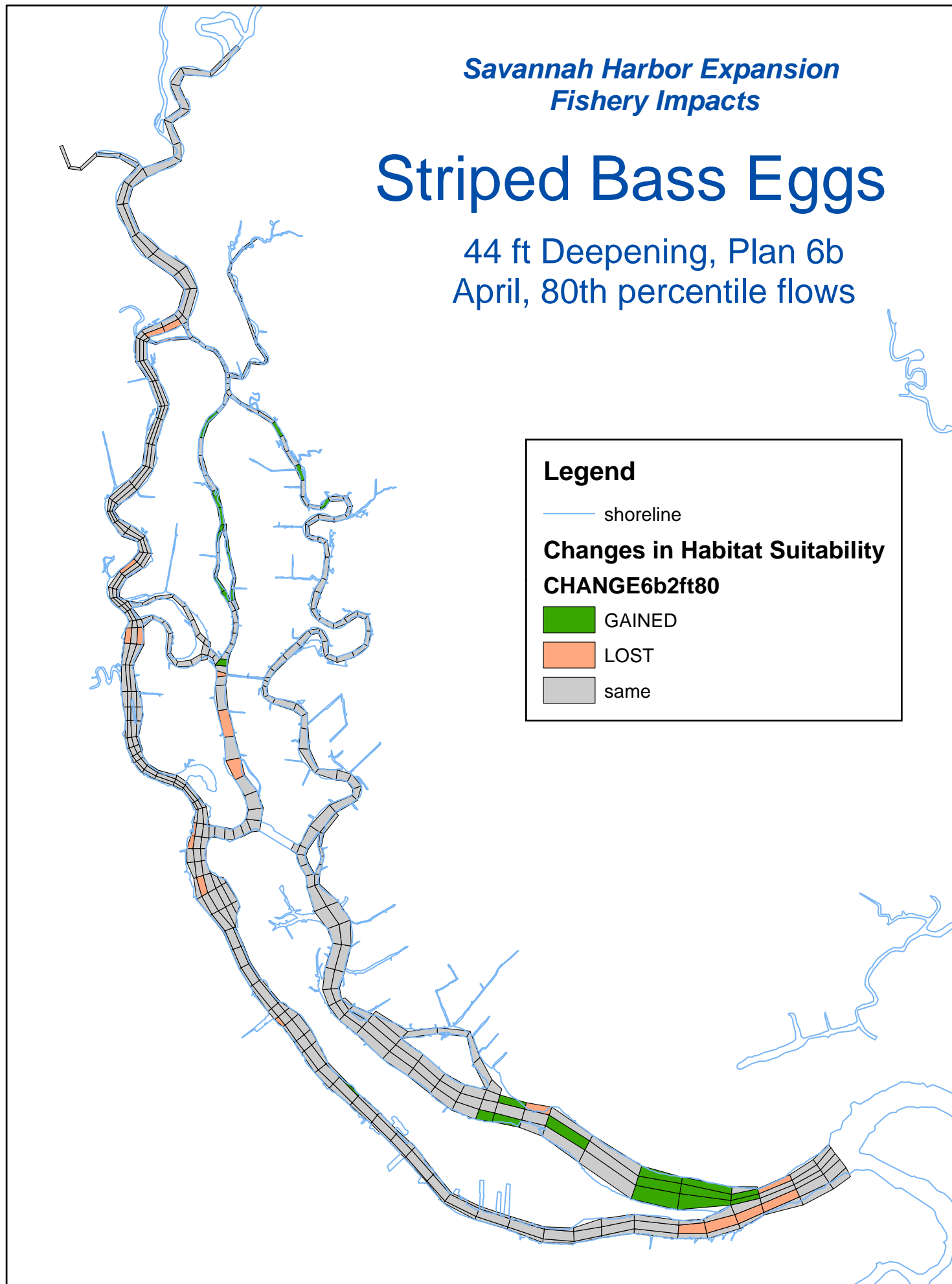
44 ft Deepening, Plan 6b
April, 50th percentile flows



*Savannah Harbor Expansion
Fishery Impacts*

Striped Bass Eggs

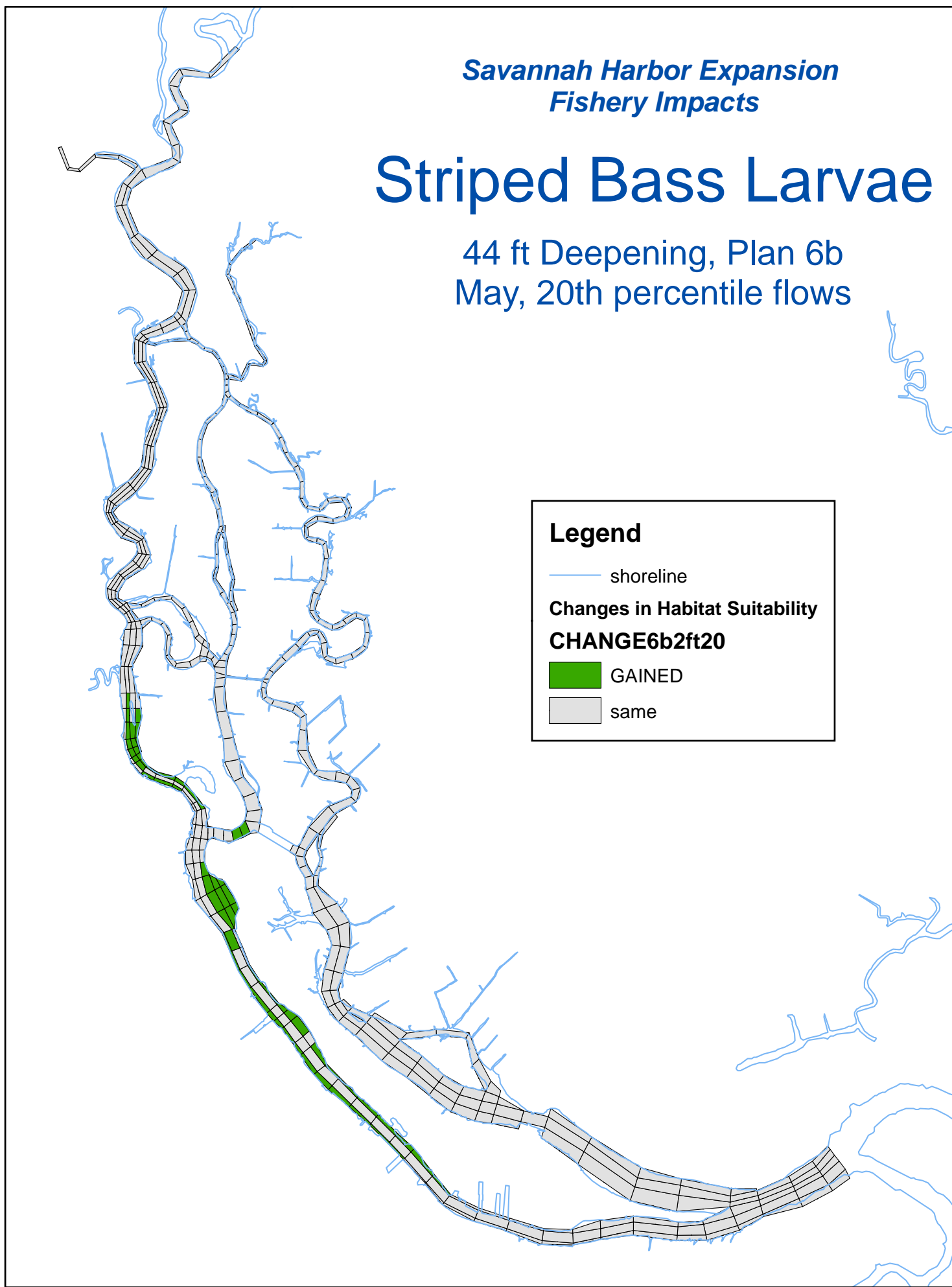
44 ft Deepening, Plan 6b
April, 80th percentile flows



*Savannah Harbor Expansion
Fishery Impacts*

Striped Bass Larvae

44 ft Deepening, Plan 6b
May, 20th percentile flows




Legend

— shoreline

Changes in Habitat Suitability

CHANGE6b2ft20

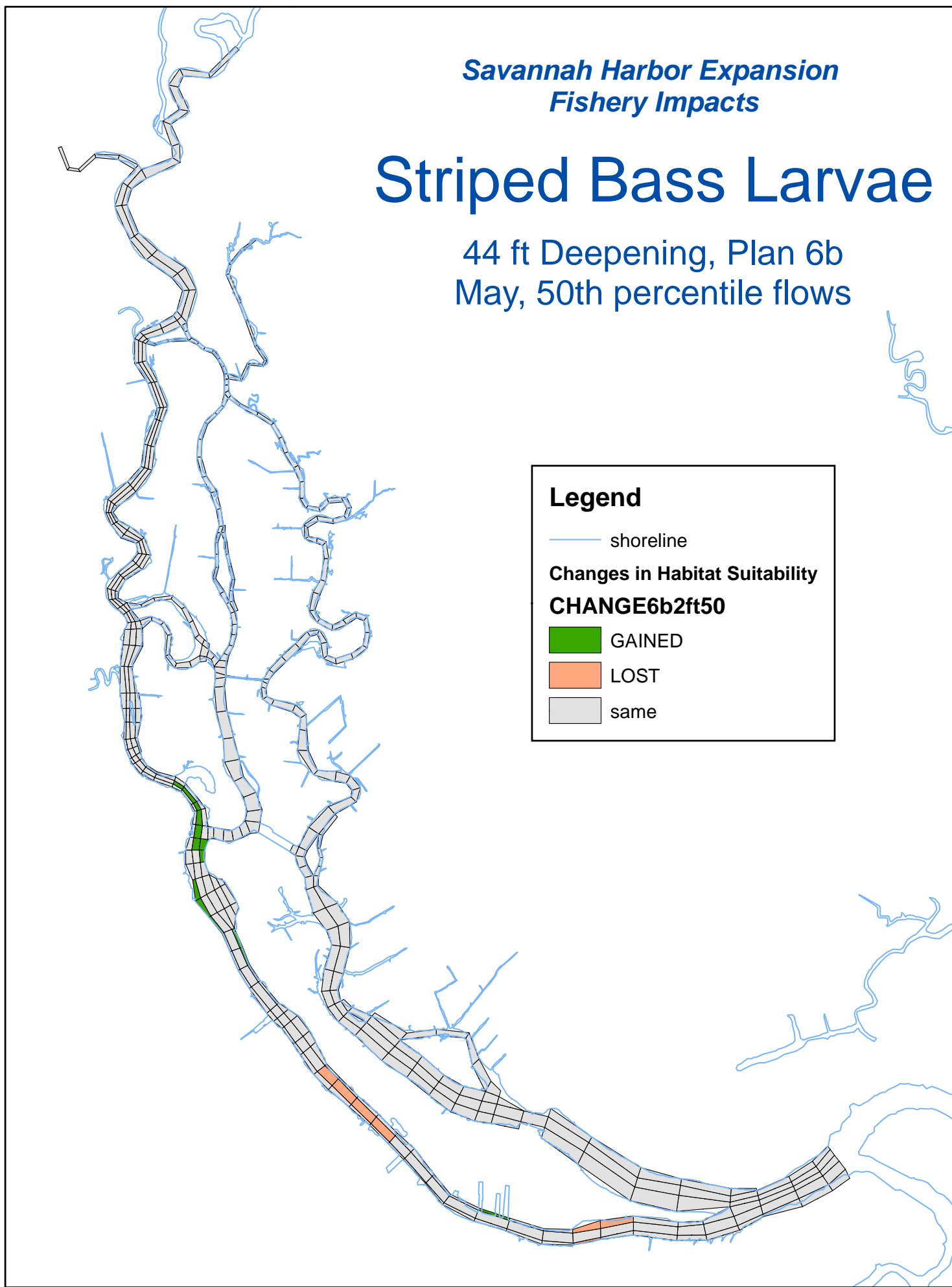
 GAINED

 same

*Savannah Harbor Expansion
Fishery Impacts*

Striped Bass Larvae

44 ft Deepening, Plan 6b
May, 50th percentile flows



Legend

— shoreline

Changes in Habitat Suitability
CHANGE6b2ft50

GAINED

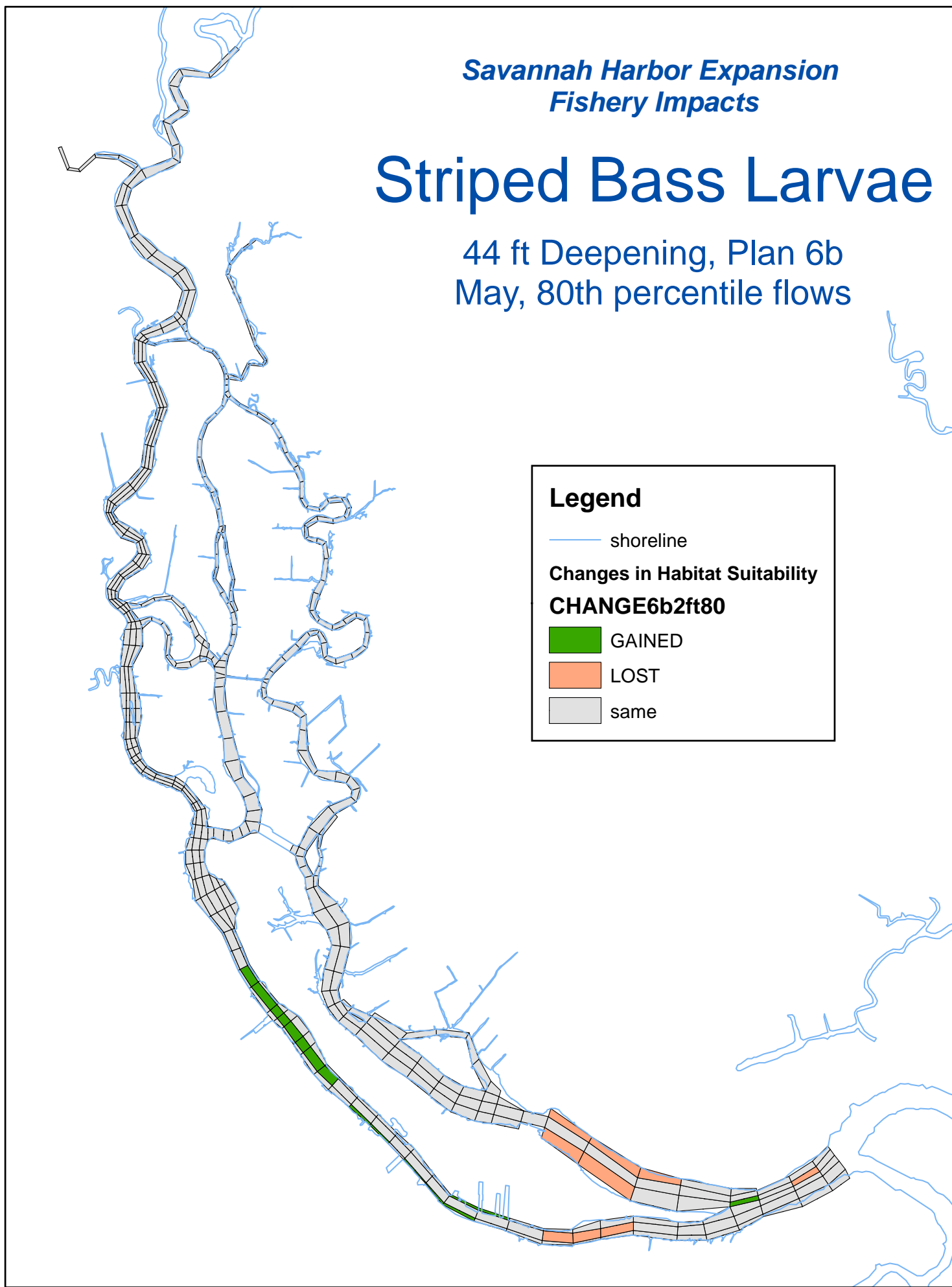
LOST

same

*Savannah Harbor Expansion
Fishery Impacts*

Striped Bass Larvae

44 ft Deepening, Plan 6b
May, 80th percentile flows



Legend


— shoreline

Changes in Habitat Suitability

CHANGE6b2ft80

 GAINED

 LOST

 same

*Savannah Harbor Expansion
Fishery Impacts*




Striped Bass Spawning

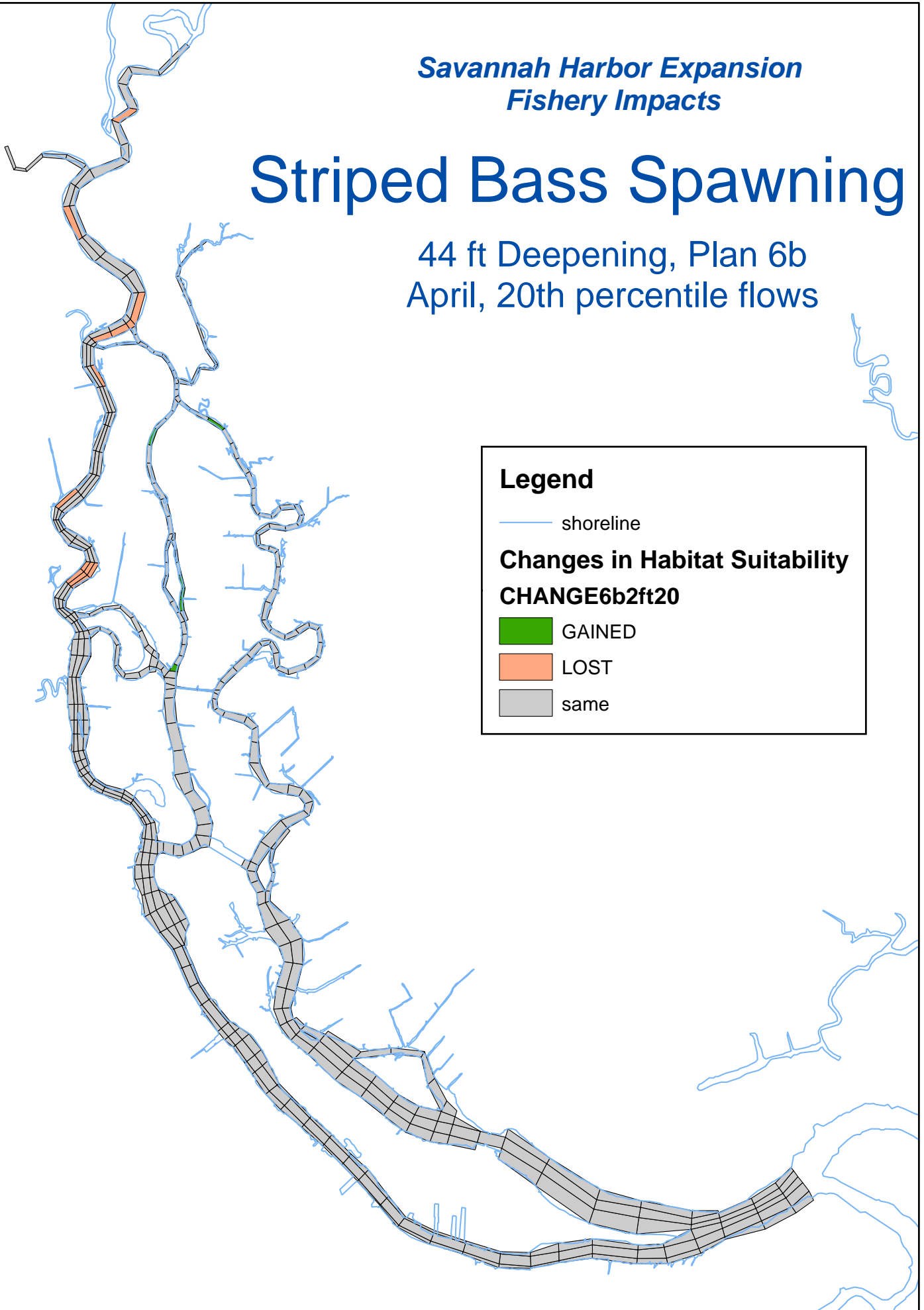
44 ft Deepening, Plan 6b
April, 20th percentile flows

Legend

— shoreline

Changes in Habitat Suitability
CHANGE6b2ft20

	GAINED
	LOST
	same



*Savannah Harbor Expansion
Fishery Impacts*

Striped Bass Spawning

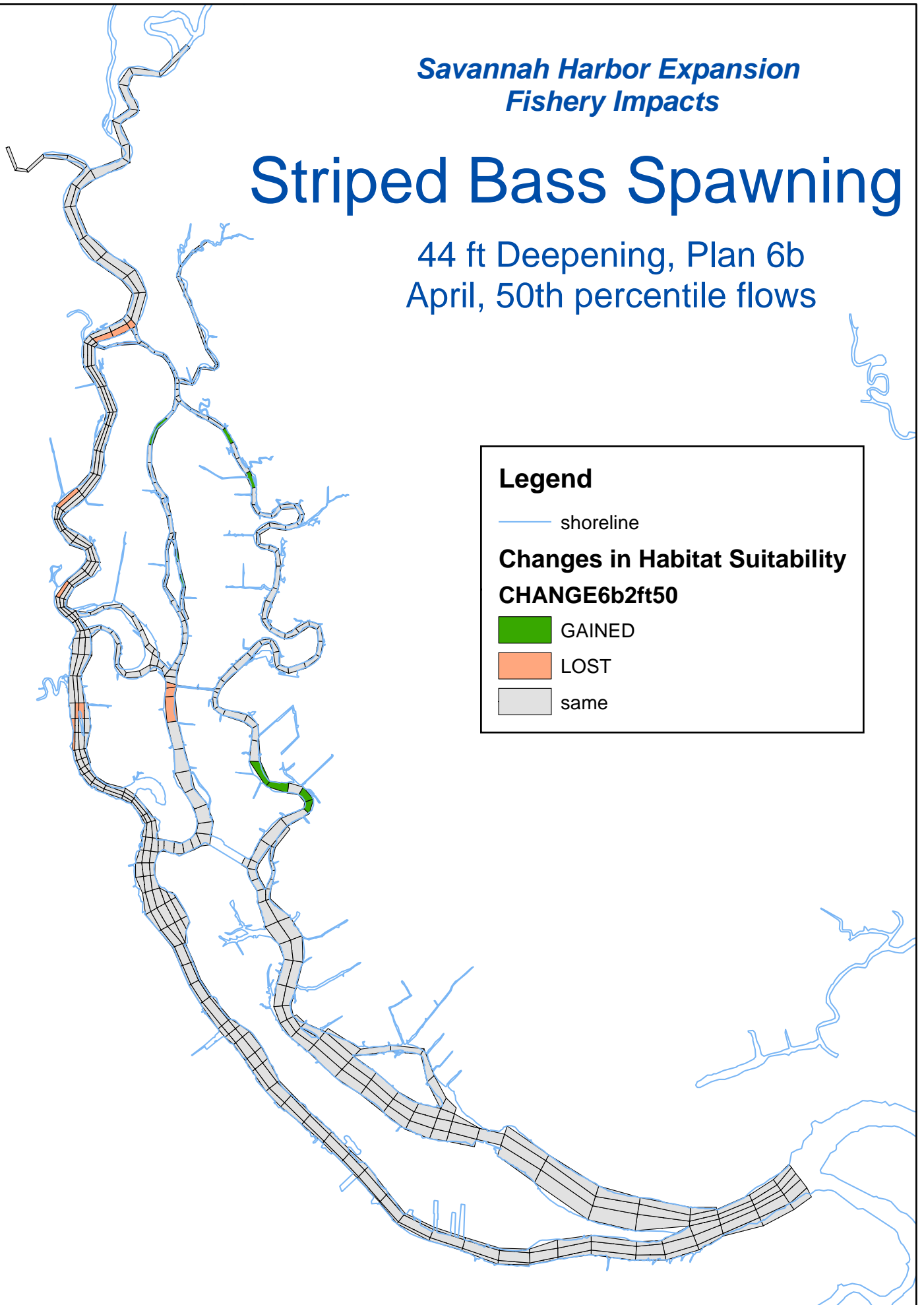
44 ft Deepening, Plan 6b
April, 50th percentile flows

Legend

— shoreline

Changes in Habitat Suitability
CHANGE6b2ft50

- GAINED
- LOST
- same



*Savannah Harbor Expansion
Fishery Impacts*




Striped Bass Spawning

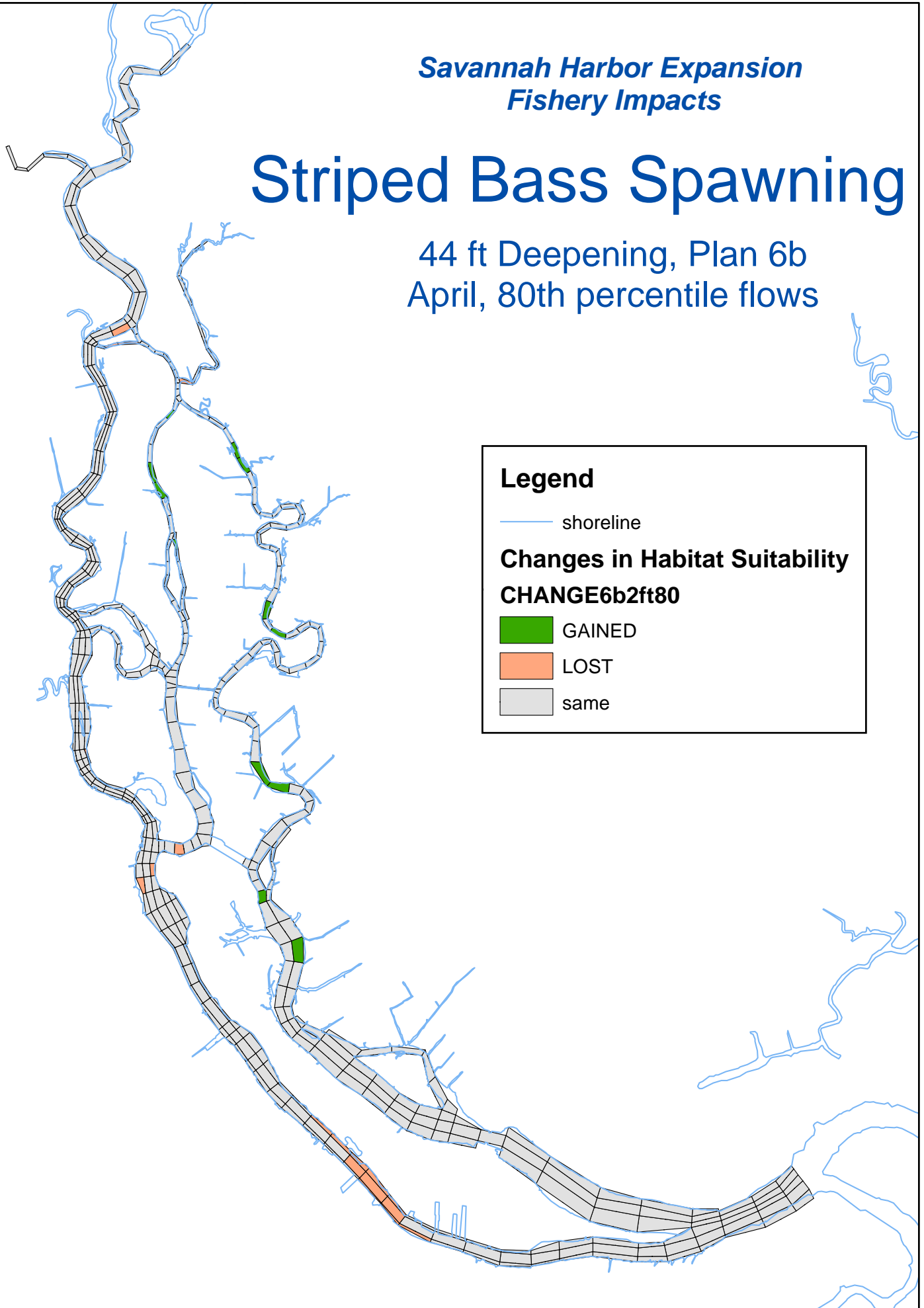
44 ft Deepening, Plan 6b
April, 80th percentile flows

Legend

— shoreline

Changes in Habitat Suitability
CHANGE6b2ft80

	GAINED
	LOST
	same



*Savannah Harbor Expansion
Fishery Impacts*

Sturgeon - Juveniles

44 ft Deepening, Plan 6b
January, 50th percentile flows

This habitat evaluation was updated in March 2011 using revised habitat suitability criteria. The updated criteria and evaluations are displayed in Attachment 1.

Legend

shoreline

Changes in Habitat Suitability

CHANGE6b2ft

GAINED

LOST

same

*Savannah Harbor Expansion
Fishery Impacts*

Sturgeon - Adults

44 ft Deepening, Plan 6b
January, 50th percentile flows

This habitat evaluation was updated in March 2011 using revised habitat suitability criteria. The updated criteria and evaluations are displayed in Attachment 1.

Legend

shoreline

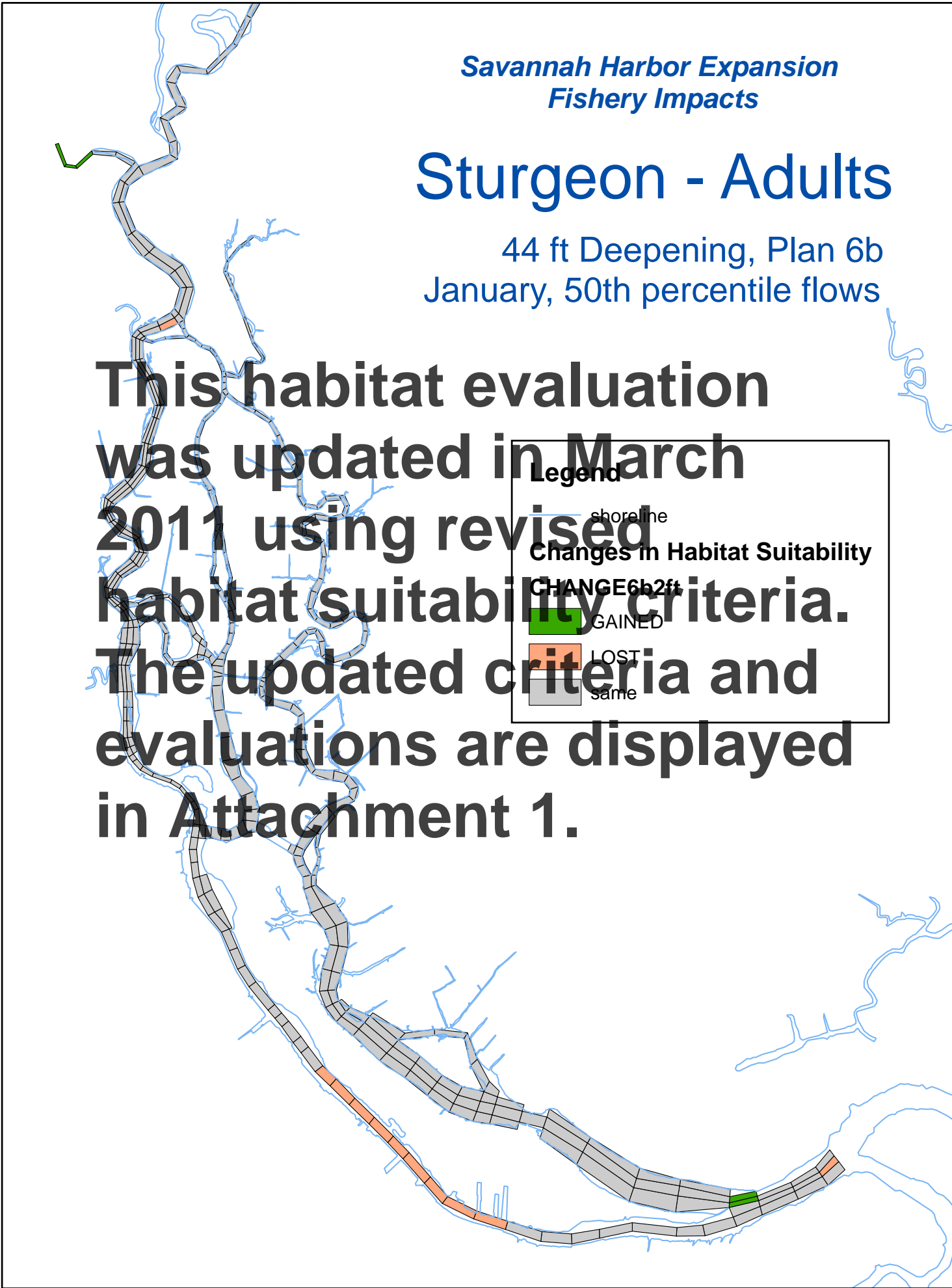
Changes in Habitat Suitability

CHANGE6b2ft

GAINED

LOST

same



*Savannah Harbor Expansion
Fishery Impacts*

Sturgeon - Adults

44 ft Deepening, Plan 6b
August, 1997 (Average) Flows

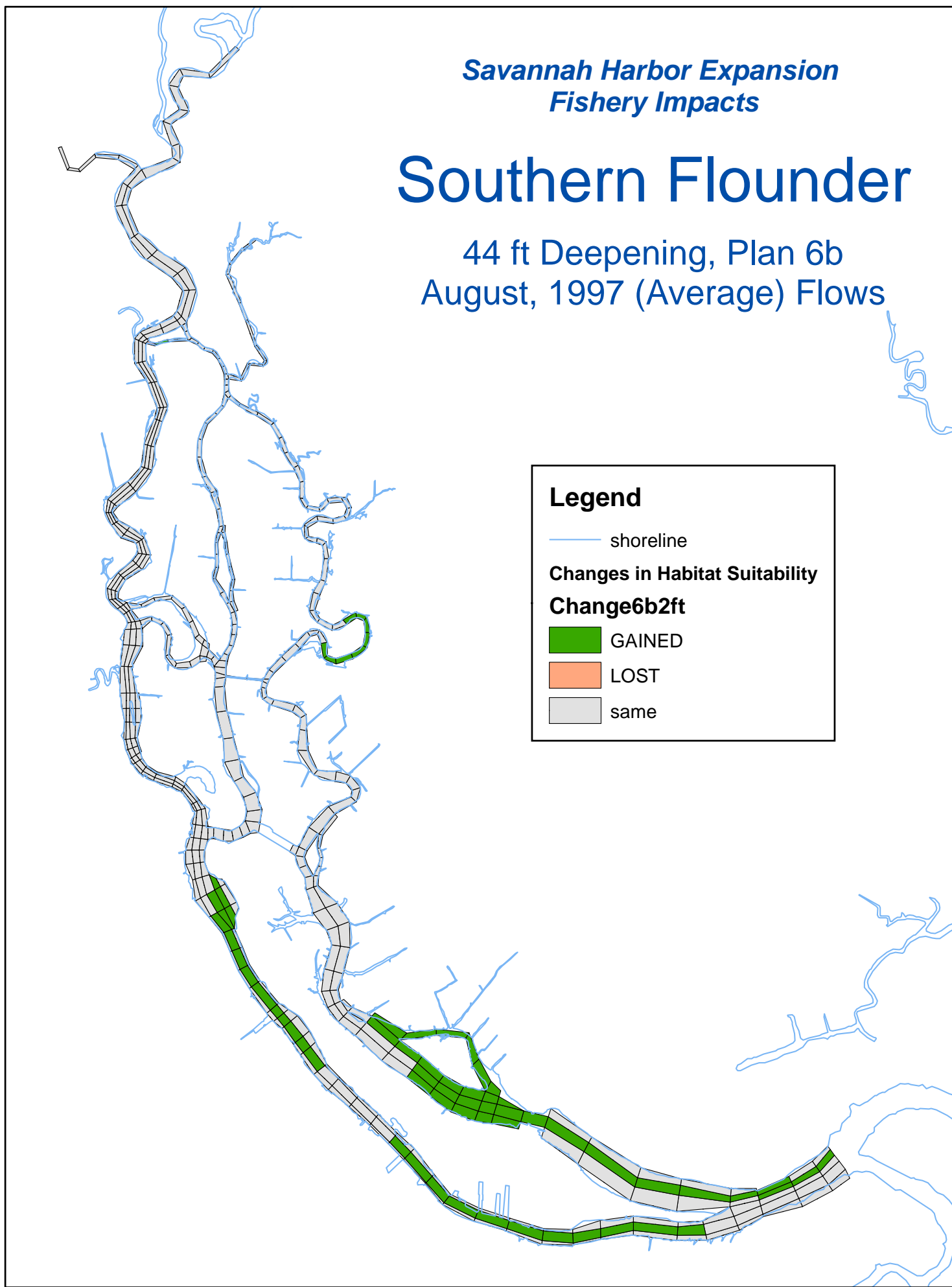
This habitat evaluation was updated in March 2011 using revised habitat suitability criteria. The updated criteria and evaluations are displayed in Attachment 1.



*Savannah Harbor Expansion
Fishery Impacts*

Southern Flounder

44 ft Deepening, Plan 6b
August, 1997 (Average) Flows



Legend

— shoreline

Changes in Habitat Suitability

Change6b2ft

- GAINED
- LOST
- same

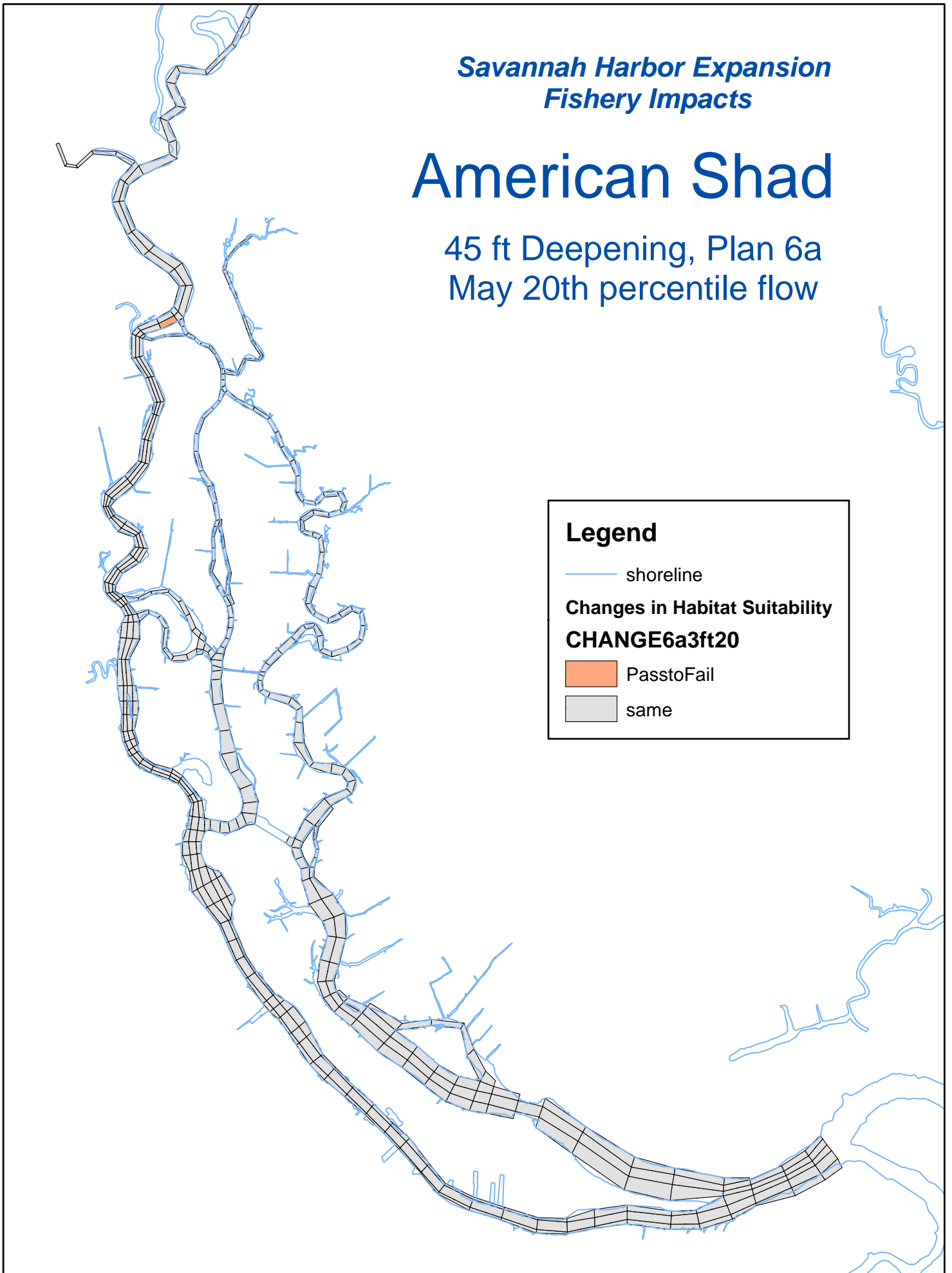
45 ft Channel Depth

Mitigation Plan 6a

*Savannah Harbor Expansion
Fishery Impacts*

American Shad

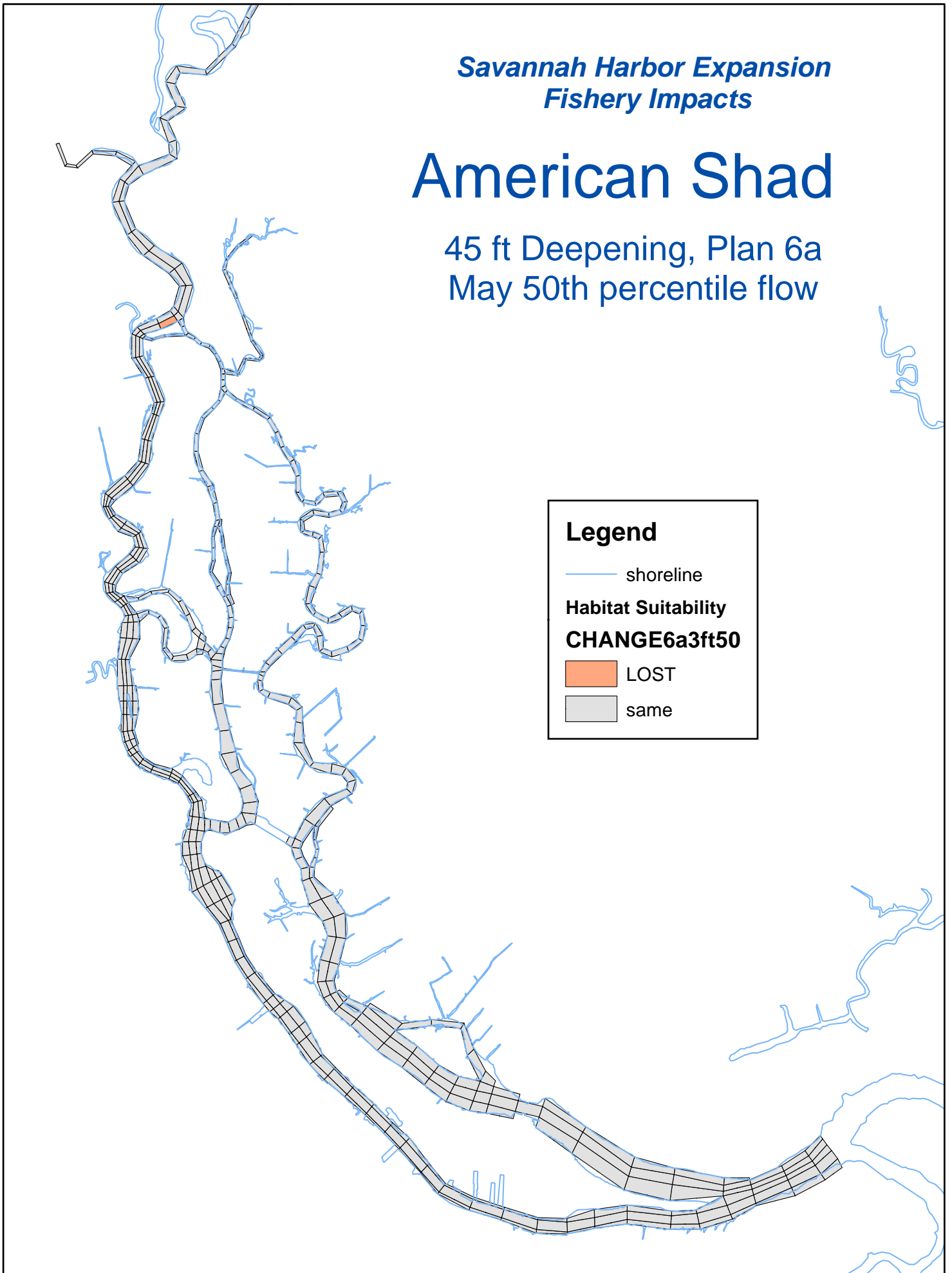
45 ft Deepening, Plan 6a
May 20th percentile flow



*Savannah Harbor Expansion
Fishery Impacts*

American Shad

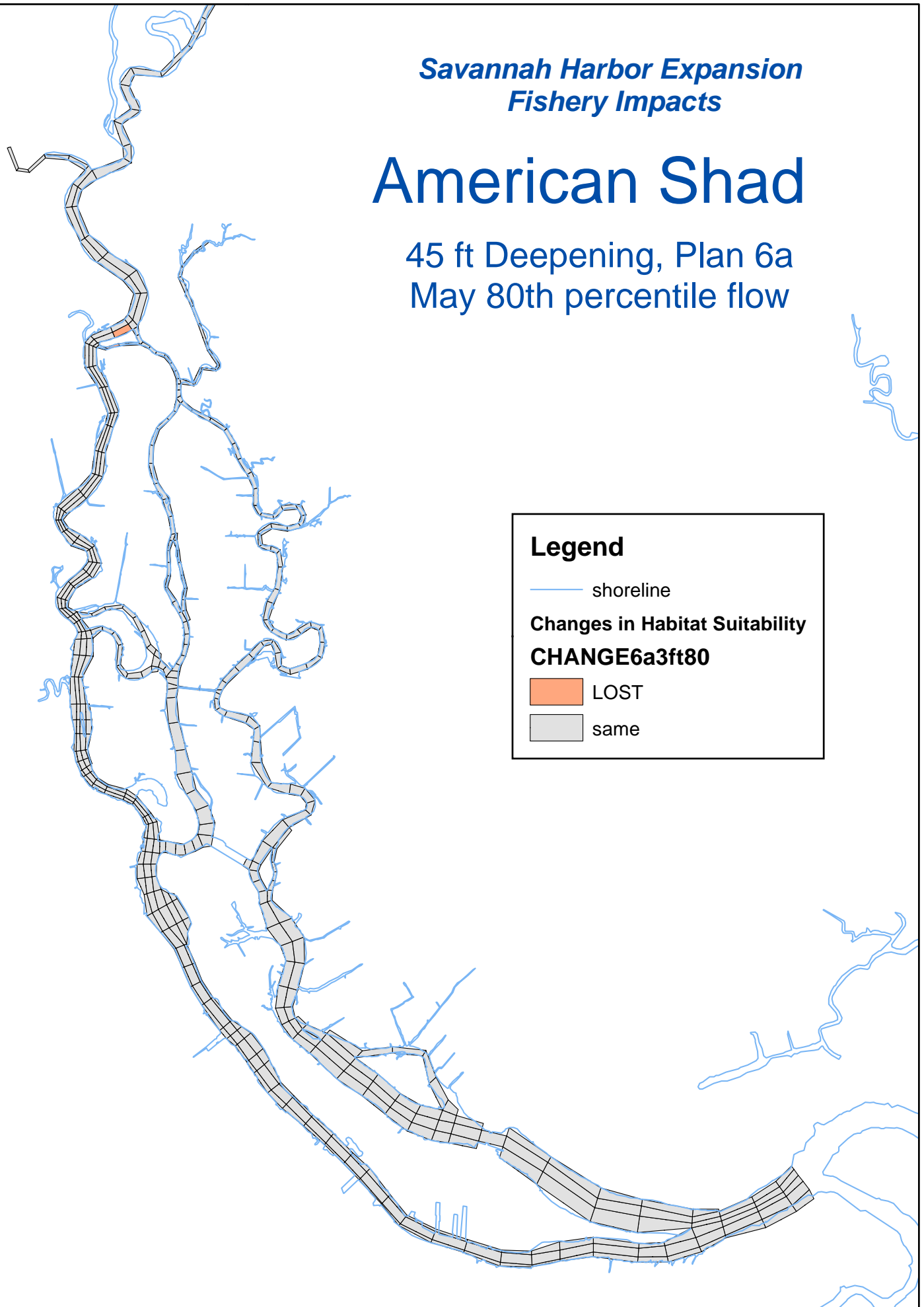
45 ft Deepening, Plan 6a
May 50th percentile flow



*Savannah Harbor Expansion
Fishery Impacts*

American Shad

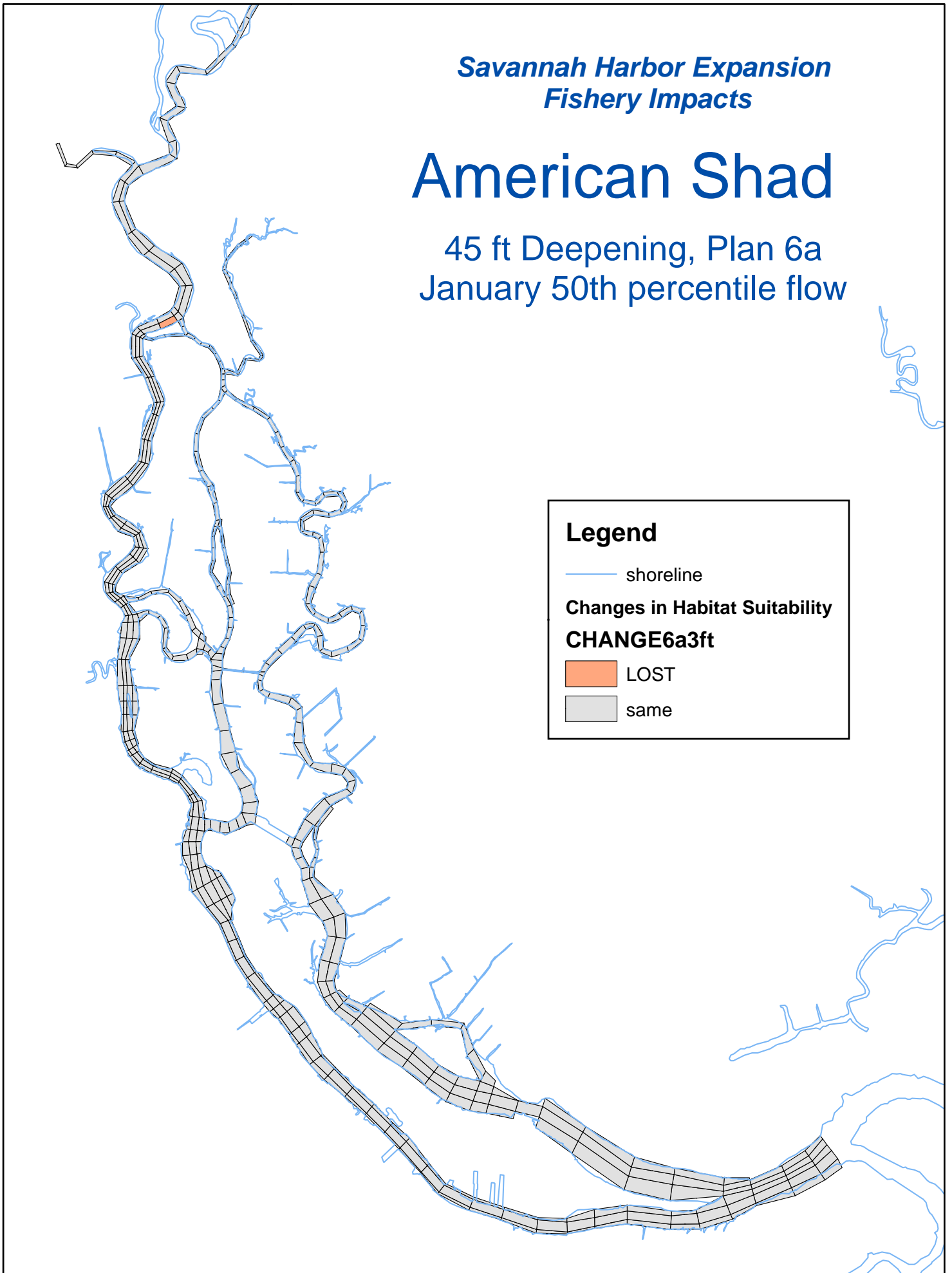
45 ft Deepening, Plan 6a
May 80th percentile flow



*Savannah Harbor Expansion
Fishery Impacts*

American Shad

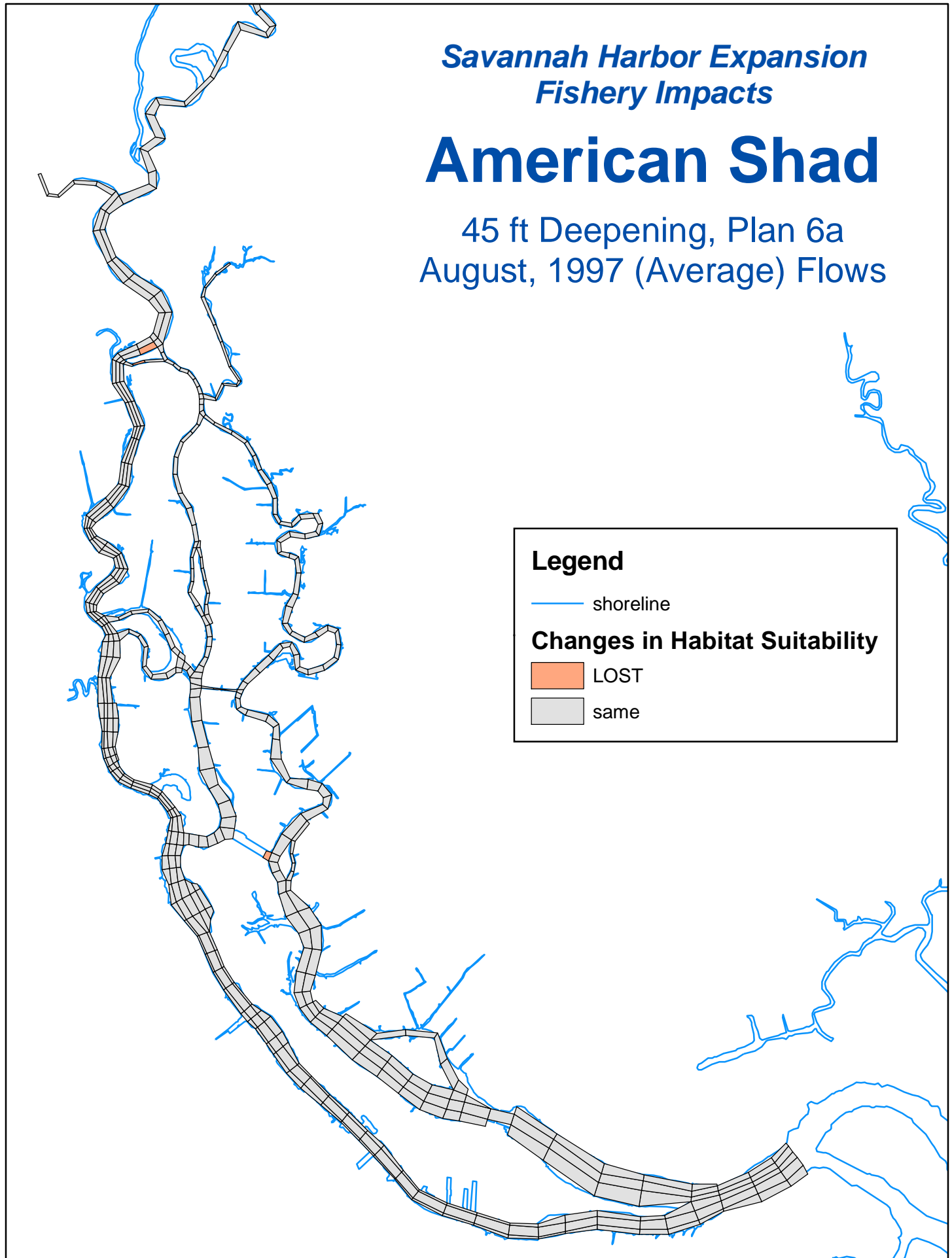
45 ft Deepening, Plan 6a
January 50th percentile flow



*Savannah Harbor Expansion
Fishery Impacts*

American Shad

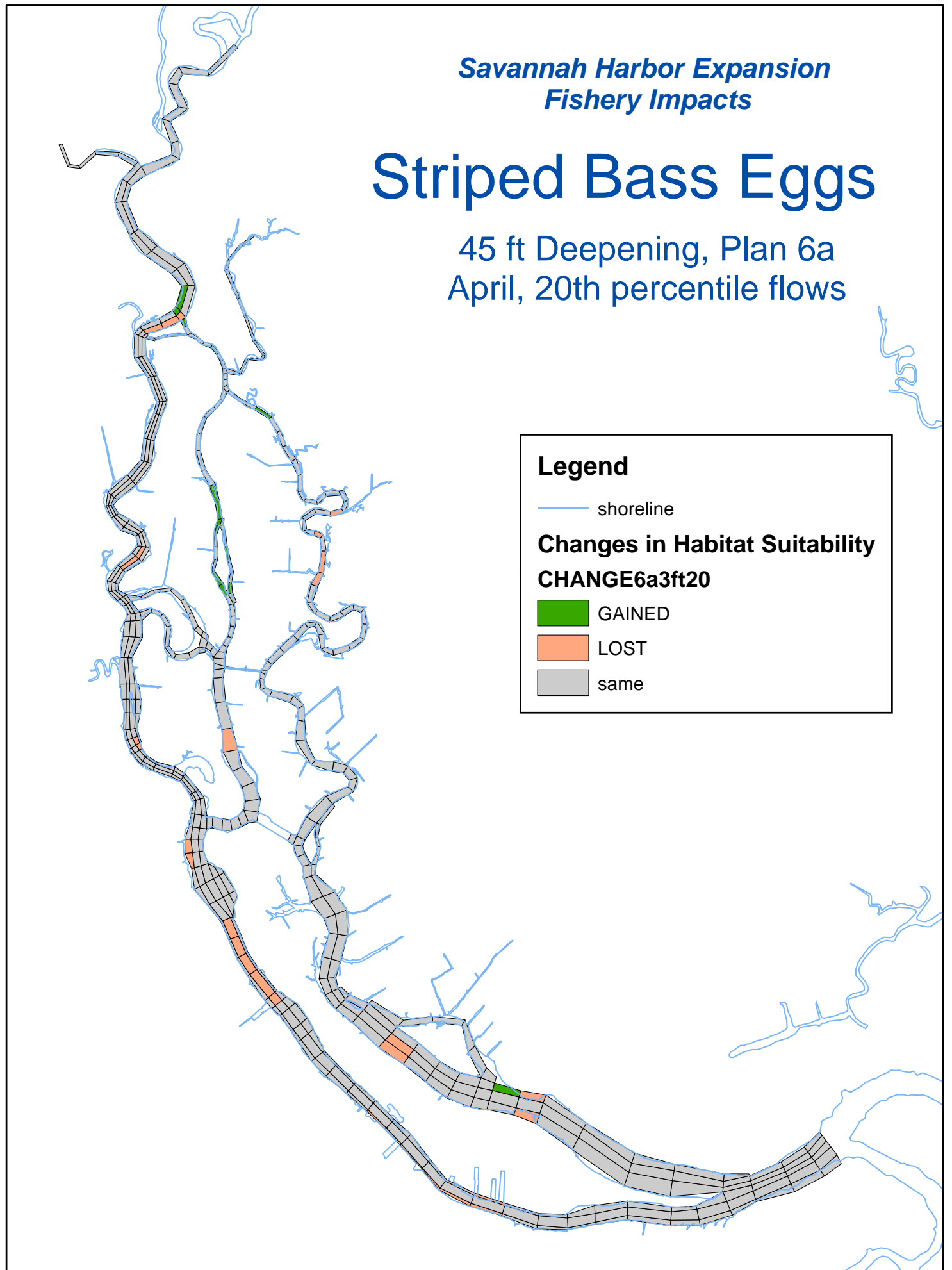
45 ft Deepening, Plan 6a
August, 1997 (Average) Flows



*Savannah Harbor Expansion
Fishery Impacts*

Striped Bass Eggs

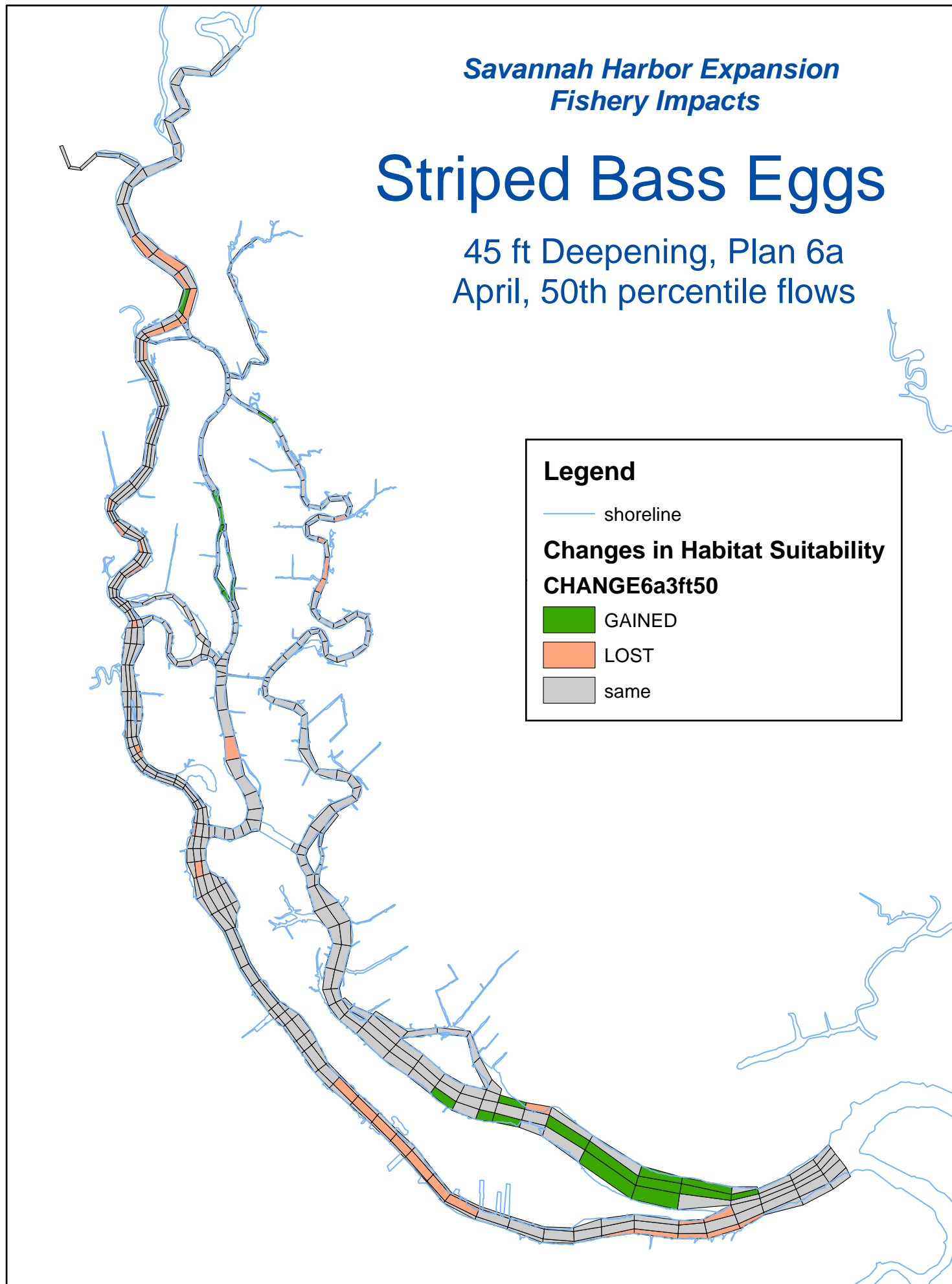
45 ft Deepening, Plan 6a
April, 20th percentile flows



*Savannah Harbor Expansion
Fishery Impacts*

Striped Bass Eggs

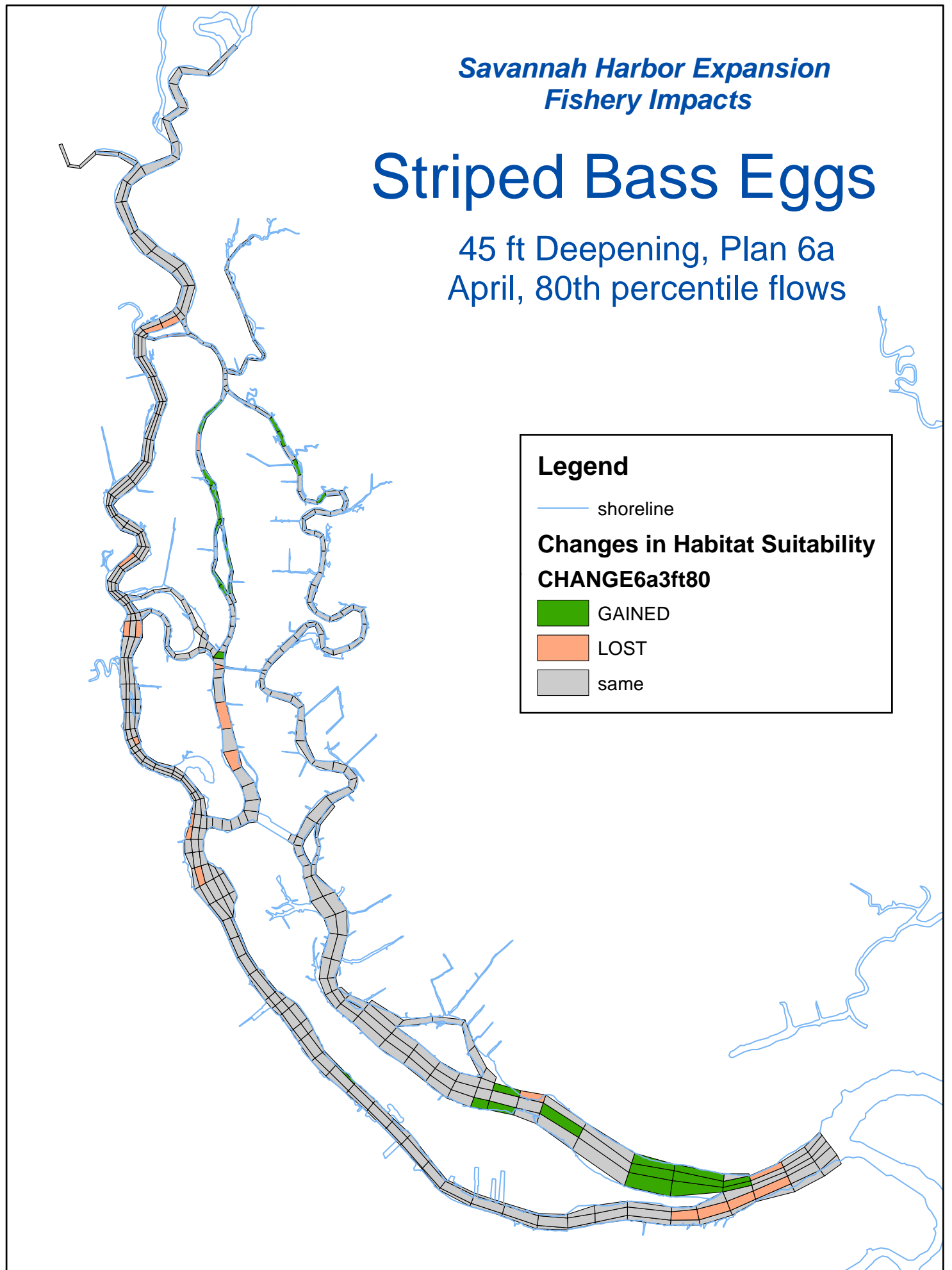
45 ft Deepening, Plan 6a
April, 50th percentile flows



*Savannah Harbor Expansion
Fishery Impacts*

Striped Bass Eggs

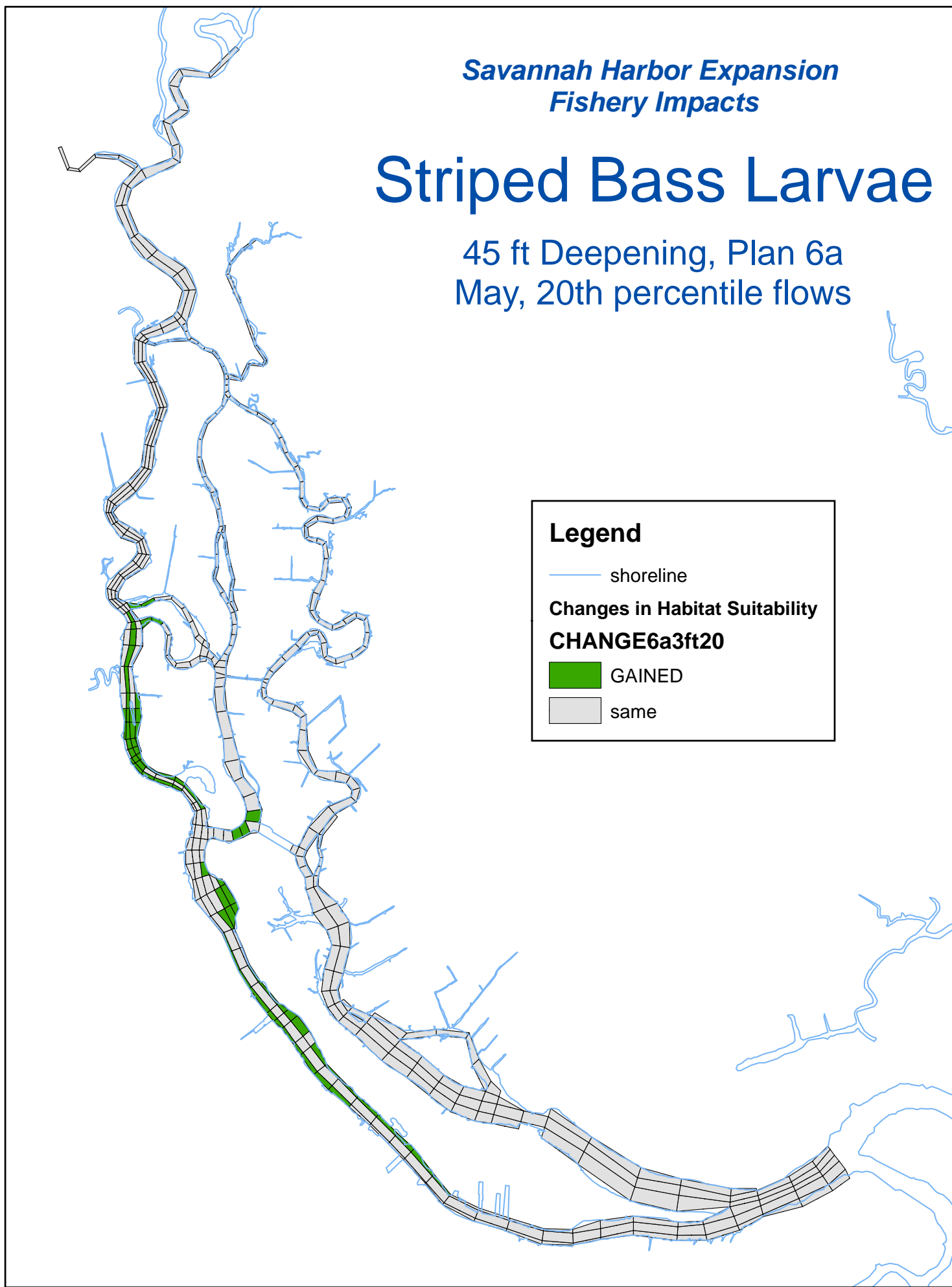
45 ft Deepening, Plan 6a
April, 80th percentile flows



*Savannah Harbor Expansion
Fishery Impacts*

Striped Bass Larvae

45 ft Deepening, Plan 6a
May, 20th percentile flows




Legend

— shoreline

Changes in Habitat Suitability

CHANGE6a3ft20

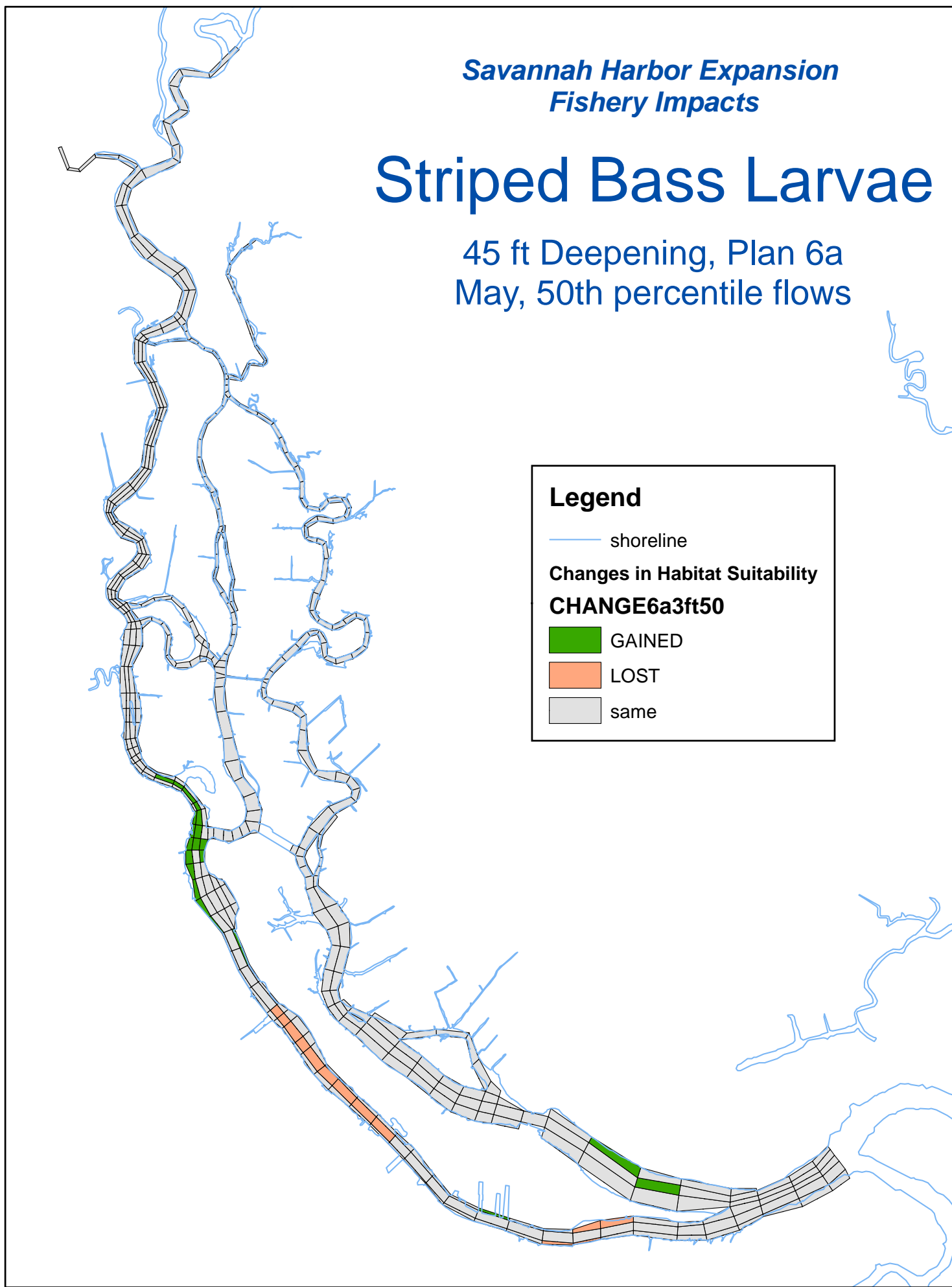
 GAINED

 same

*Savannah Harbor Expansion
Fishery Impacts*

Striped Bass Larvae

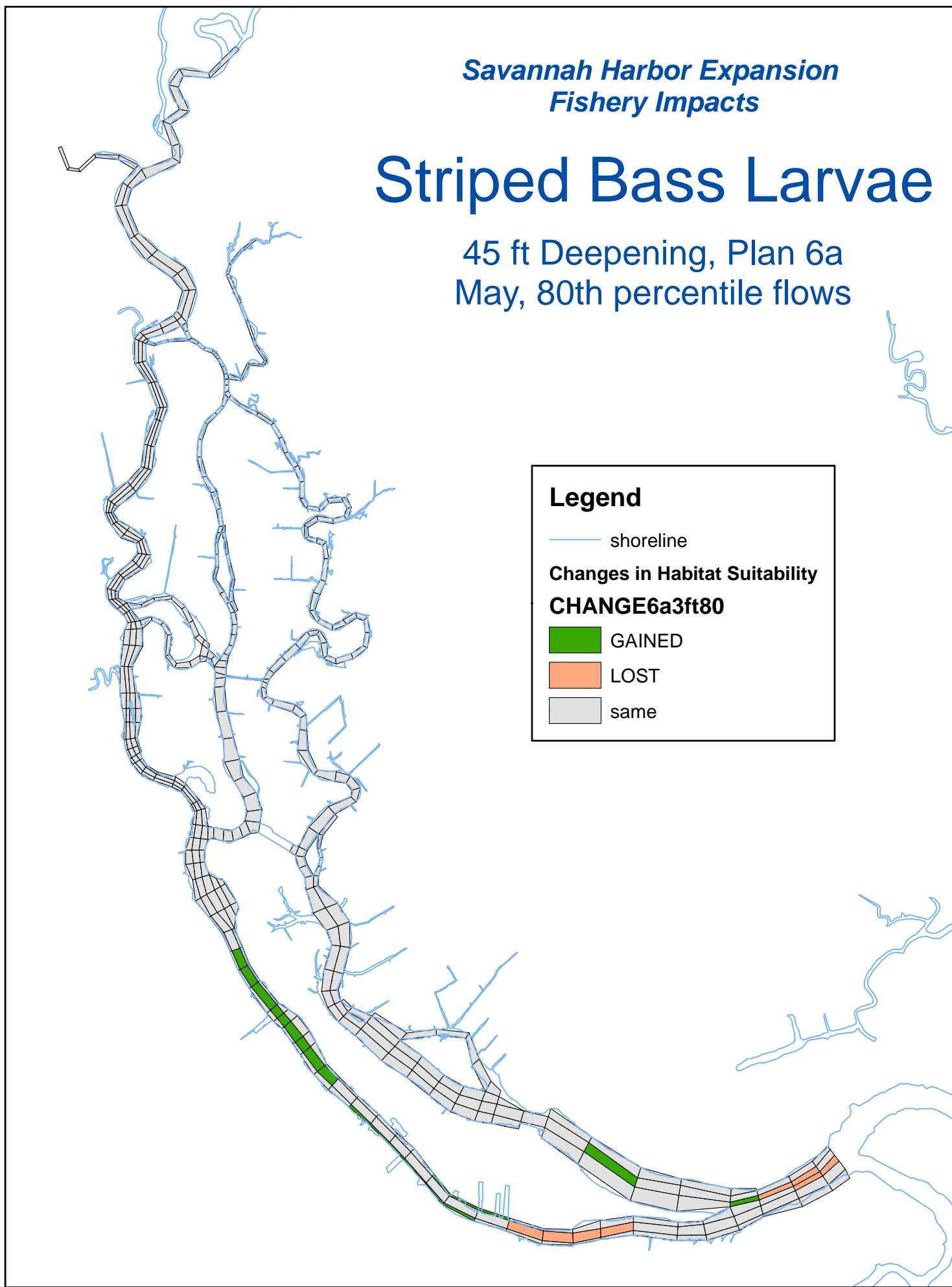
45 ft Deepening, Plan 6a
May, 50th percentile flows



*Savannah Harbor Expansion
Fishery Impacts*

Striped Bass Larvae

45 ft Deepening, Plan 6a
May, 80th percentile flows



Legend

— shoreline

Changes in Habitat Suitability
CHANGE6a3ft80

- GAINED
- LOST
- same

*Savannah Harbor Expansion
Fishery Impacts*




Striped Bass Spawning

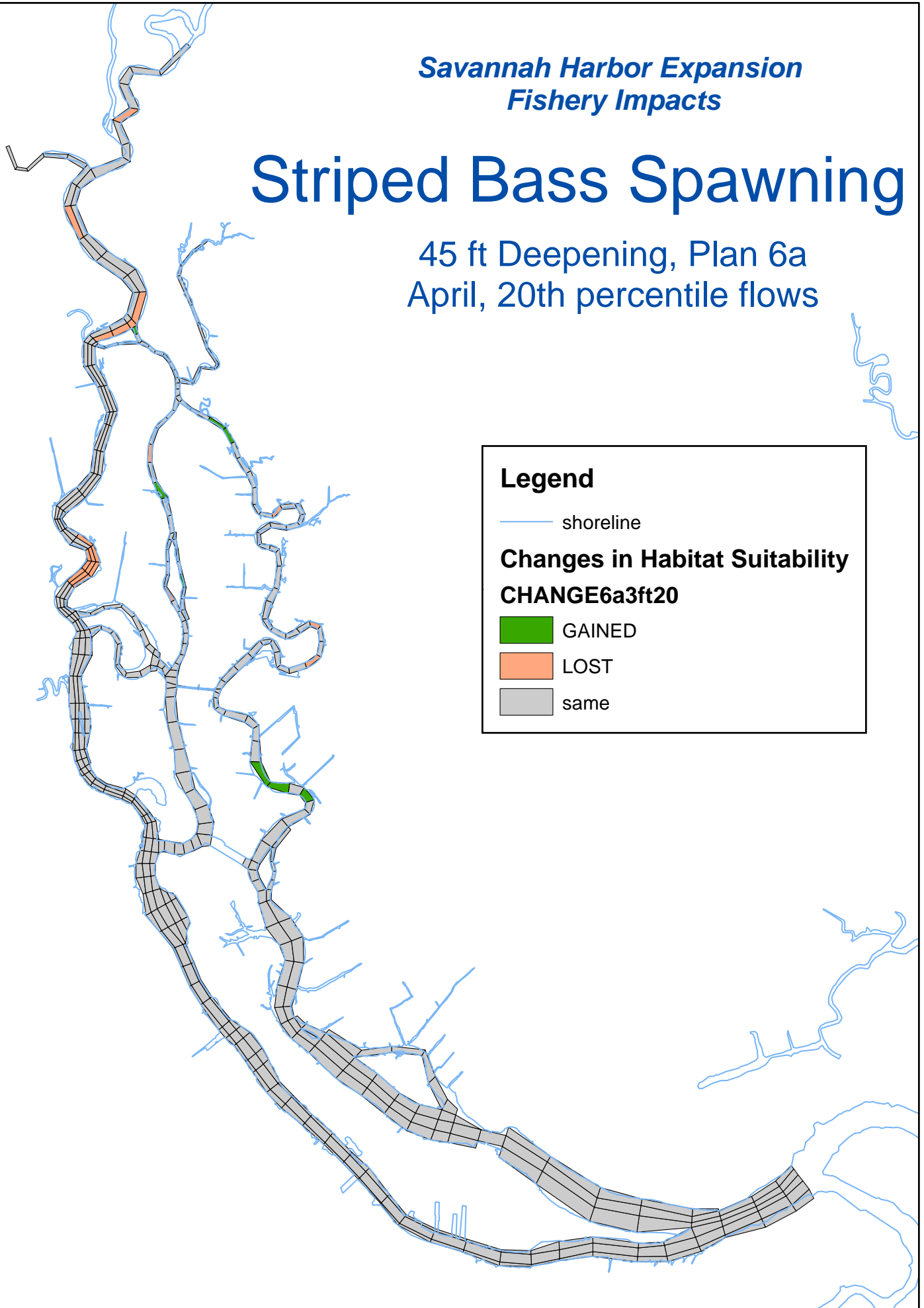
45 ft Deepening, Plan 6a
April, 20th percentile flows

Legend

— shoreline

Changes in Habitat Suitability
CHANGE6a3ft20

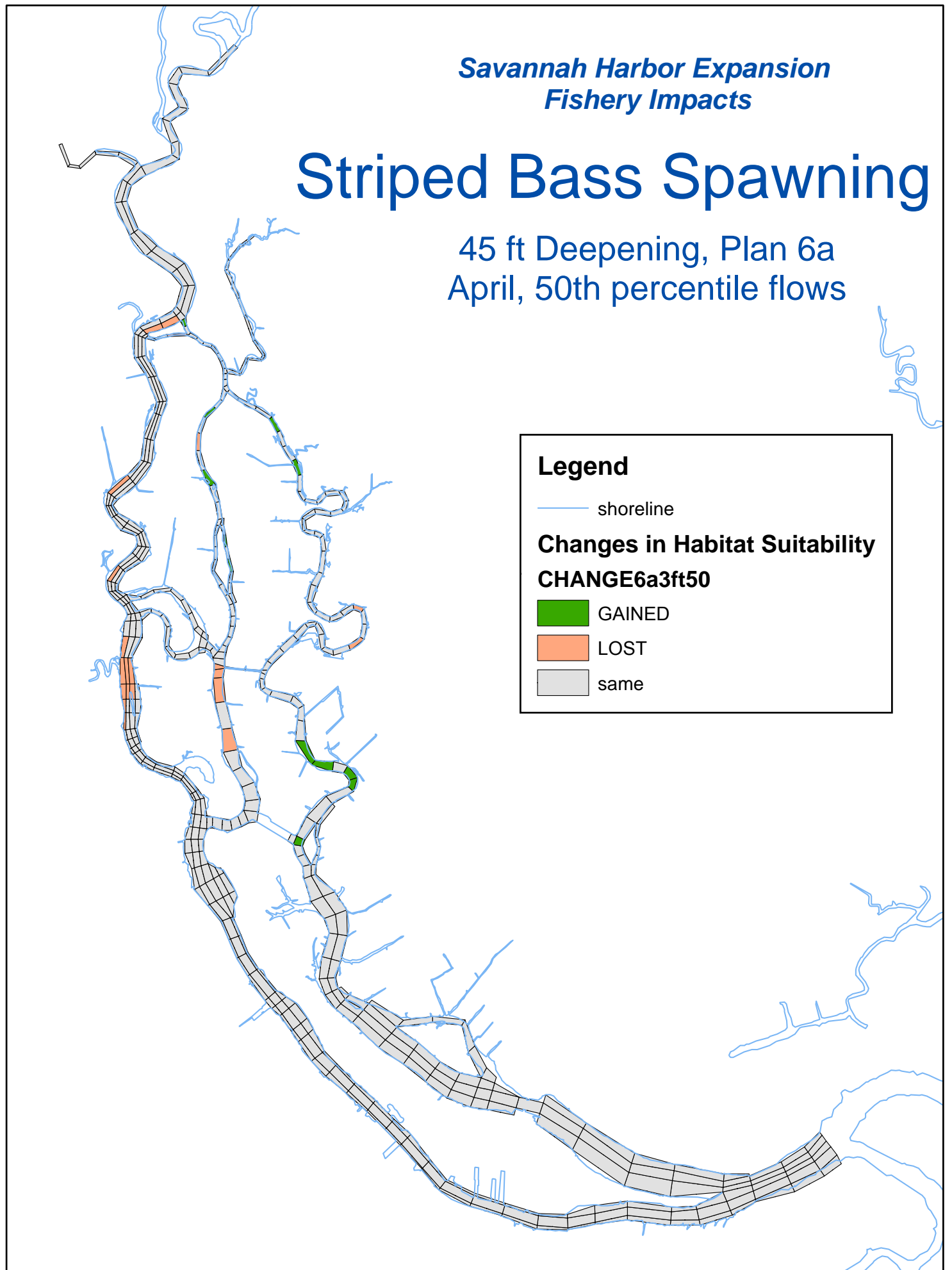
	GAINED
	LOST
	same



*Savannah Harbor Expansion
Fishery Impacts*

Striped Bass Spawning

45 ft Deepening, Plan 6a
April, 50th percentile flows



*Savannah Harbor Expansion
Fishery Impacts*

Striped Bass Spawning

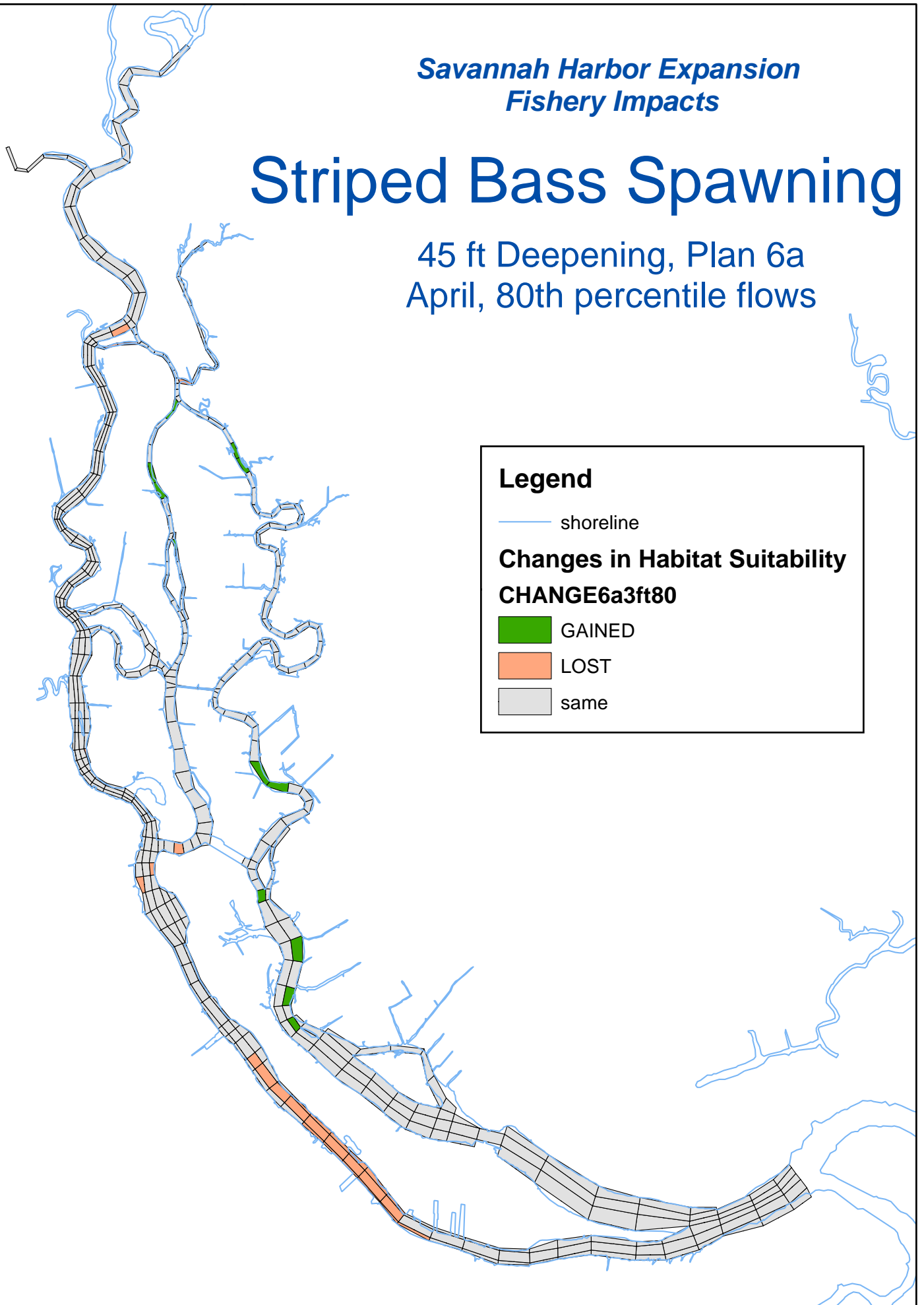
45 ft Deepening, Plan 6a
April, 80th percentile flows

Legend

— shoreline

Changes in Habitat Suitability
CHANGE6a3ft80

- GAINED
- LOST
- same



*Savannah Harbor Expansion
Fishery Impacts*

Sturgeon - Juveniles

45 ft Deepening, Plan 6a
January, 50th percentile flows

This habitat evaluation was updated in March 2011 using revised habitat suitability criteria. The updated criteria and evaluations are displayed in Attachment 1.

Legend

shoreline

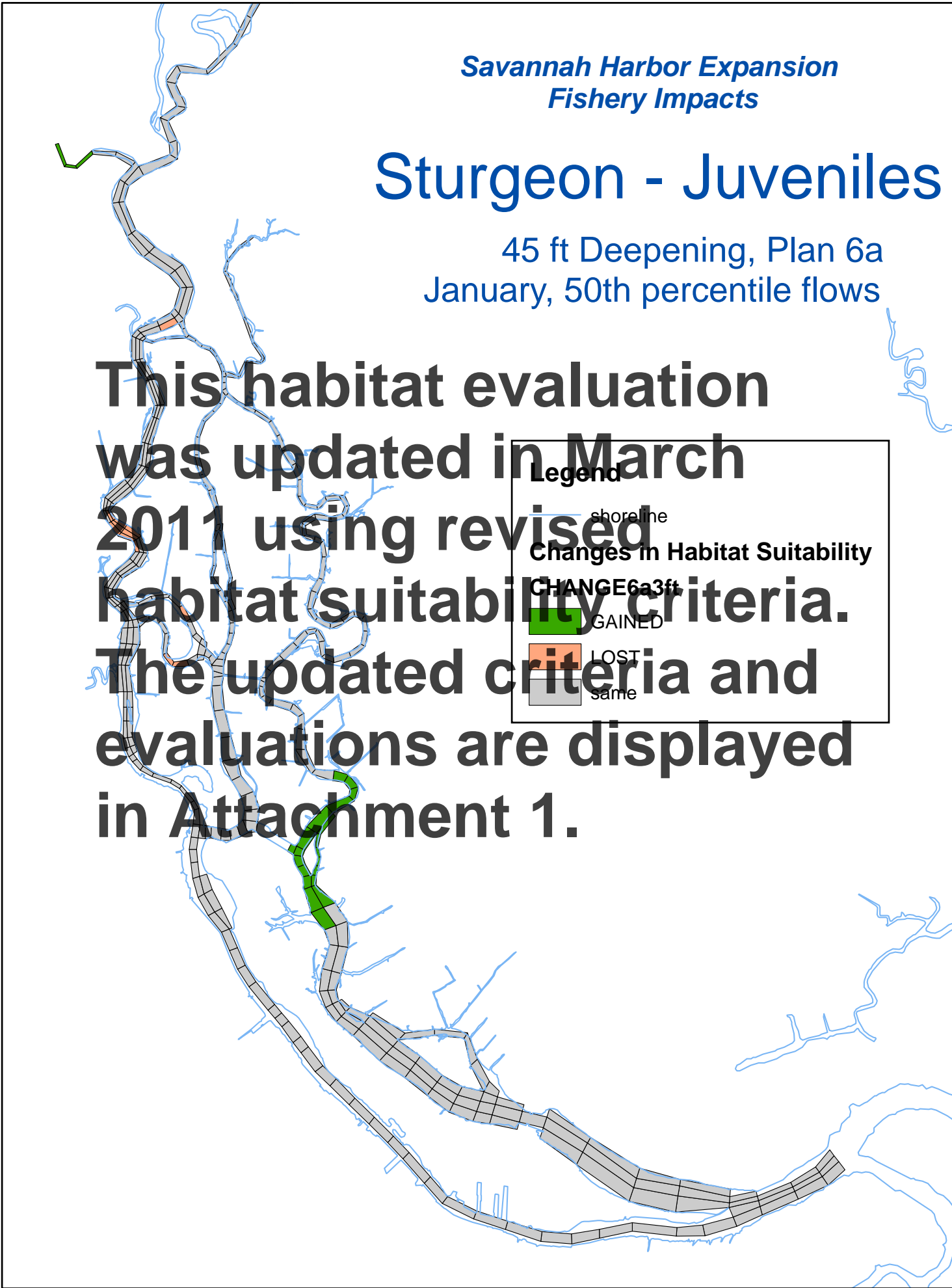
Changes in Habitat Suitability

CHANGE6a3ft

GAINED

LOST

same



*Savannah Harbor Expansion
Fishery Impacts*

Sturgeon - Adults

45 ft Deepening, Plan 6a
January, 50th percentile flows

This habitat evaluation was updated in March 2011 using revised habitat suitability criteria. The updated criteria and evaluations are displayed in Attachment 1.

Legend

shoreline

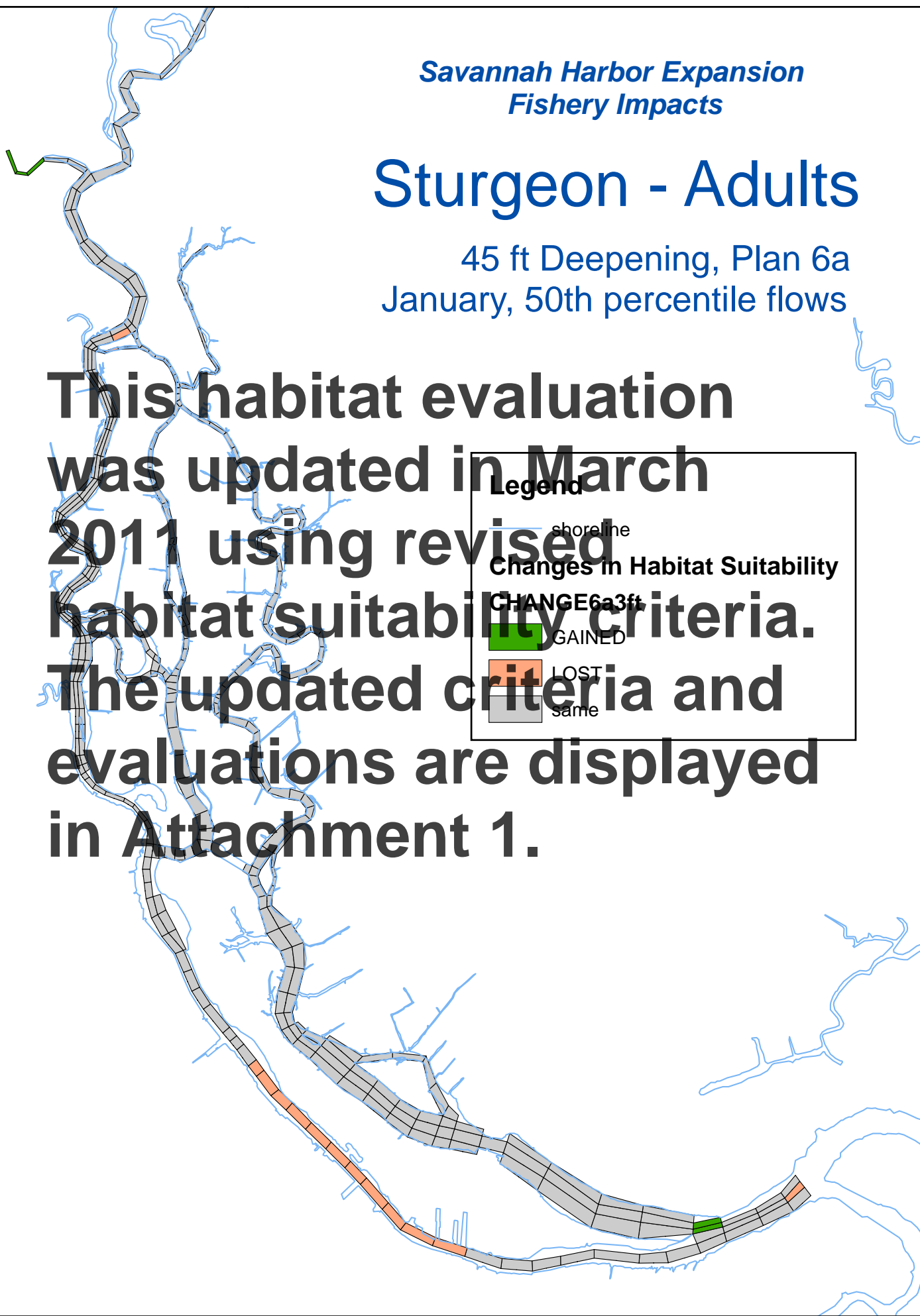
Changes in Habitat Suitability

CHANGE6a3ft

GAINED

LOST

same



*Savannah Harbor Expansion
Fishery Impacts*

Sturgeon - Adults

45 ft Deepening, Plan 6a
August, 1997 (Average) Flows

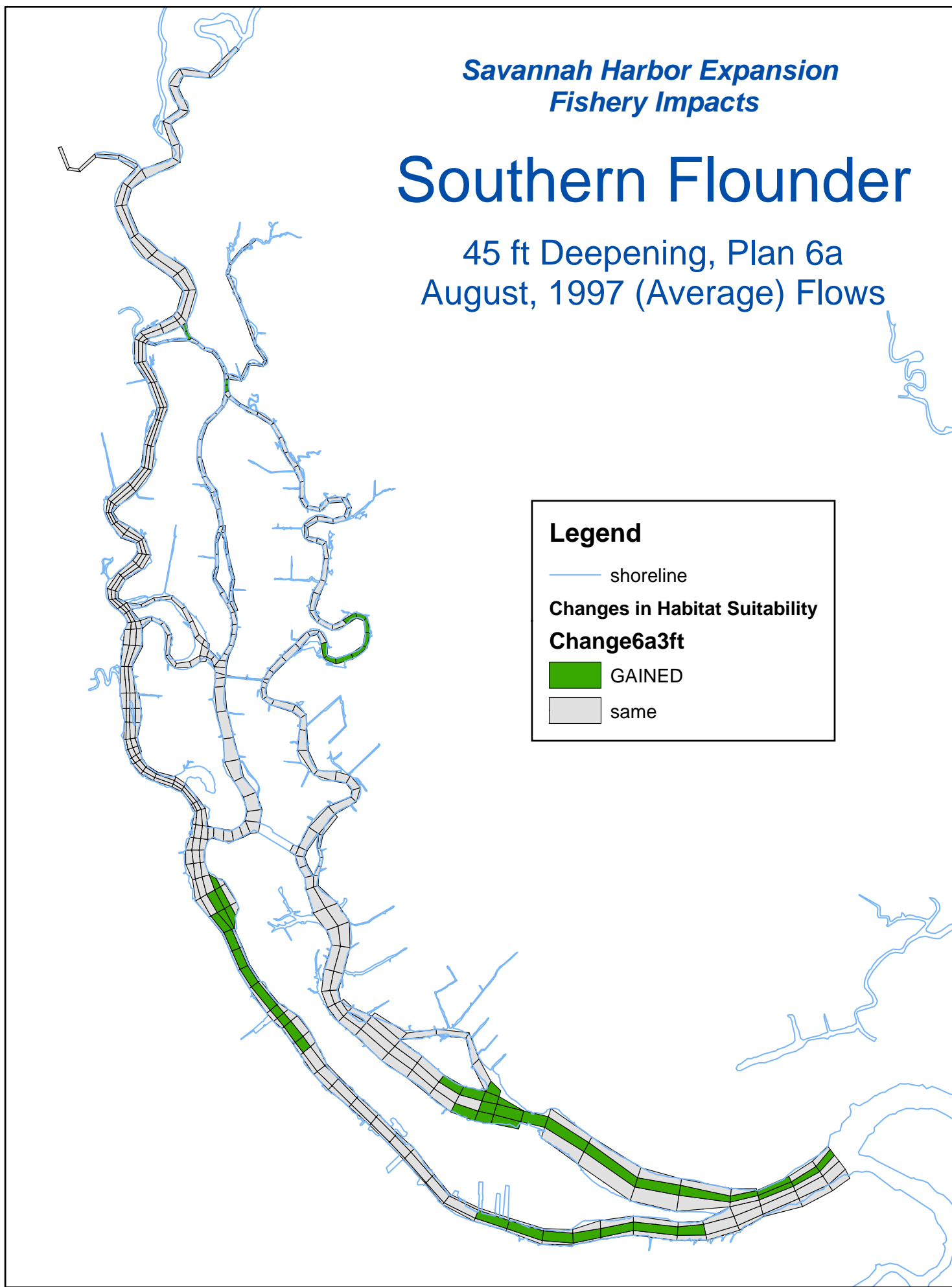
This habitat evaluation was updated in March 2011 using revised habitat suitability criteria. The updated criteria and evaluations are displayed in Attachment 1.



*Savannah Harbor Expansion
Fishery Impacts*

Southern Flounder

45 ft Deepening, Plan 6a
August, 1997 (Average) Flows



Legend

— shoreline

Changes in Habitat Suitability

Change6a3ft

GAINED

same

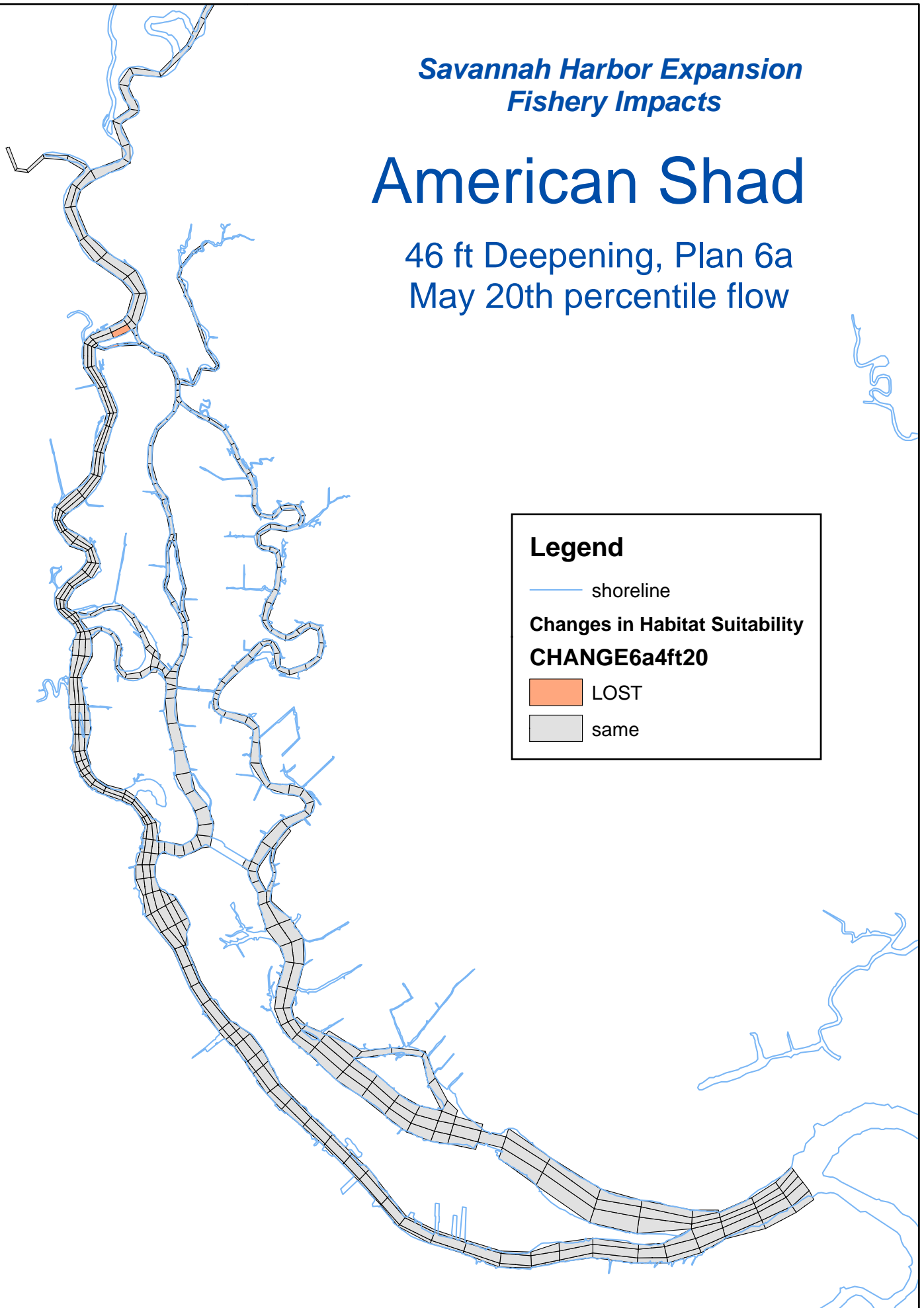
46 ft Channel Depth

Mitigation Plan 6a

*Savannah Harbor Expansion
Fishery Impacts*

American Shad

46 ft Deepening, Plan 6a
May 20th percentile flow



Legend

— shoreline

Changes in Habitat Suitability
CHANGE6a4ft20

LOST

same

*Savannah Harbor Expansion
Fishery Impacts*

American Shad

46 ft Deepening, Plan 6a
May 50th percentile flow

Legend

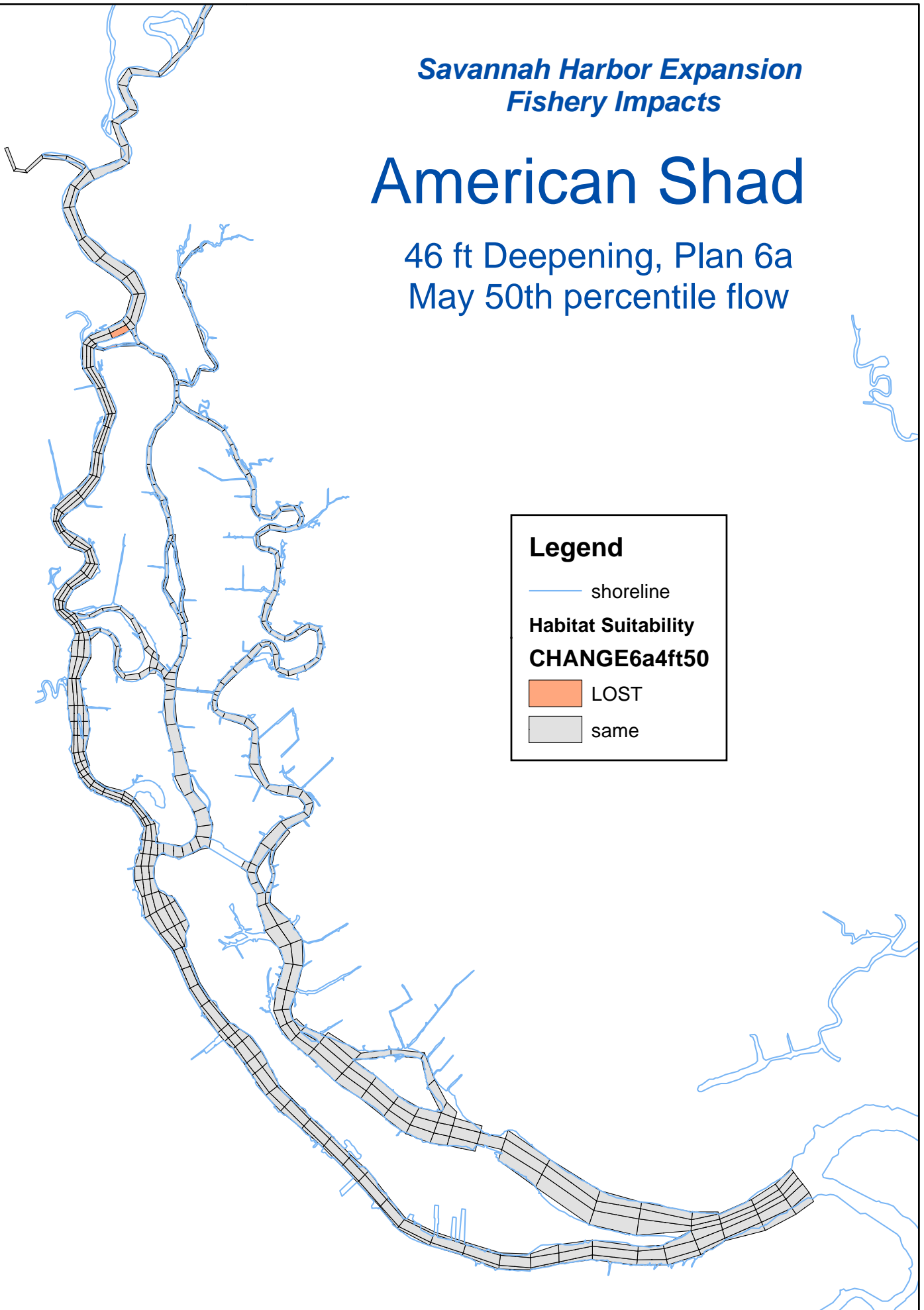
— shoreline

Habitat Suitability

CHANGE6a4ft50

LOST

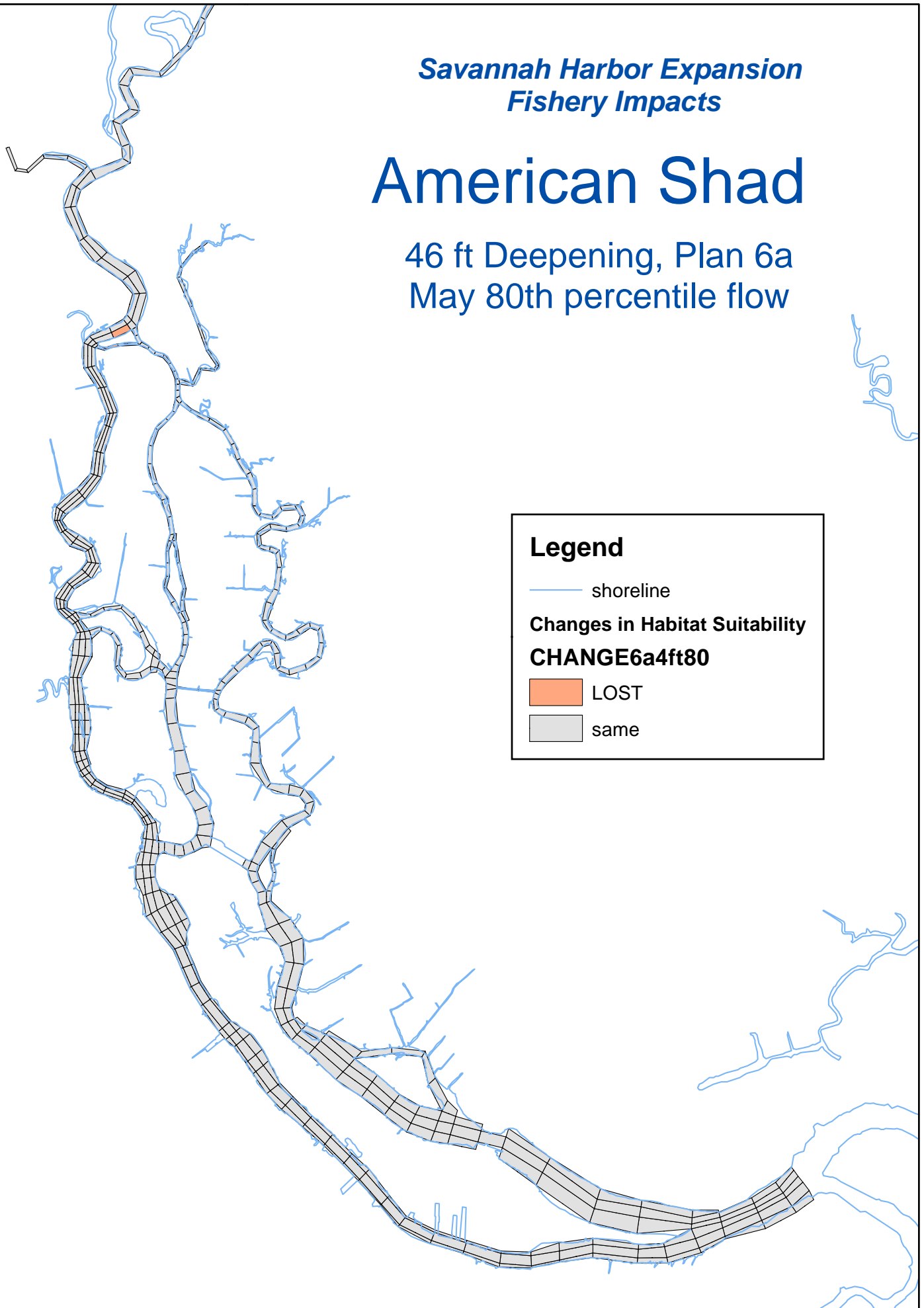
same



*Savannah Harbor Expansion
Fishery Impacts*

American Shad

46 ft Deepening, Plan 6a
May 80th percentile flow



Legend

— shoreline

Changes in Habitat Suitability
CHANGE6a4ft80

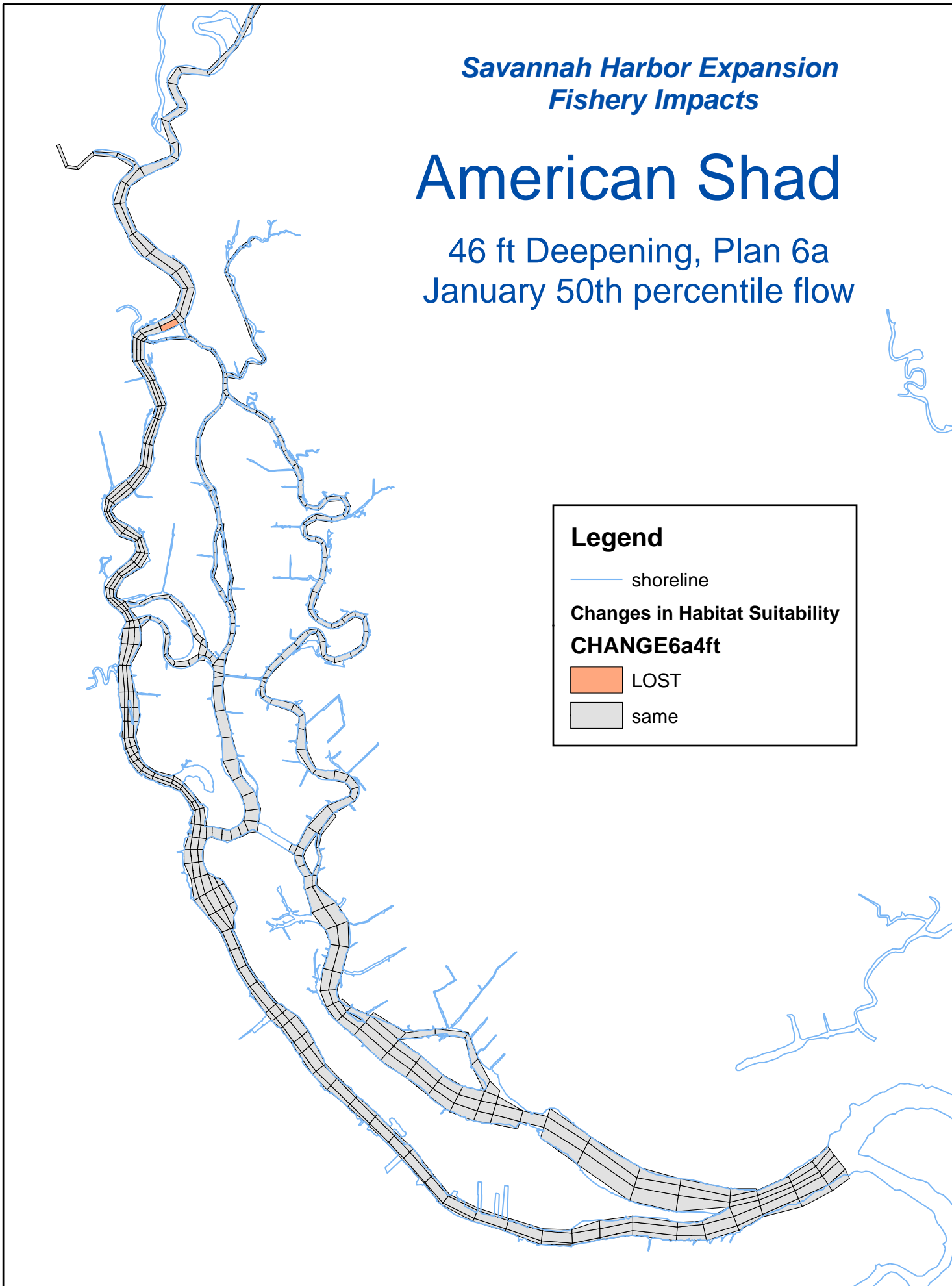
LOST

same

*Savannah Harbor Expansion
Fishery Impacts*

American Shad

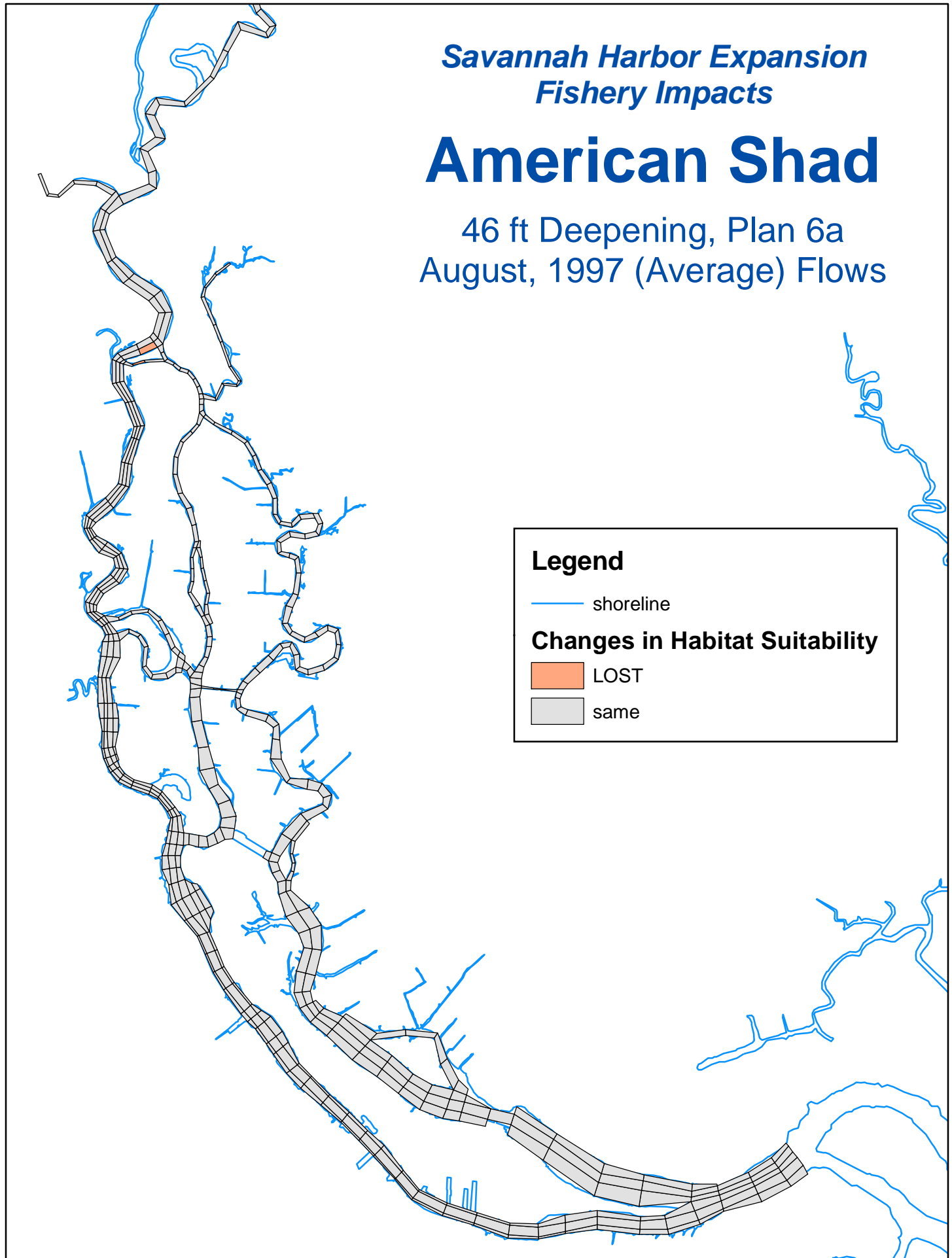
46 ft Deepening, Plan 6a
January 50th percentile flow



*Savannah Harbor Expansion
Fishery Impacts*

American Shad

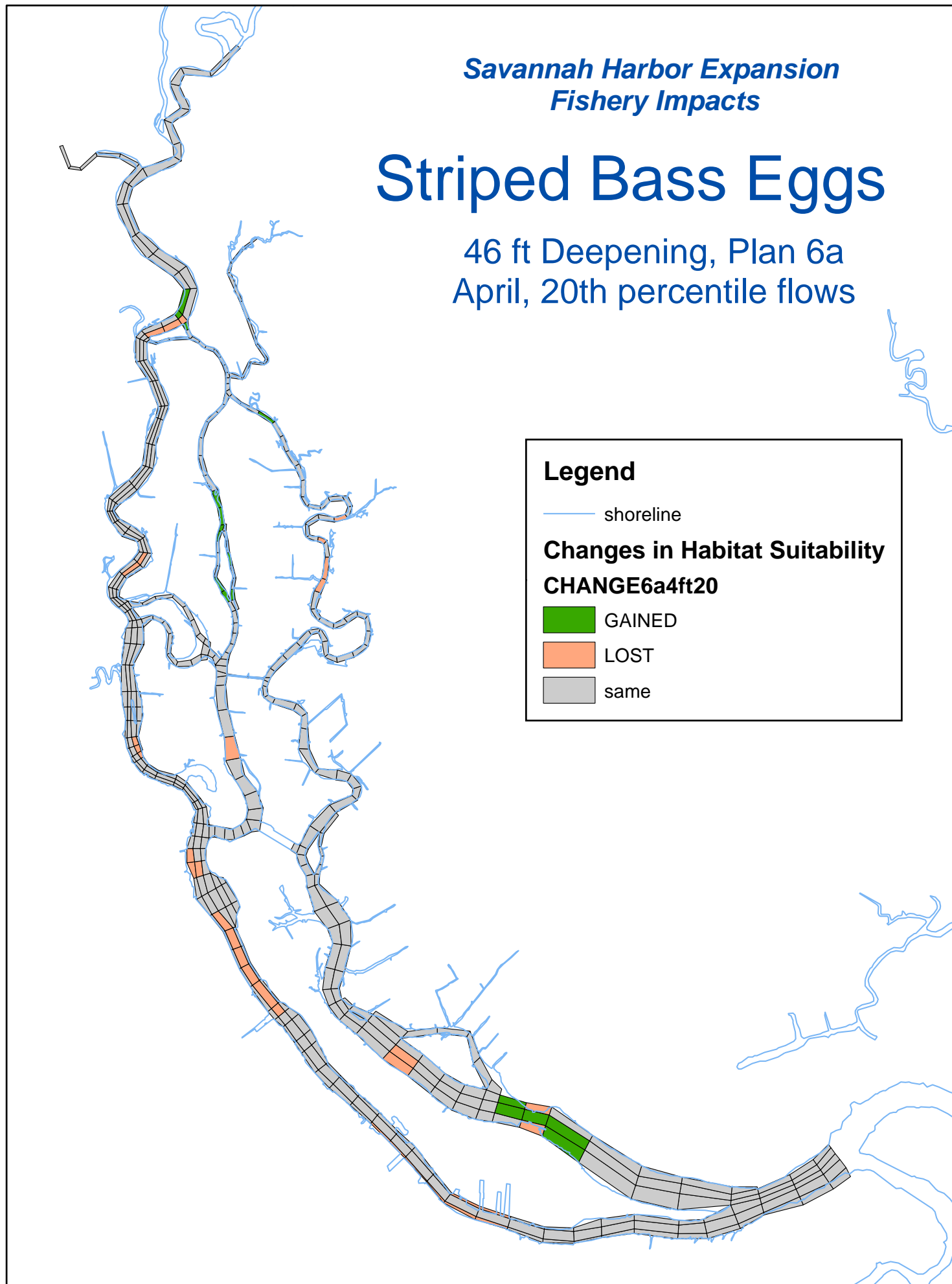
46 ft Deepening, Plan 6a
August, 1997 (Average) Flows



*Savannah Harbor Expansion
Fishery Impacts*

Striped Bass Eggs

46 ft Deepening, Plan 6a
April, 20th percentile flows



Legend

— shoreline

Changes in Habitat Suitability

CHANGE6a4ft20

GAINED

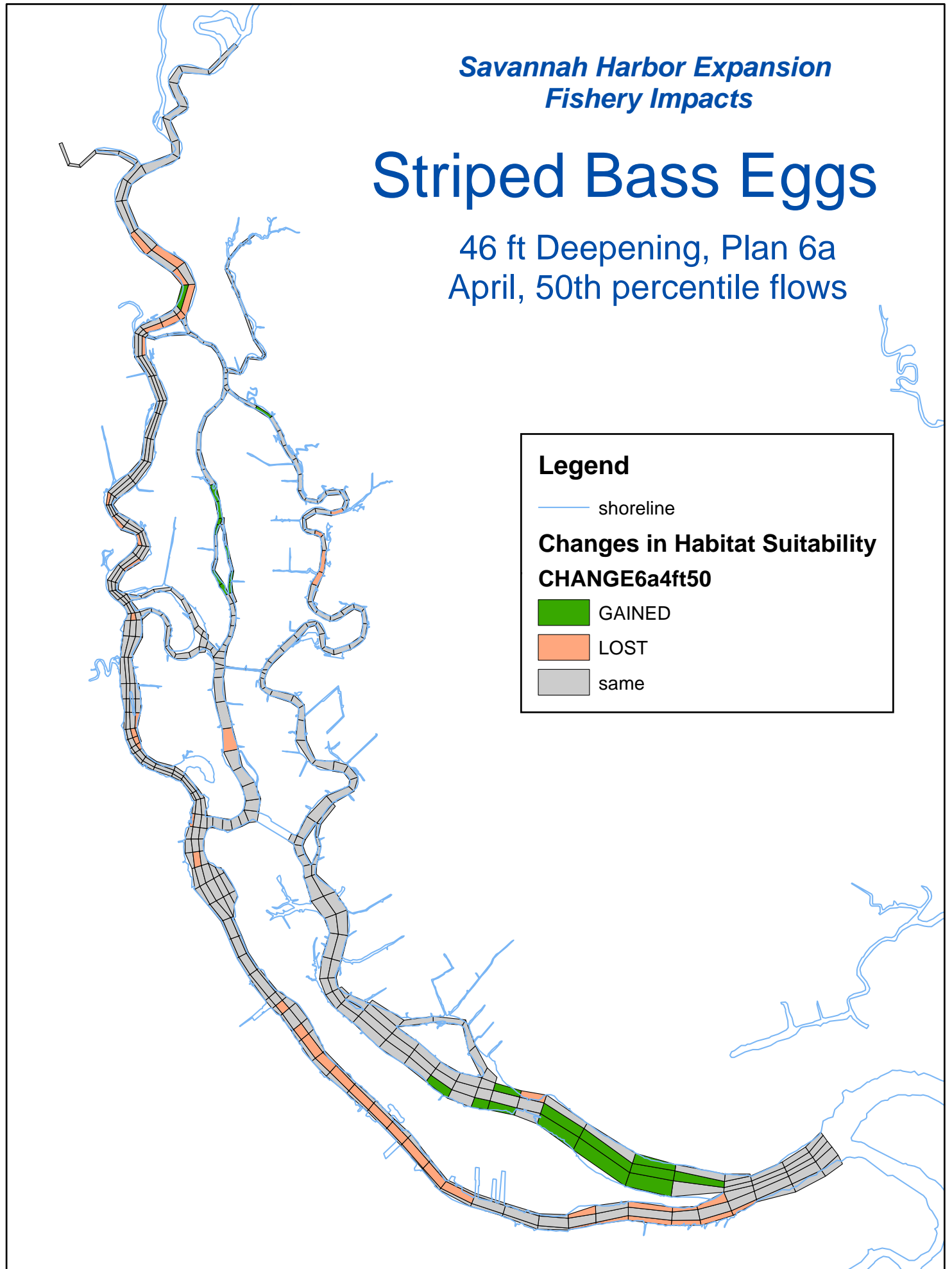
LOST

same

*Savannah Harbor Expansion
Fishery Impacts*

Striped Bass Eggs

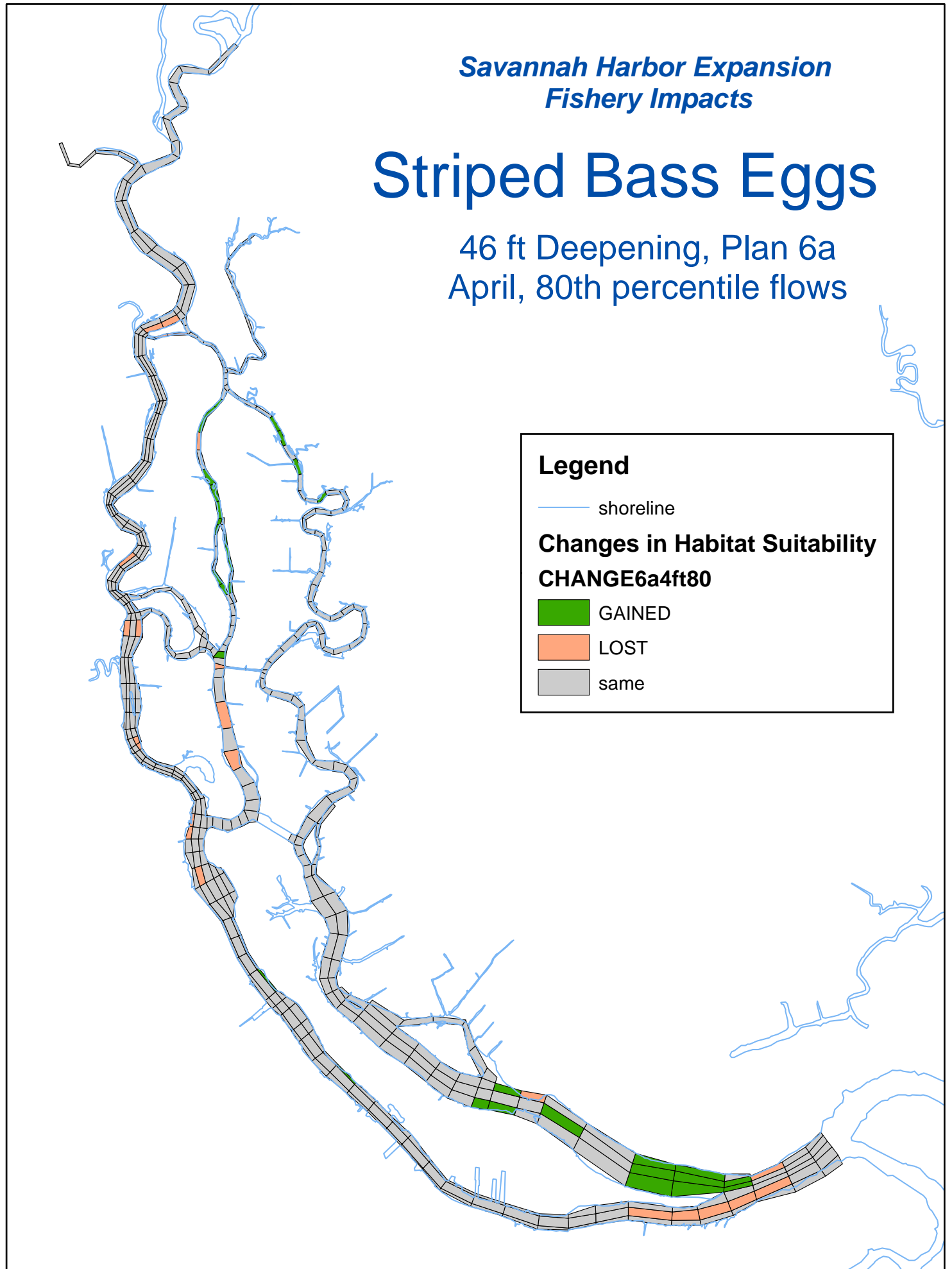
46 ft Deepening, Plan 6a
April, 50th percentile flows



*Savannah Harbor Expansion
Fishery Impacts*

Striped Bass Eggs

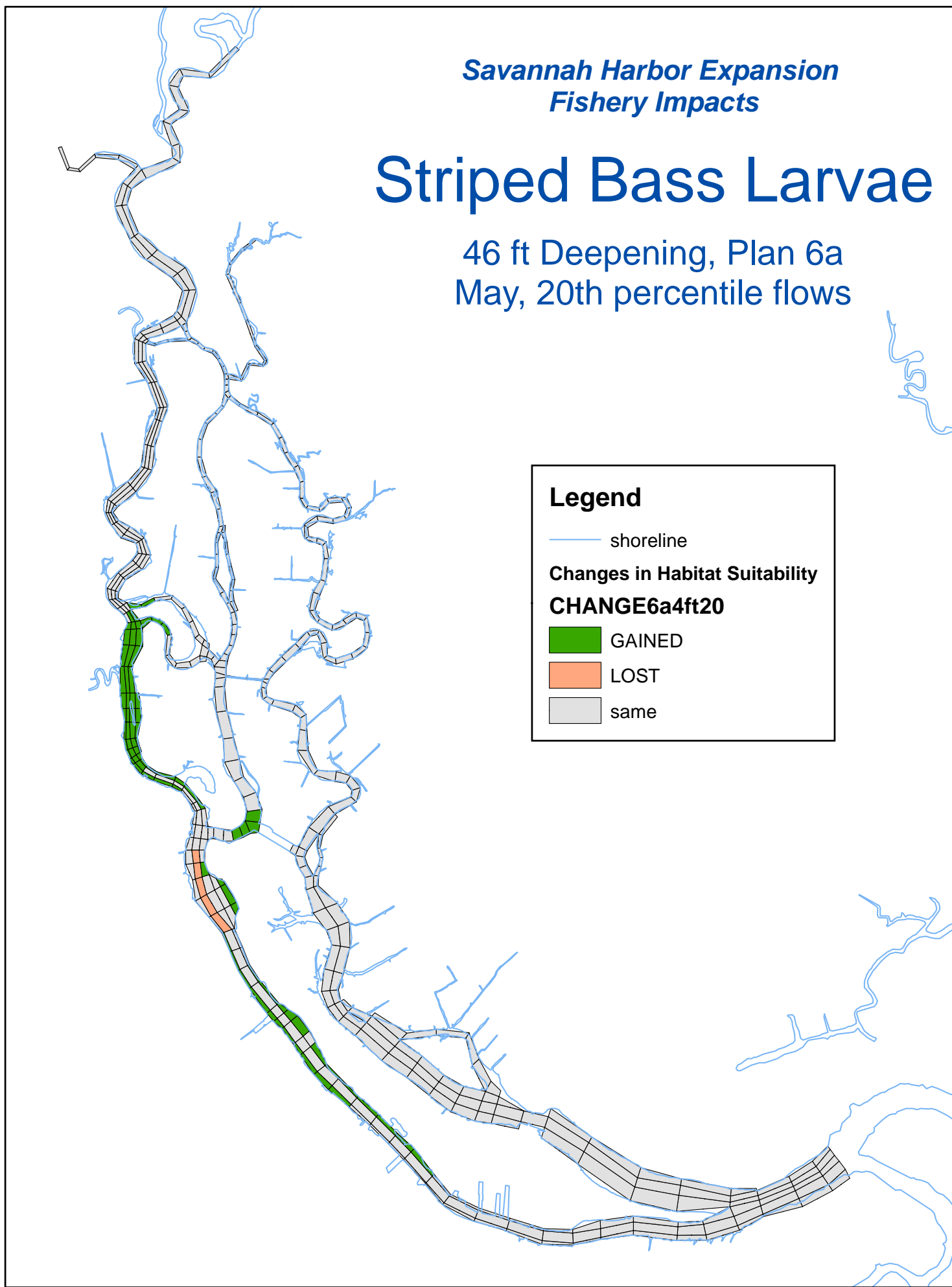
46 ft Deepening, Plan 6a
April, 80th percentile flows



*Savannah Harbor Expansion
Fishery Impacts*

Striped Bass Larvae

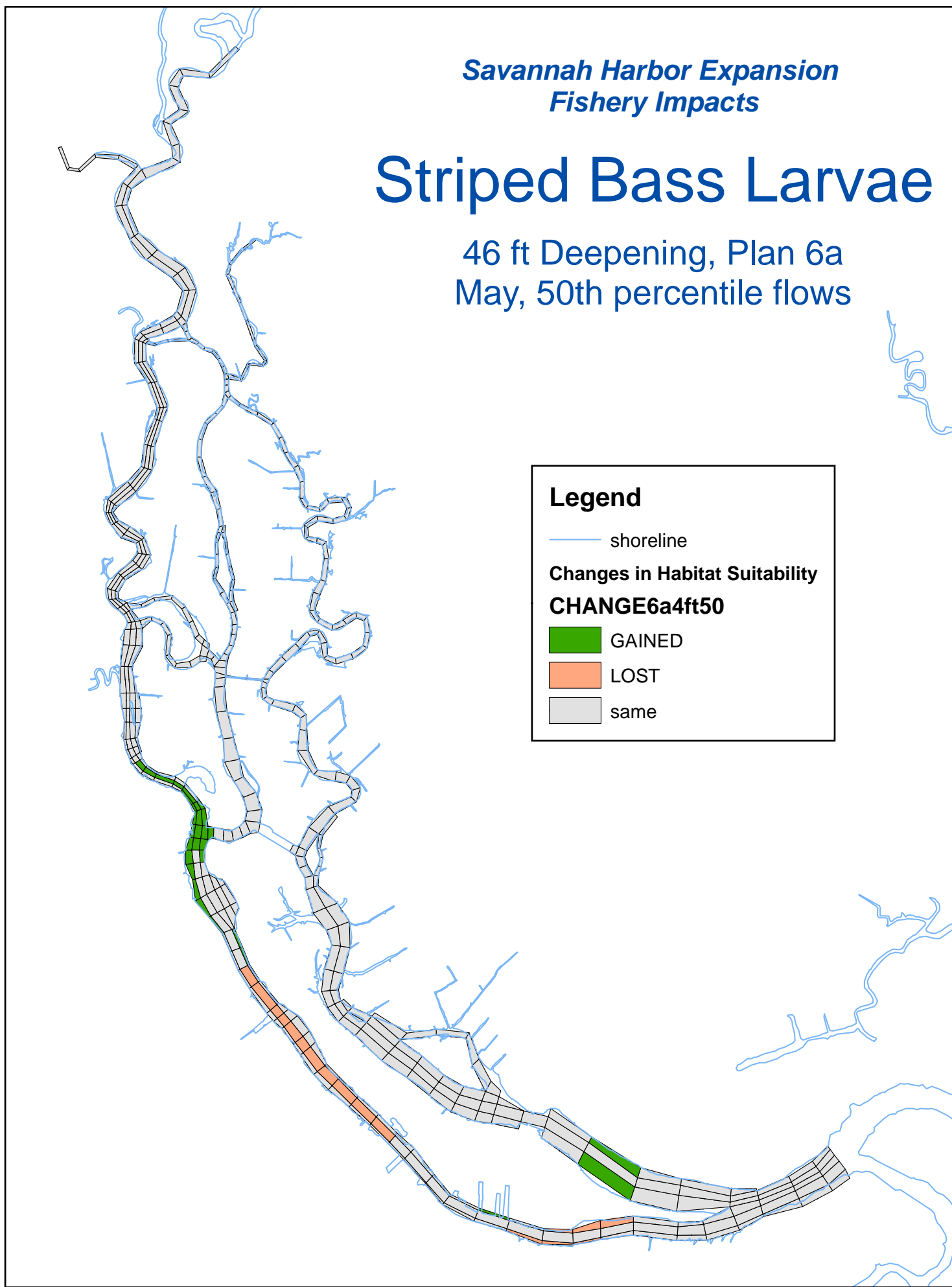
46 ft Deepening, Plan 6a
May, 20th percentile flows



*Savannah Harbor Expansion
Fishery Impacts*

Striped Bass Larvae

46 ft Deepening, Plan 6a
May, 50th percentile flows



Legend


— shoreline

Changes in Habitat Suitability

CHANGE6a4ft50

 GAINED

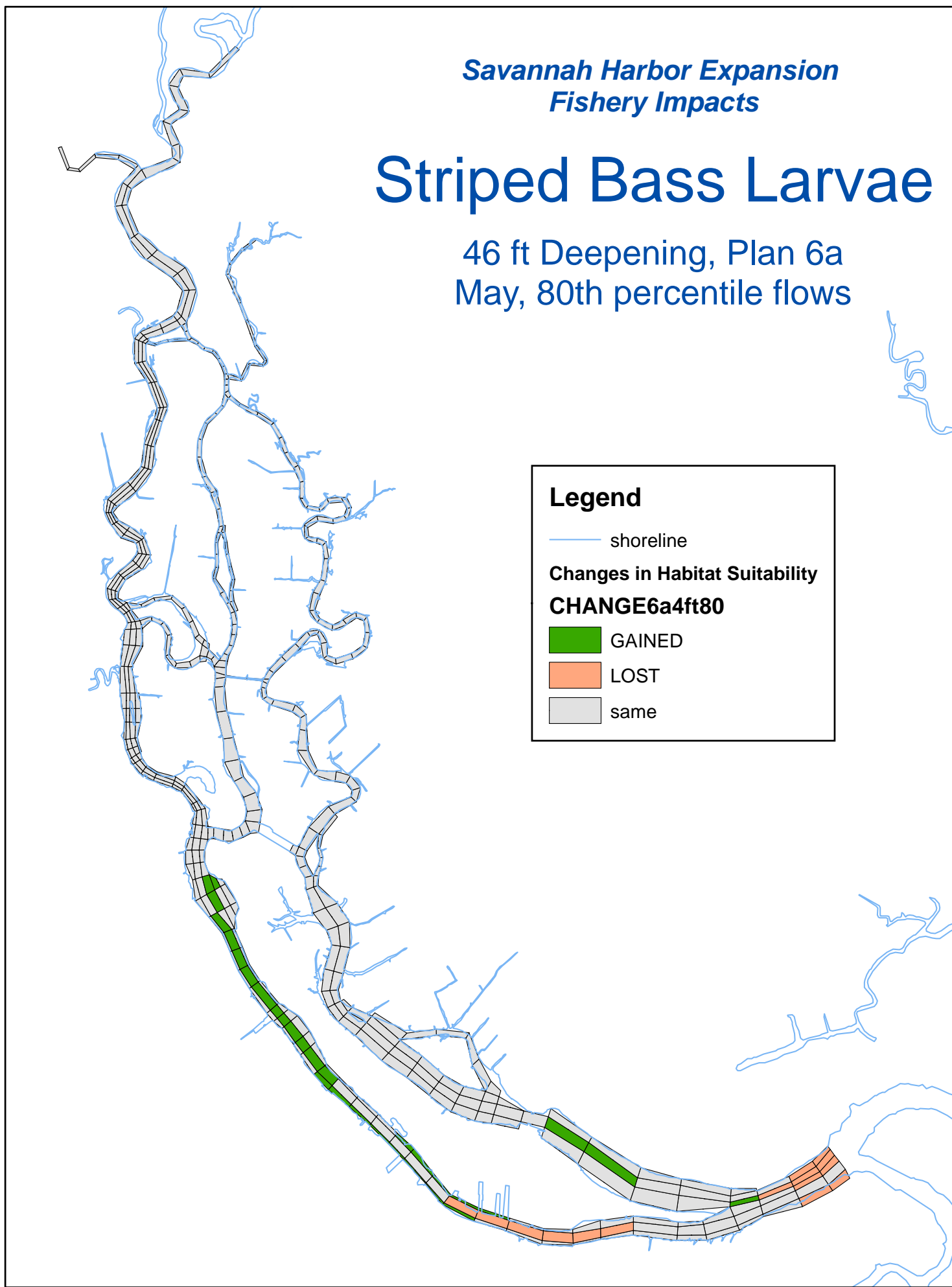
 LOST

 same

*Savannah Harbor Expansion
Fishery Impacts*

Striped Bass Larvae

46 ft Deepening, Plan 6a
May, 80th percentile flows



*Savannah Harbor Expansion
Fishery Impacts*




Striped Bass Spawning

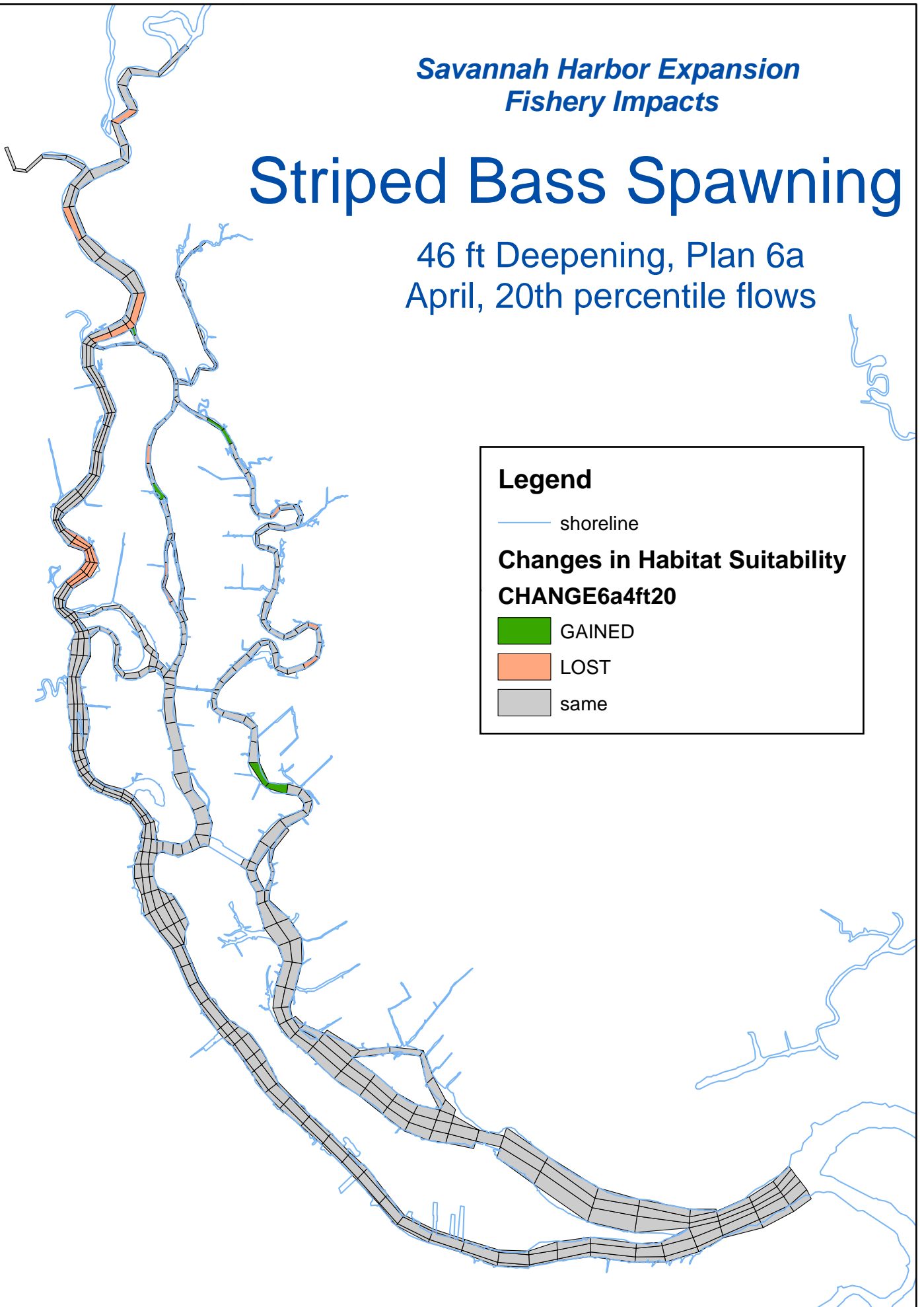
46 ft Deepening, Plan 6a
April, 20th percentile flows

Legend

— shoreline

Changes in Habitat Suitability
CHANGE6a4ft20

	GAINED
	LOST
	same



*Savannah Harbor Expansion
Fishery Impacts*




Striped Bass Spawning

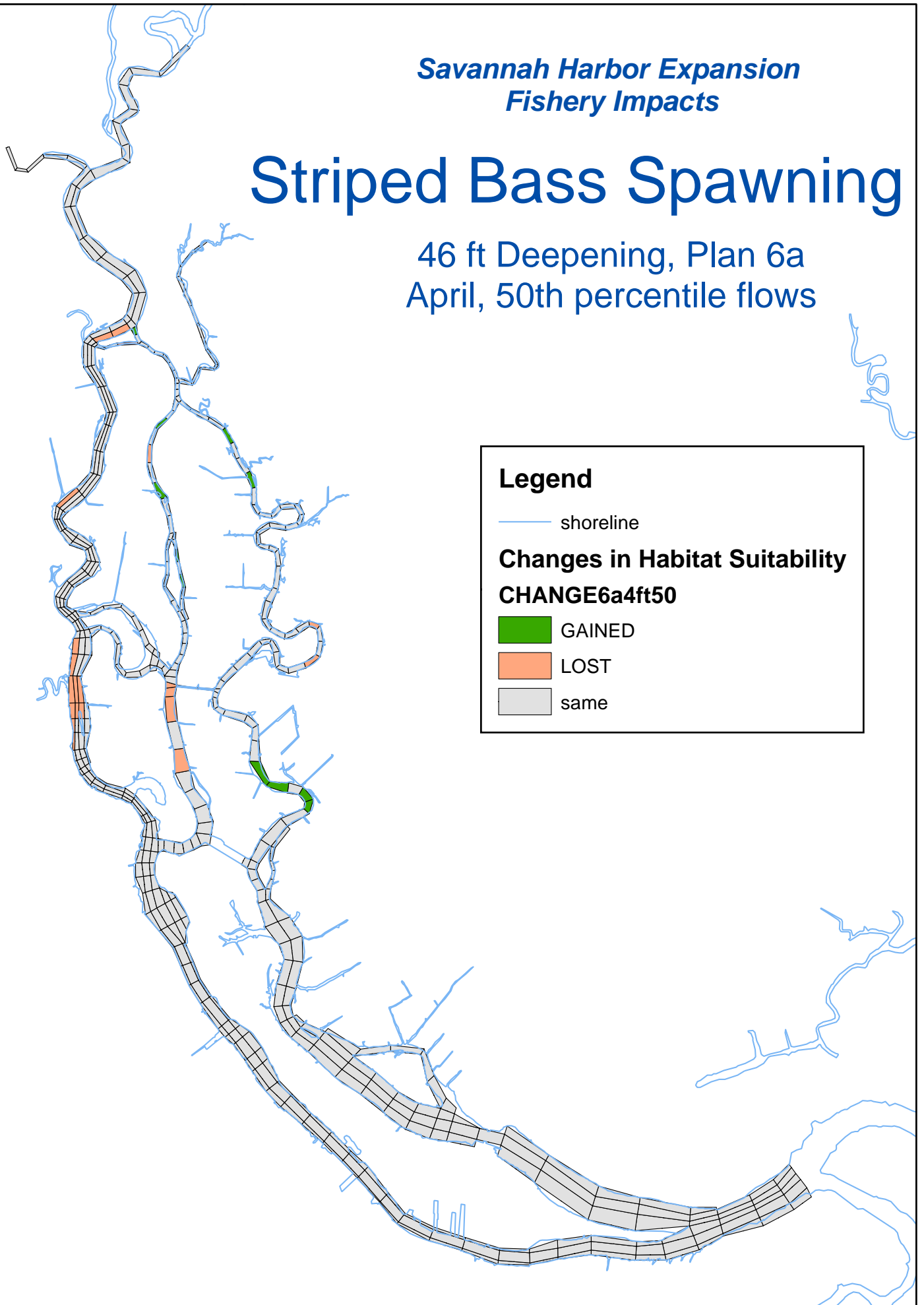
46 ft Deepening, Plan 6a
April, 50th percentile flows

Legend

— shoreline

Changes in Habitat Suitability
CHANGE6a4ft50

	GAINED
	LOST
	same



*Savannah Harbor Expansion
Fishery Impacts*

Striped Bass Spawning

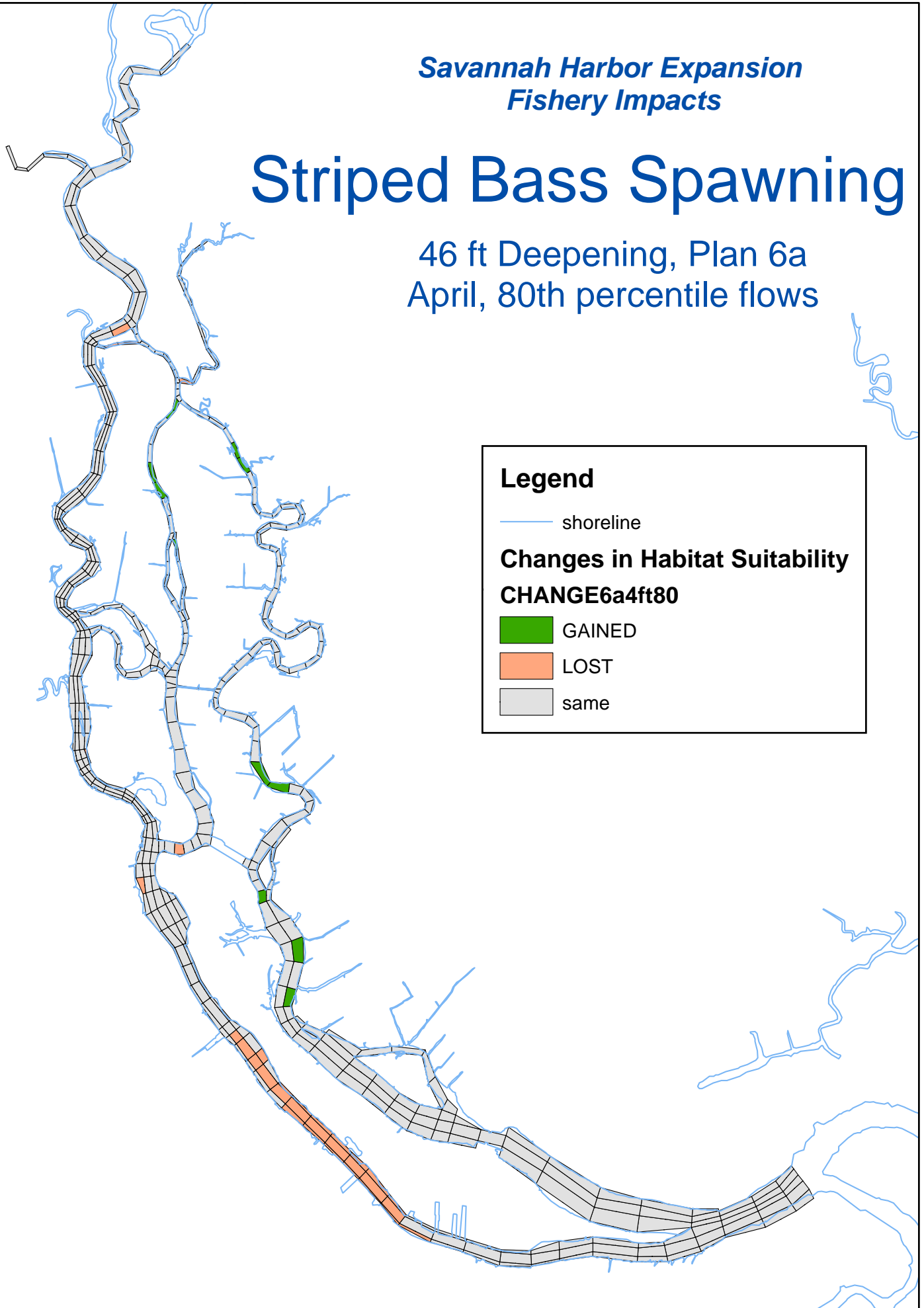
46 ft Deepening, Plan 6a
April, 80th percentile flows

Legend

— shoreline

Changes in Habitat Suitability
CHANGE6a4ft80

- GAINED
- LOST
- same



*Savannah Harbor Expansion
Fishery Impacts*

Sturgeon - Juveniles

46 ft Deepening, Plan 6a
January, 50th percentile flows

This habitat evaluation was updated in March 2011 using revised habitat suitability criteria. The updated criteria and evaluations are displayed in Attachment 1.

Legend

shoreline

Changes in Habitat Suitability

CHANGE6a4ft

GAINED

LOST

same

*Savannah Harbor Expansion
Fishery Impacts*

Sturgeon - Adults

46 ft Deepening, Plan 6a
January, 50th percentile flows

This habitat evaluation was updated in March 2011 using revised habitat suitability criteria. The updated criteria and evaluations are displayed in Attachment 1.

Legend

shoreline

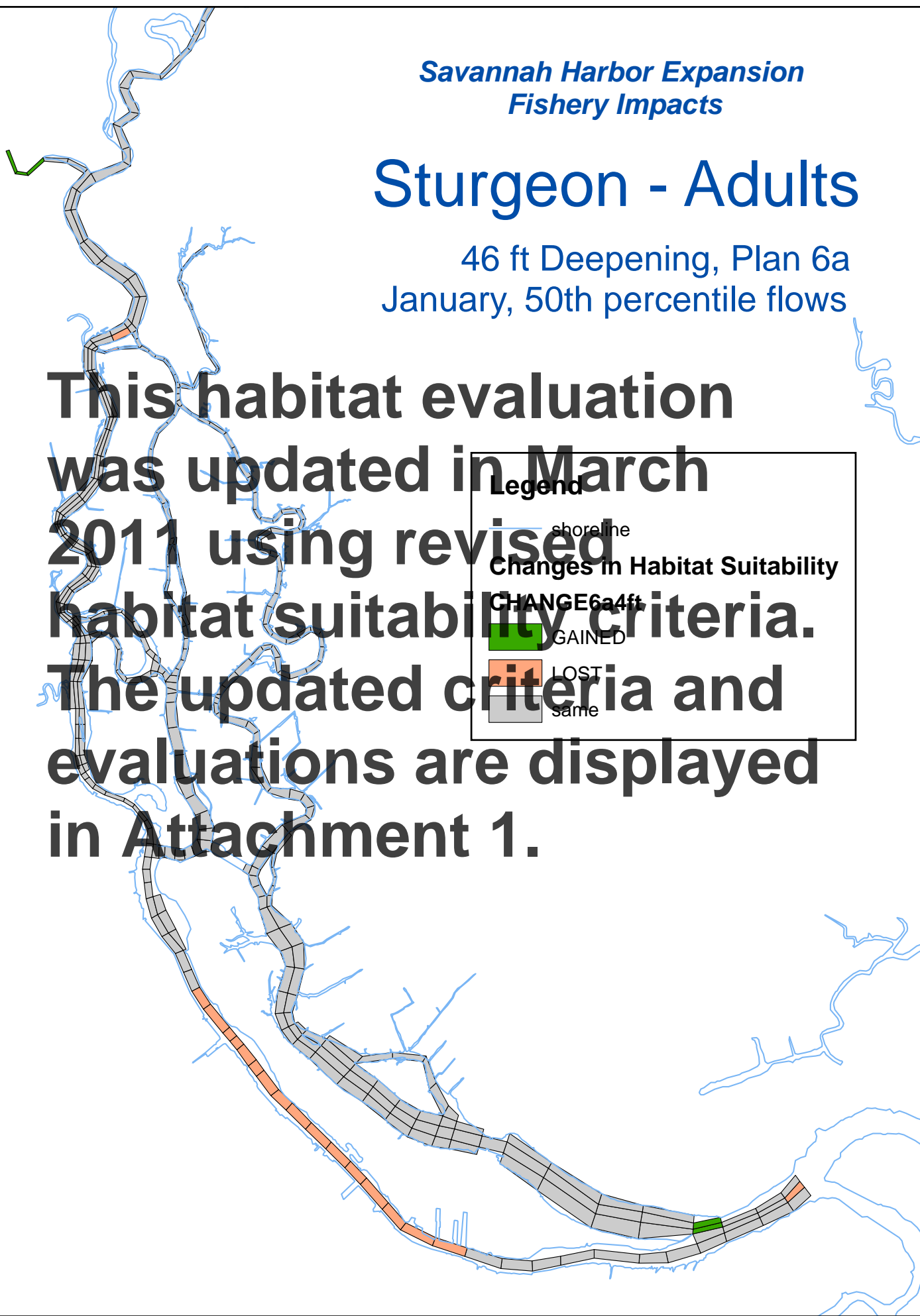
Changes in Habitat Suitability

CHANGE6a4ft

GAINED

LOST

same



*Savannah Harbor Expansion
Fishery Impacts*

Sturgeon - Adults

46 ft Deepening, Plan 6a
August, 1997 (Average) Flows

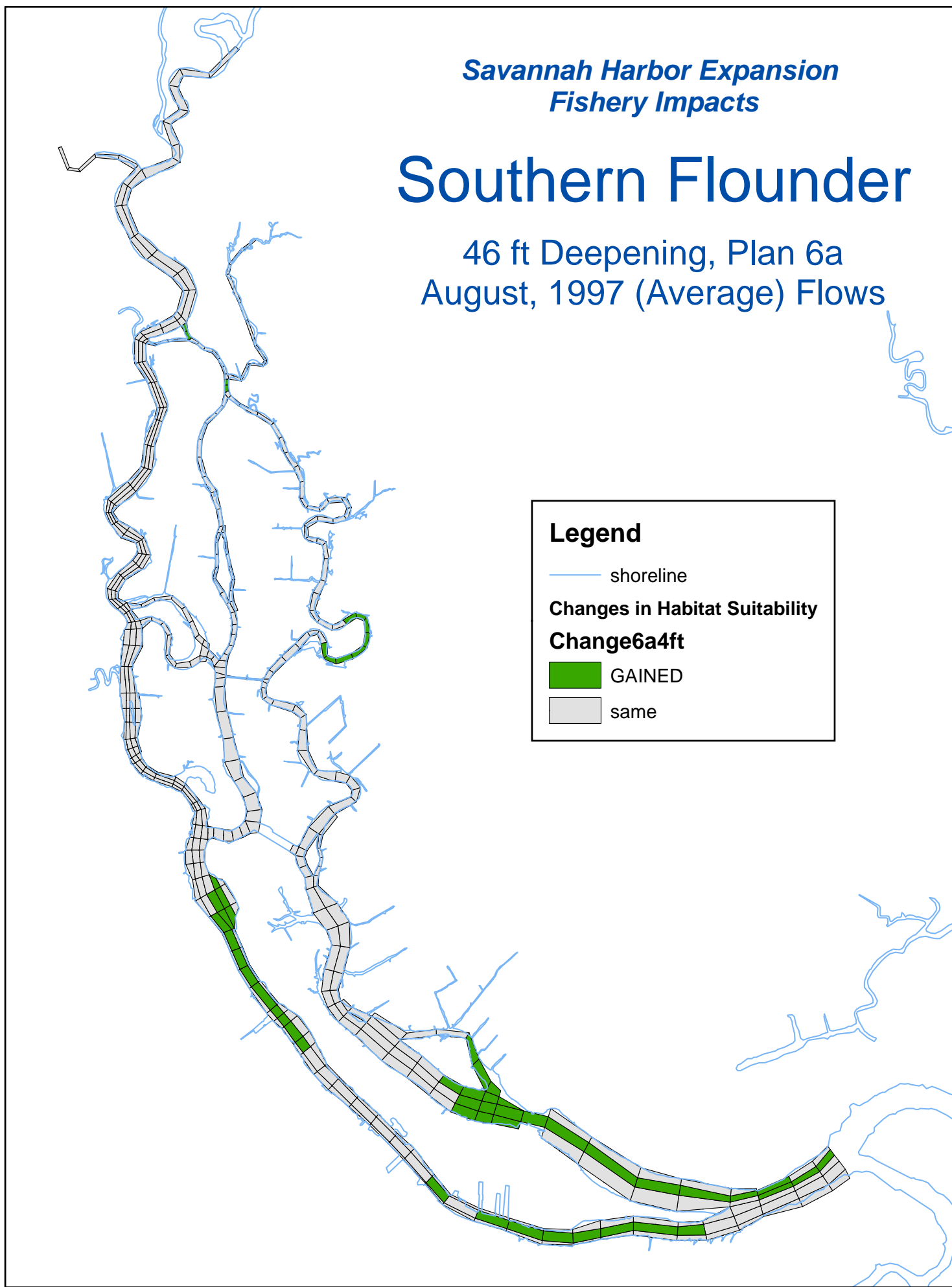
This habitat evaluation was updated in March 2011 using revised habitat suitability criteria. The updated criteria and evaluations are displayed in Attachment 1.



*Savannah Harbor Expansion
Fishery Impacts*

Southern Flounder

46 ft Deepening, Plan 6a
August, 1997 (Average) Flows




Legend

— shoreline

Changes in Habitat Suitability

Change6a4ft

 GAINED

 same

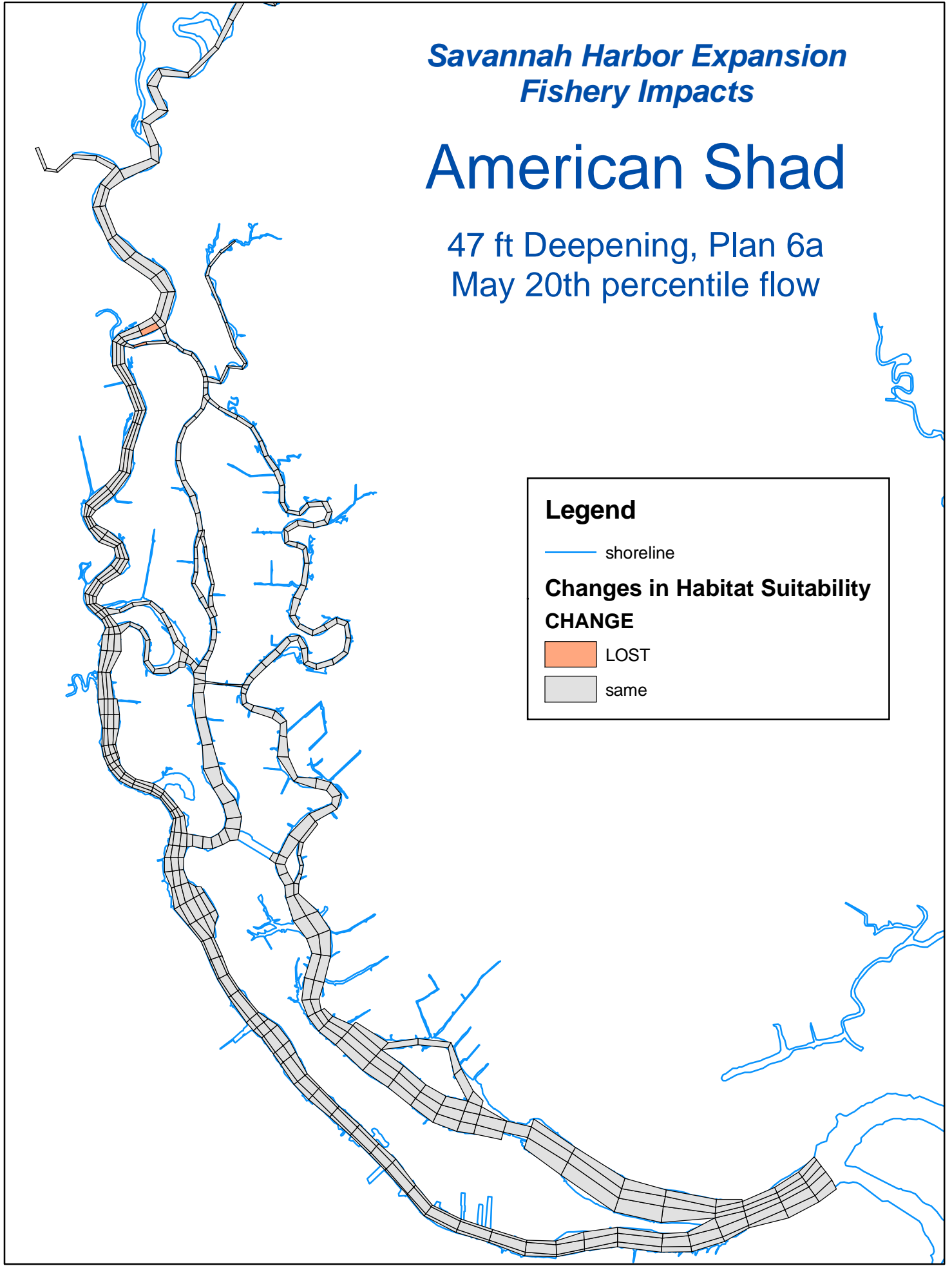
47 ft Channel Depth

Mitigation Plan 6a

*Savannah Harbor Expansion
Fishery Impacts*

American Shad

47 ft Deepening, Plan 6a
May 20th percentile flow



Legend

— shoreline

Changes in Habitat Suitability

CHANGE

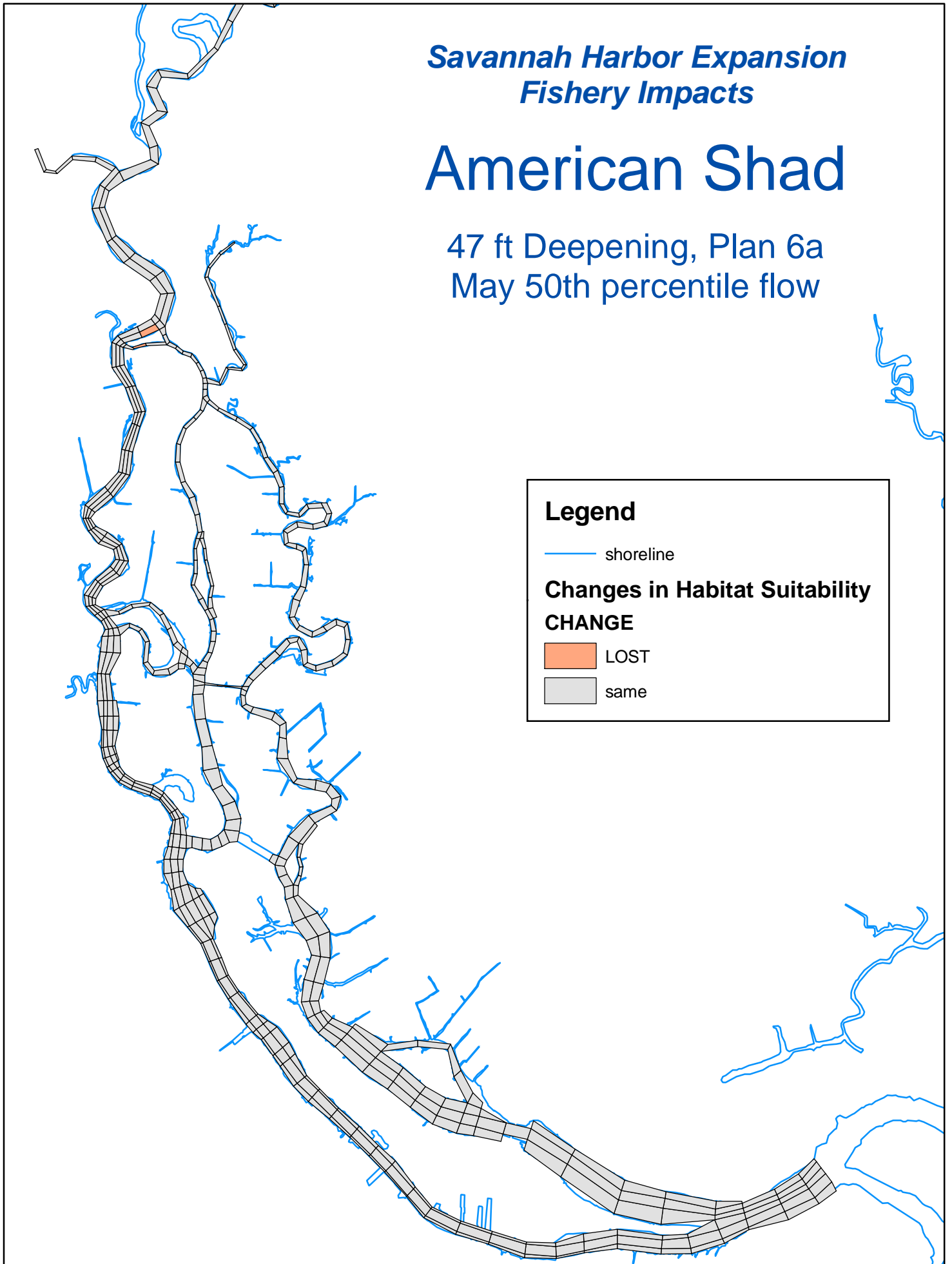
LOST

same

*Savannah Harbor Expansion
Fishery Impacts*

American Shad

47 ft Deepening, Plan 6a
May 50th percentile flow



*Savannah Harbor Expansion
Fishery Impacts*

American Shad

47 ft Deepening, Plan 6a
May 80th percentile flow

Legend

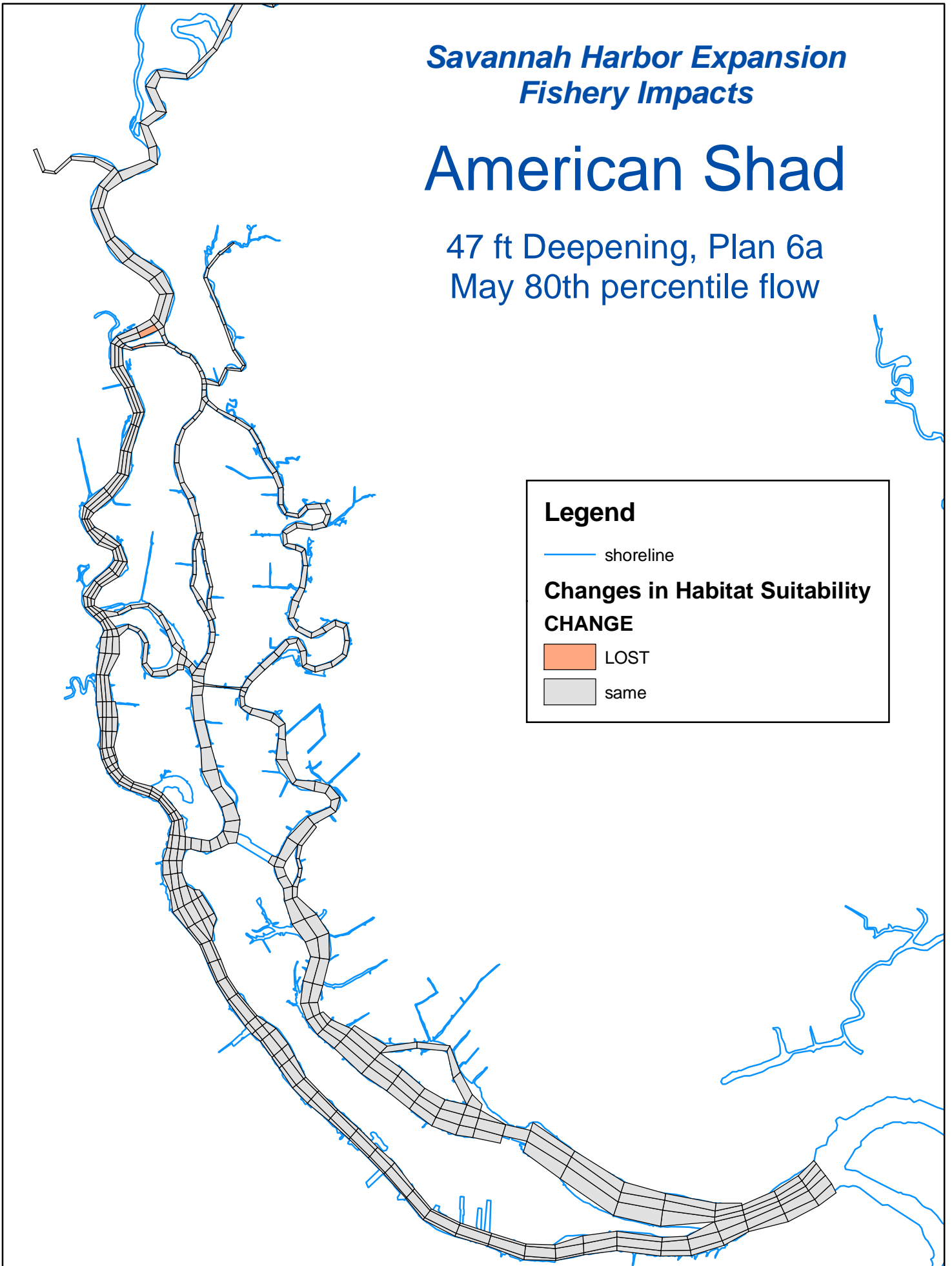
— shoreline

Changes in Habitat Suitability

CHANGE

LOST

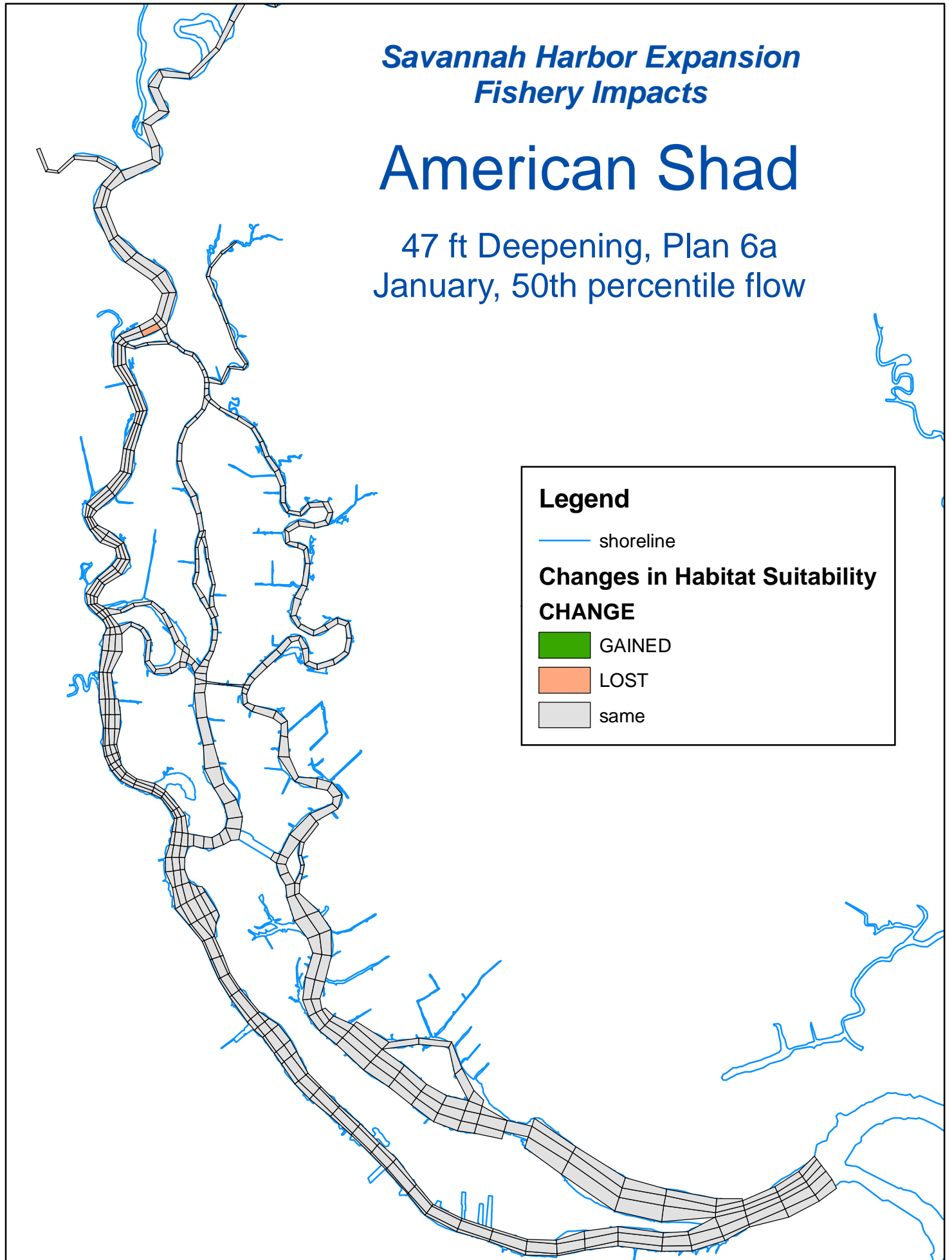
same



Savannah Harbor Expansion Fishery Impacts

American Shad

47 ft Deepening, Plan 6a
January, 50th percentile flow



Legend

— shoreline

Changes in Habitat Suitability

CHANGE

■ GAINED

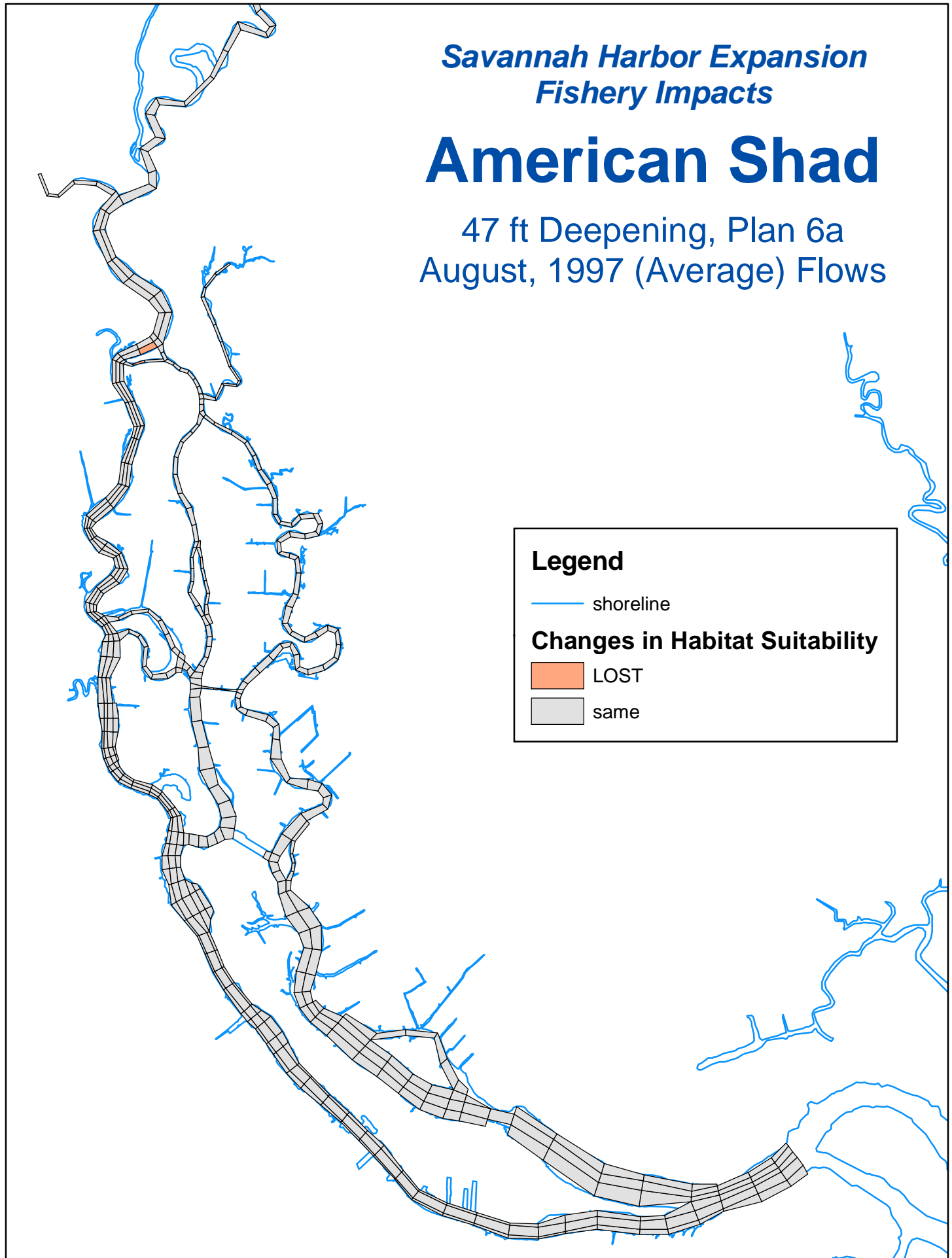
■ LOST

■ same

*Savannah Harbor Expansion
Fishery Impacts*

American Shad

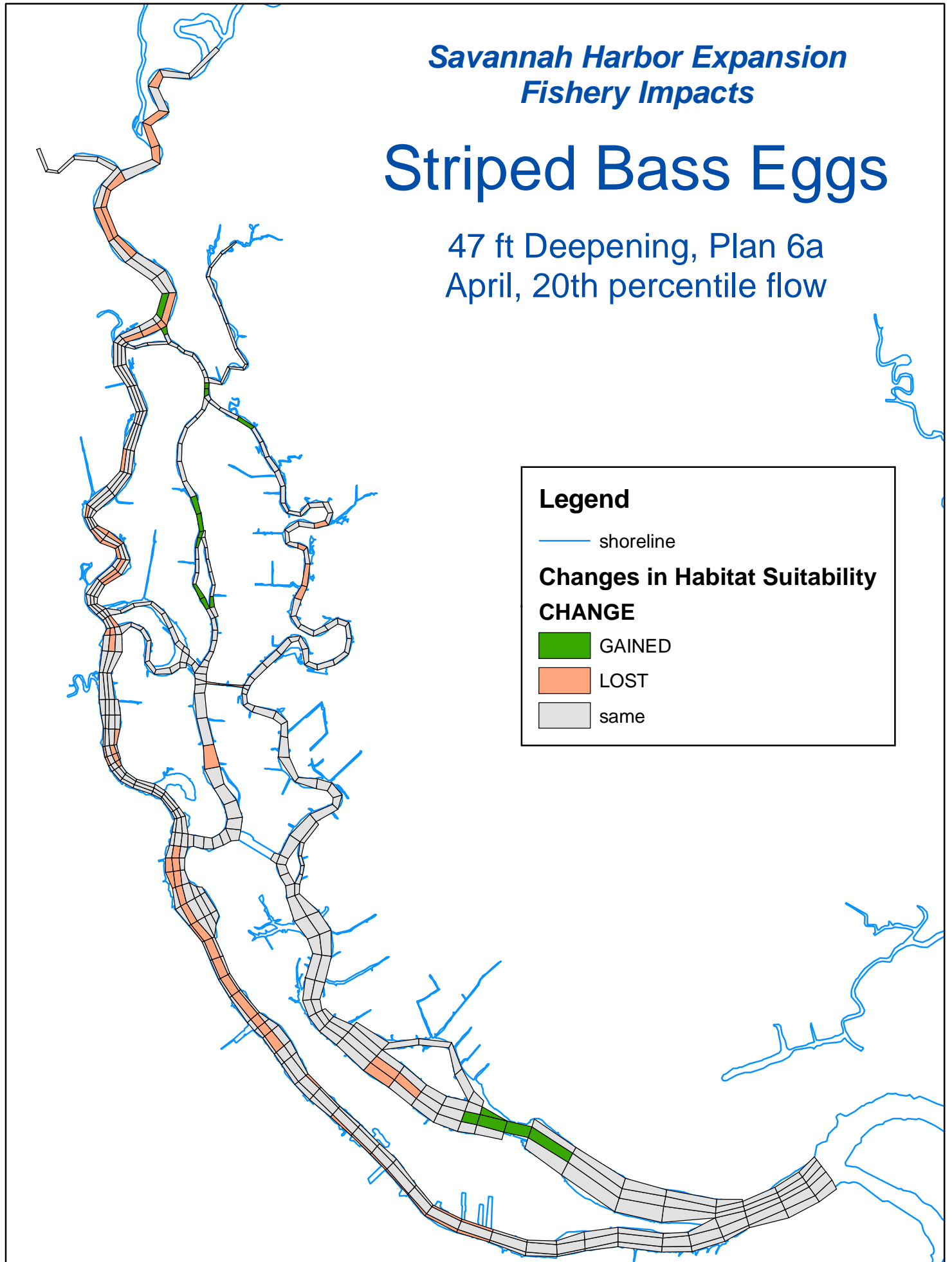
47 ft Deepening, Plan 6a
August, 1997 (Average) Flows



*Savannah Harbor Expansion
Fishery Impacts*

Striped Bass Eggs

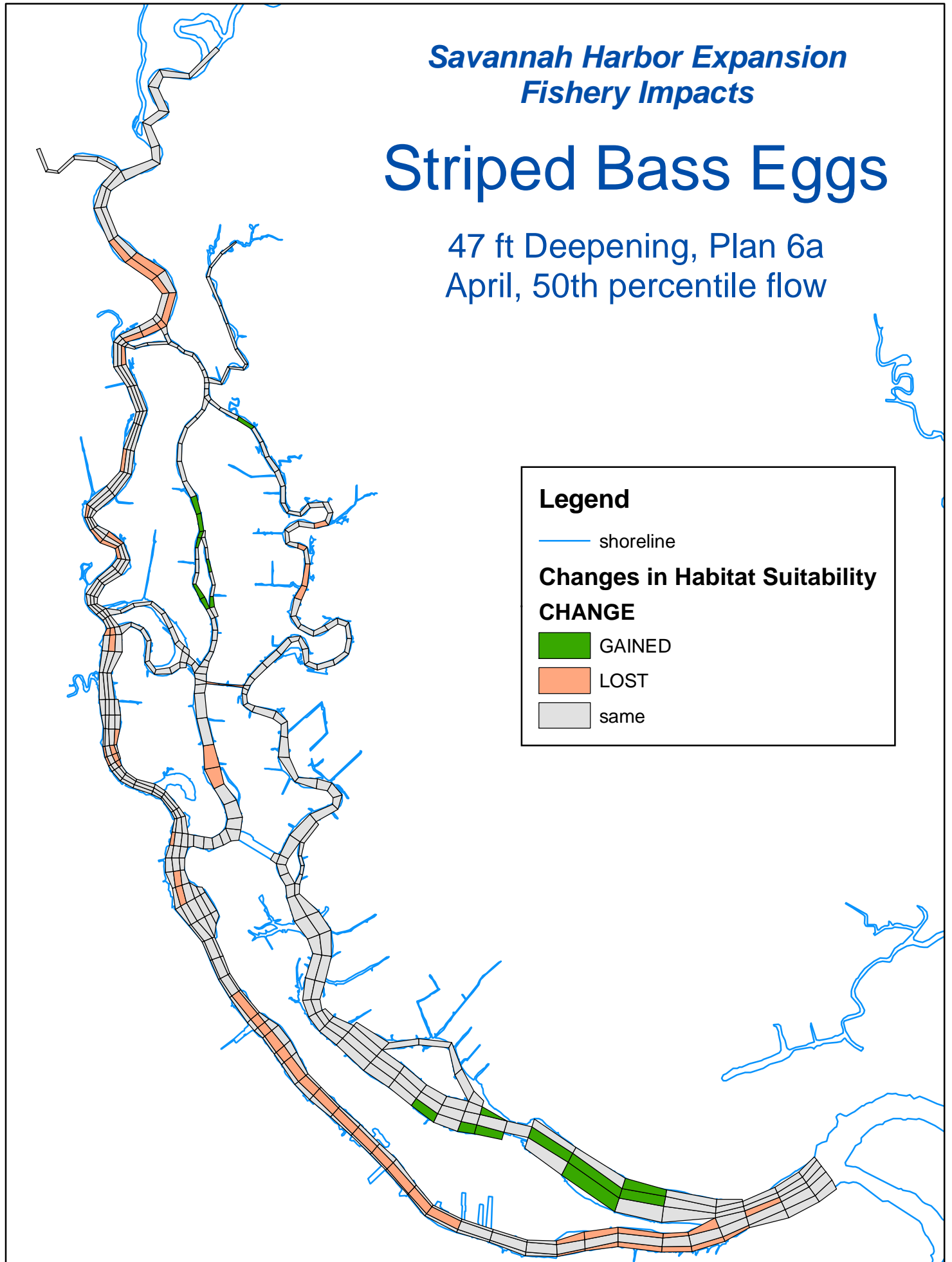
47 ft Deepening, Plan 6a
April, 20th percentile flow



*Savannah Harbor Expansion
Fishery Impacts*

Striped Bass Eggs

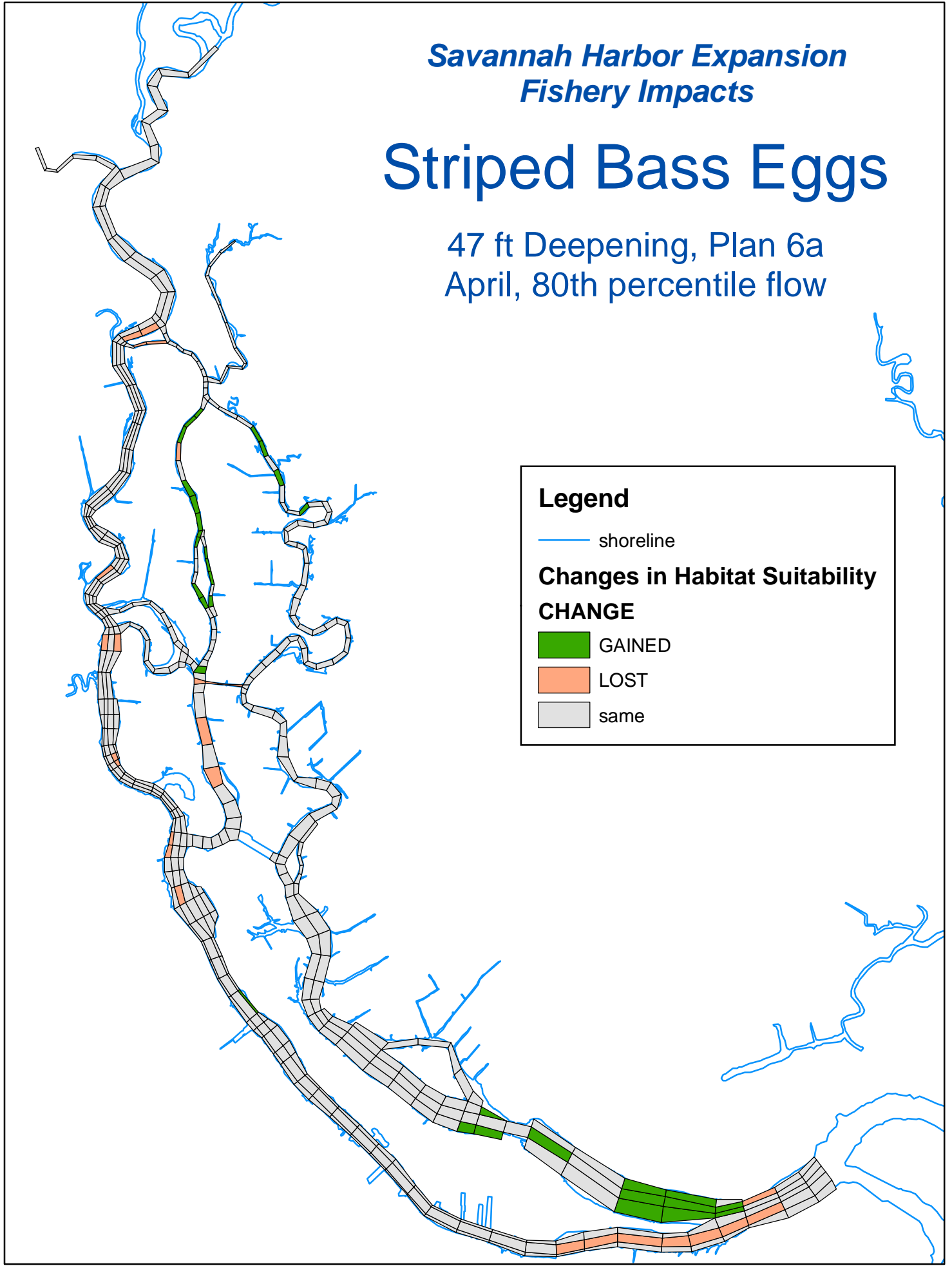
47 ft Deepening, Plan 6a
April, 50th percentile flow



*Savannah Harbor Expansion
Fishery Impacts*

Striped Bass Eggs

47 ft Deepening, Plan 6a
April, 80th percentile flow



Legend

— shoreline

Changes in Habitat Suitability

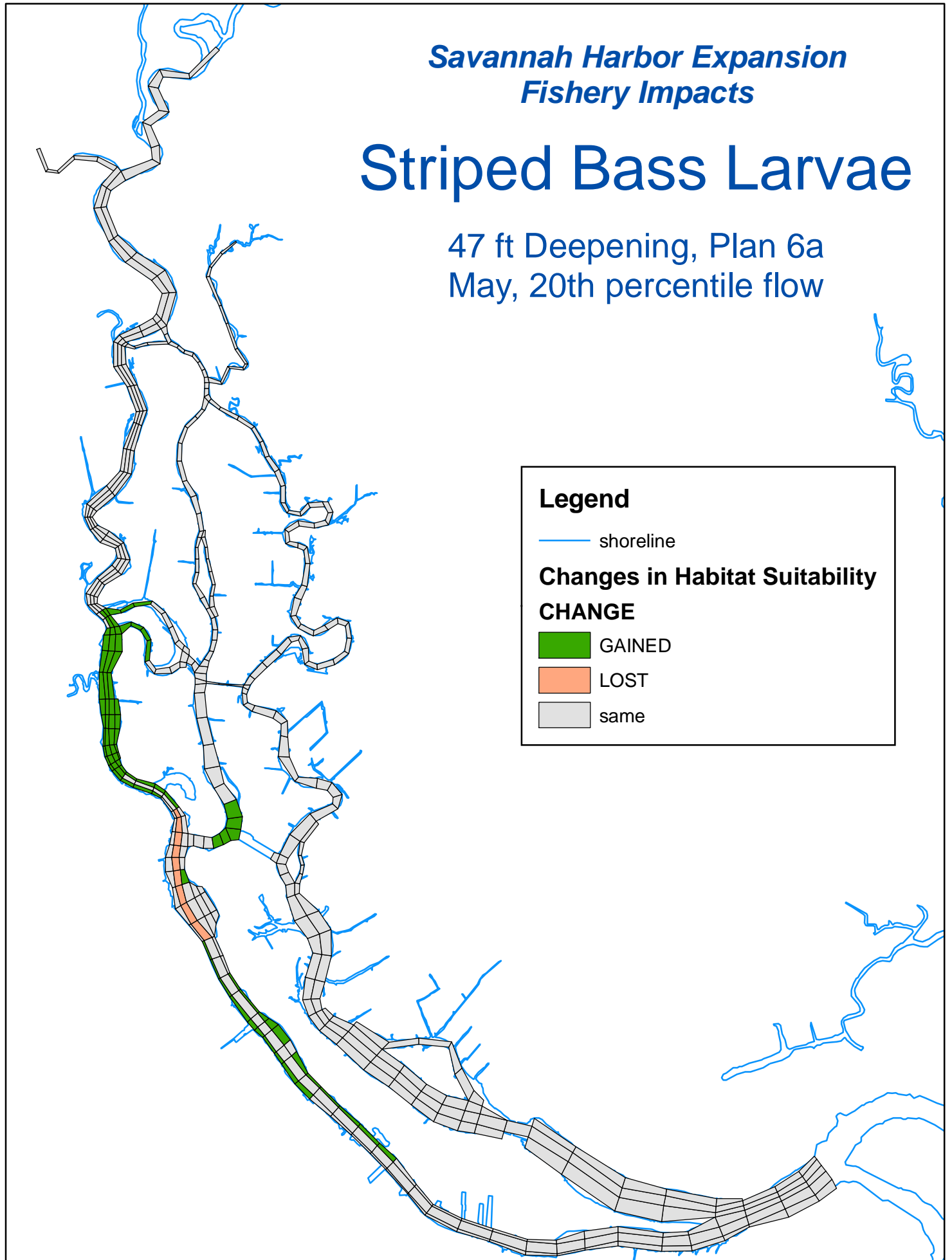
CHANGE

- GAINED
- LOST
- same

*Savannah Harbor Expansion
Fishery Impacts*

Striped Bass Larvae

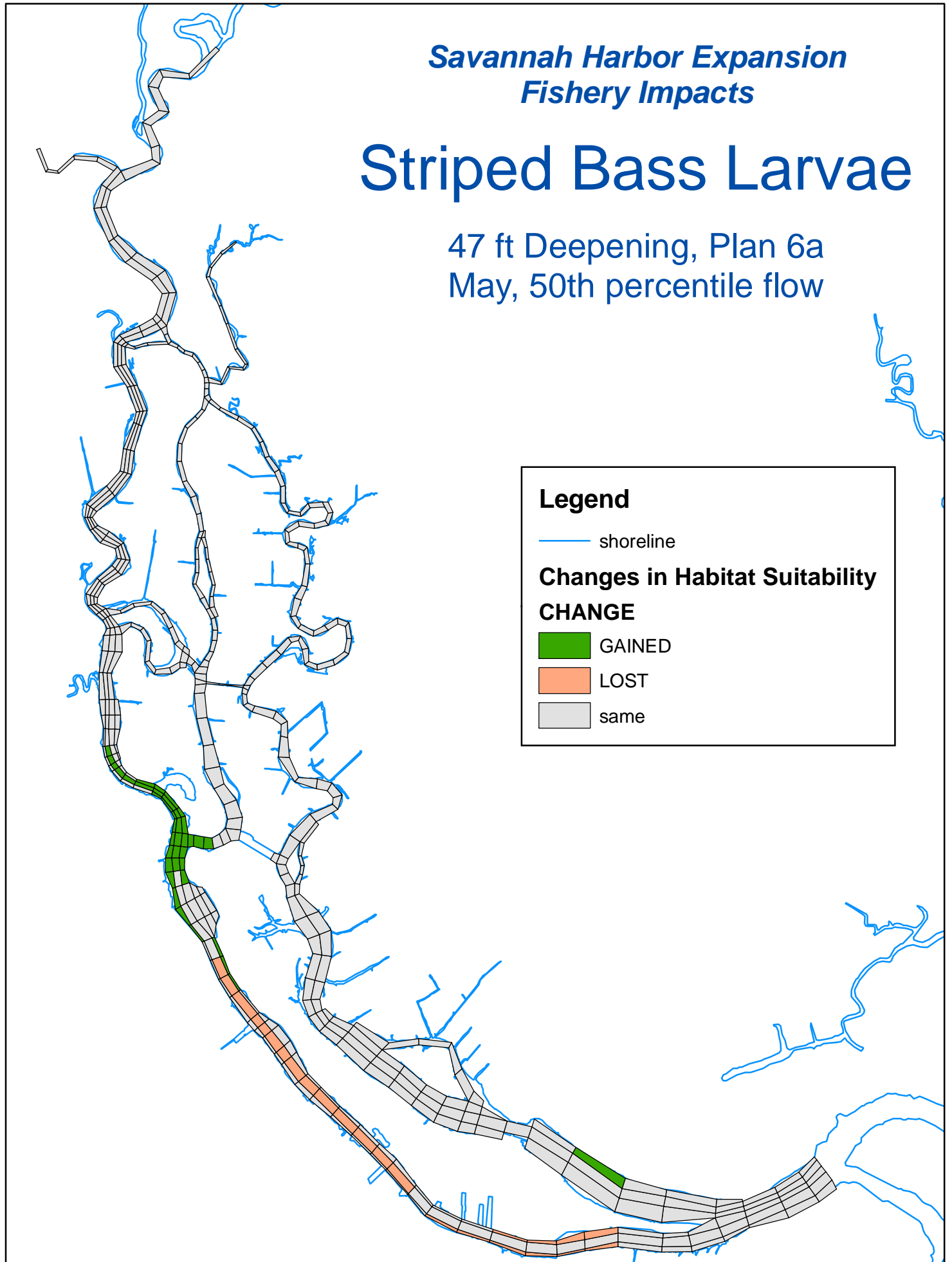
47 ft Deepening, Plan 6a
May, 20th percentile flow



*Savannah Harbor Expansion
Fishery Impacts*

Striped Bass Larvae

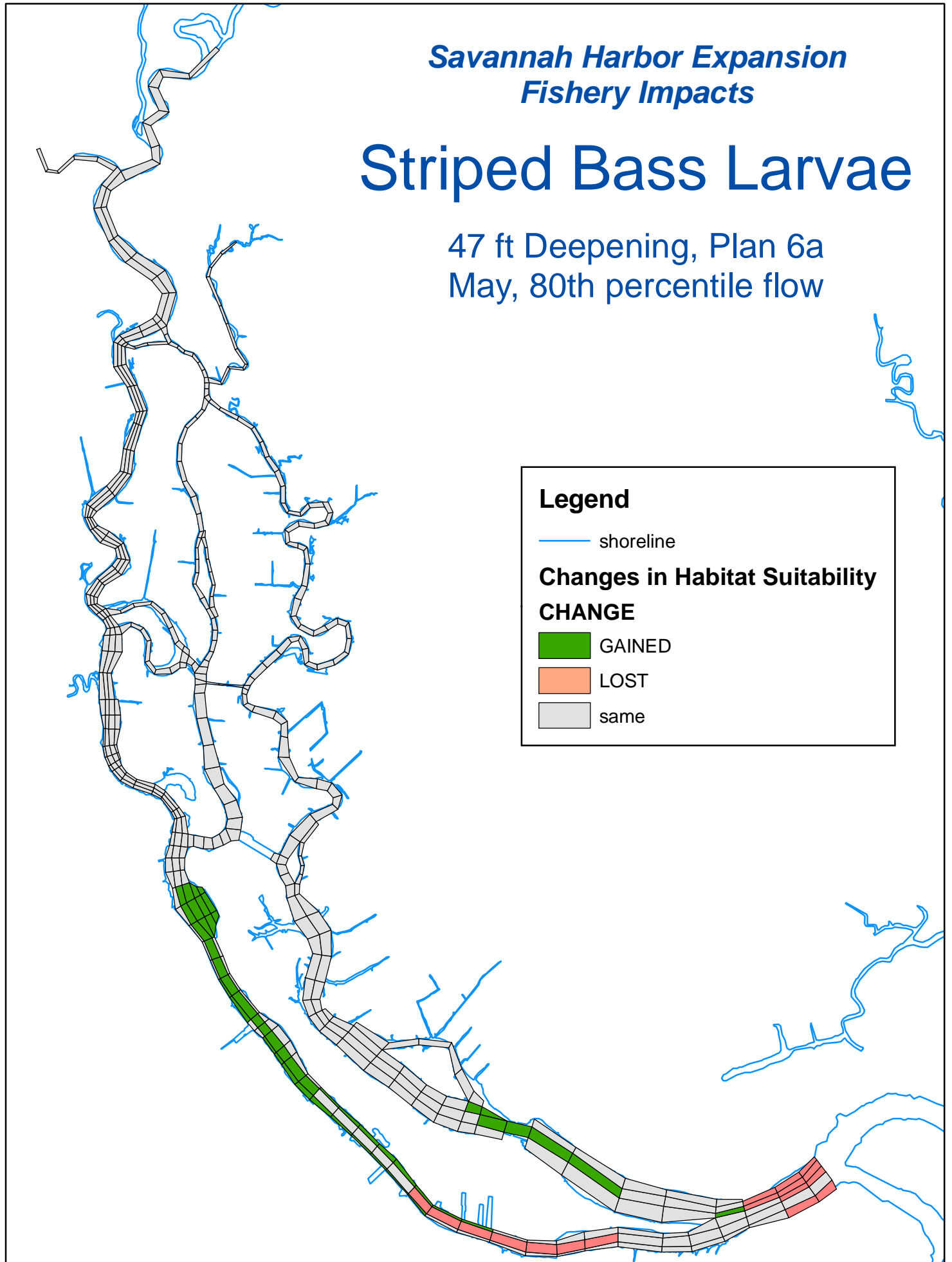
47 ft Deepening, Plan 6a
May, 50th percentile flow



*Savannah Harbor Expansion
Fishery Impacts*

Striped Bass Larvae

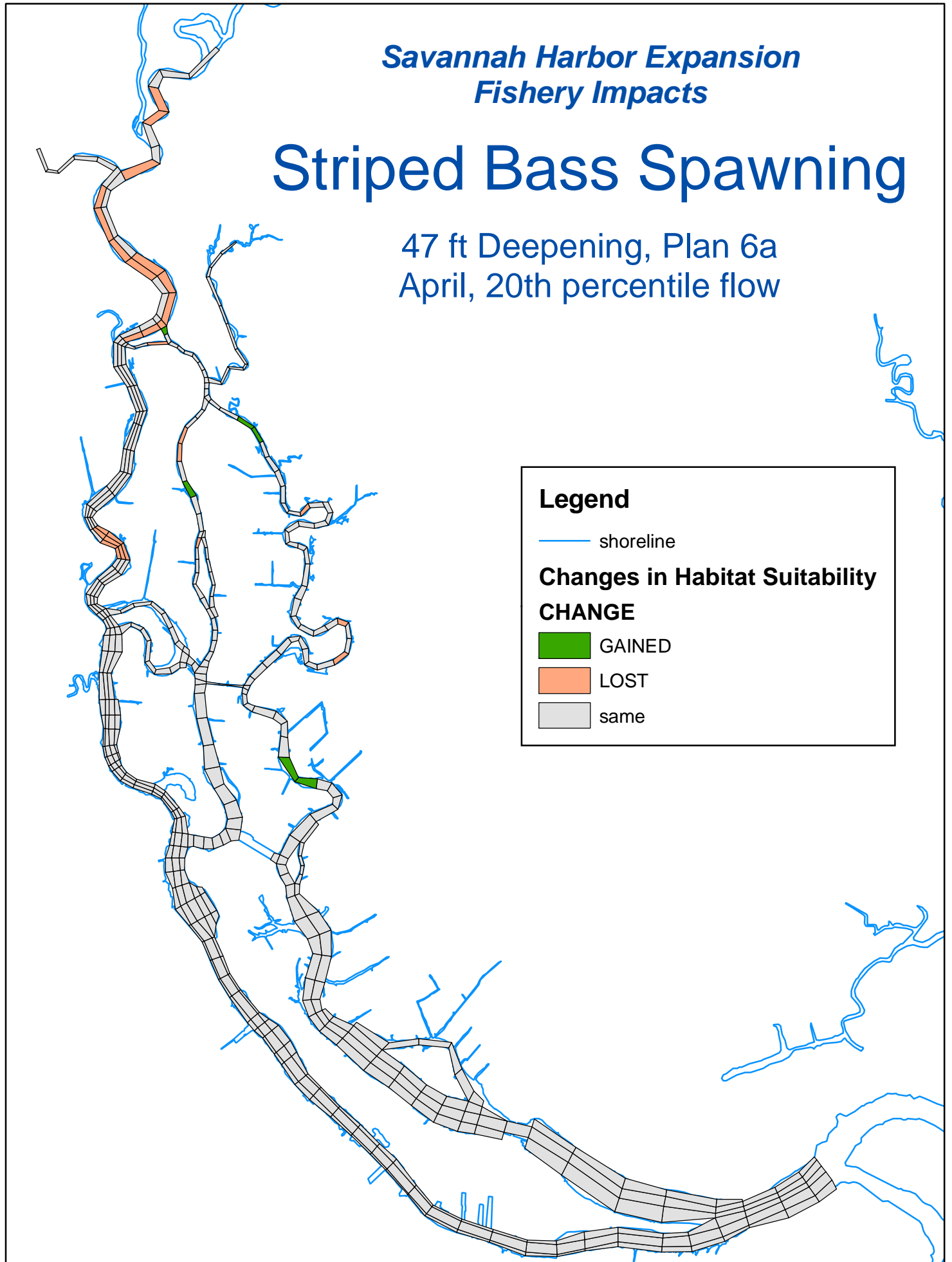
47 ft Deepening, Plan 6a
May, 80th percentile flow



*Savannah Harbor Expansion
Fishery Impacts*

Striped Bass Spawning

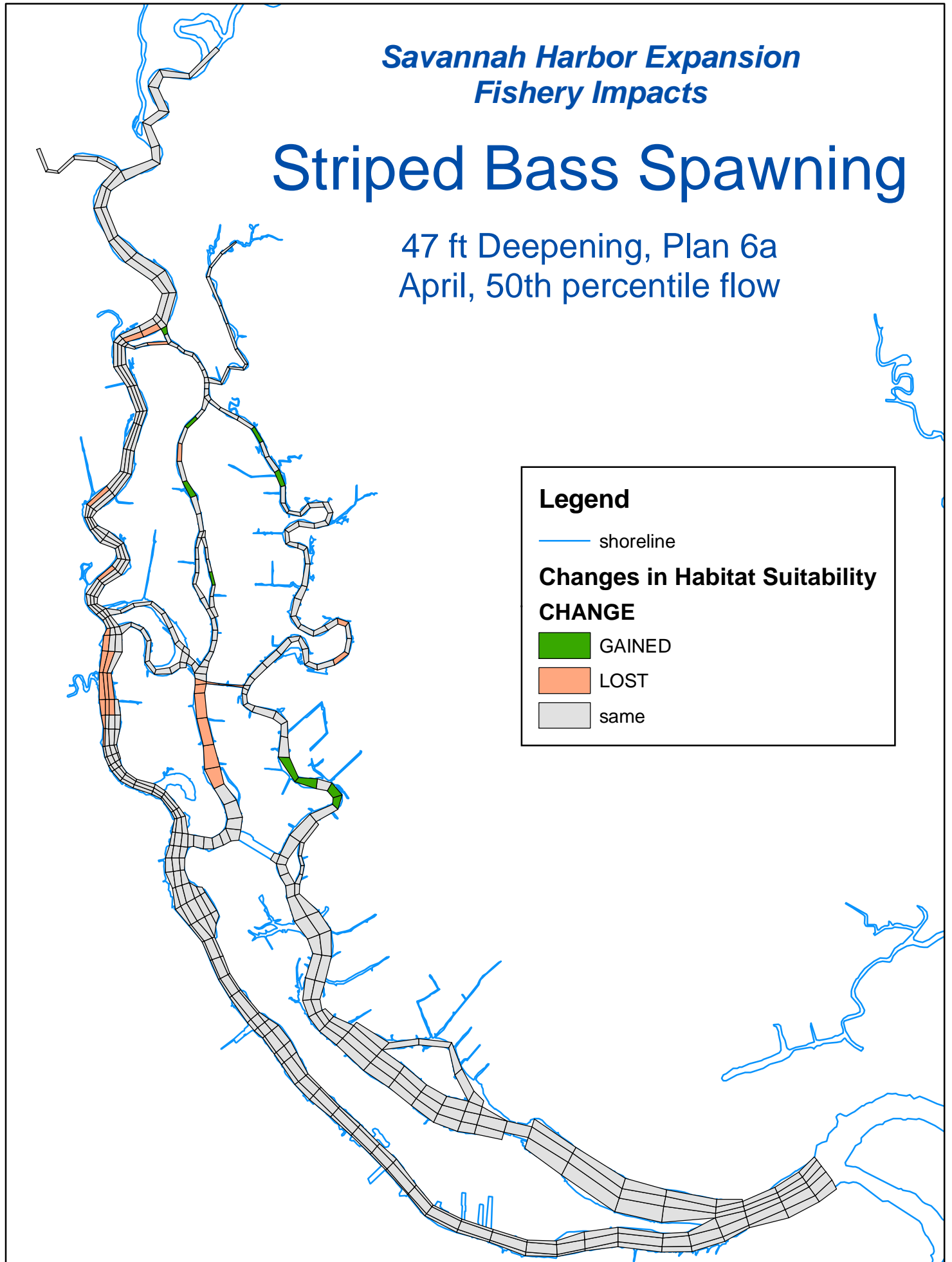
47 ft Deepening, Plan 6a
April, 20th percentile flow



*Savannah Harbor Expansion
Fishery Impacts*

Striped Bass Spawning

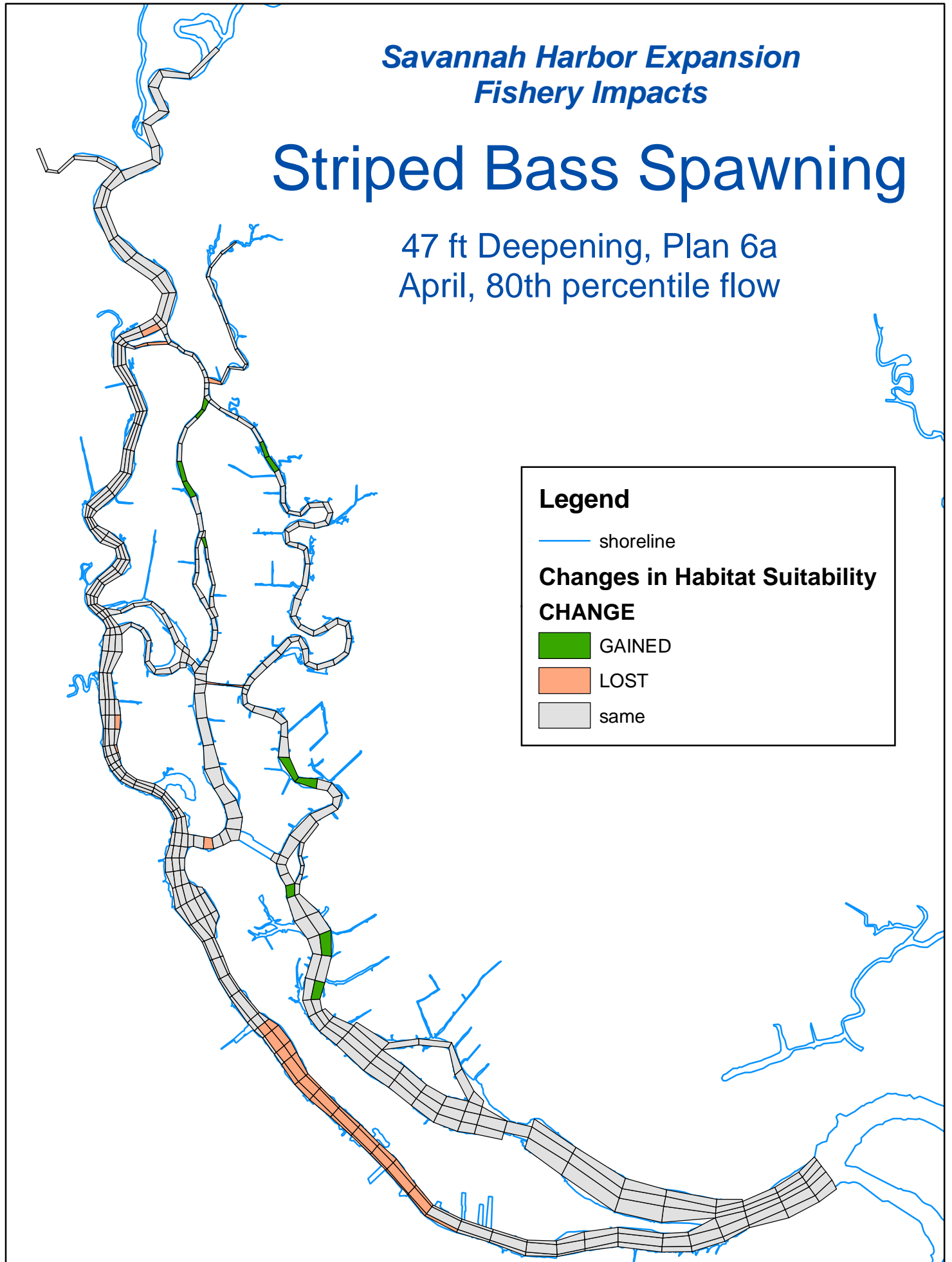
47 ft Deepening, Plan 6a
April, 50th percentile flow



*Savannah Harbor Expansion
Fishery Impacts*

Striped Bass Spawning

47 ft Deepening, Plan 6a
April, 80th percentile flow



*Savannah Harbor Expansion
Fishery Impacts*

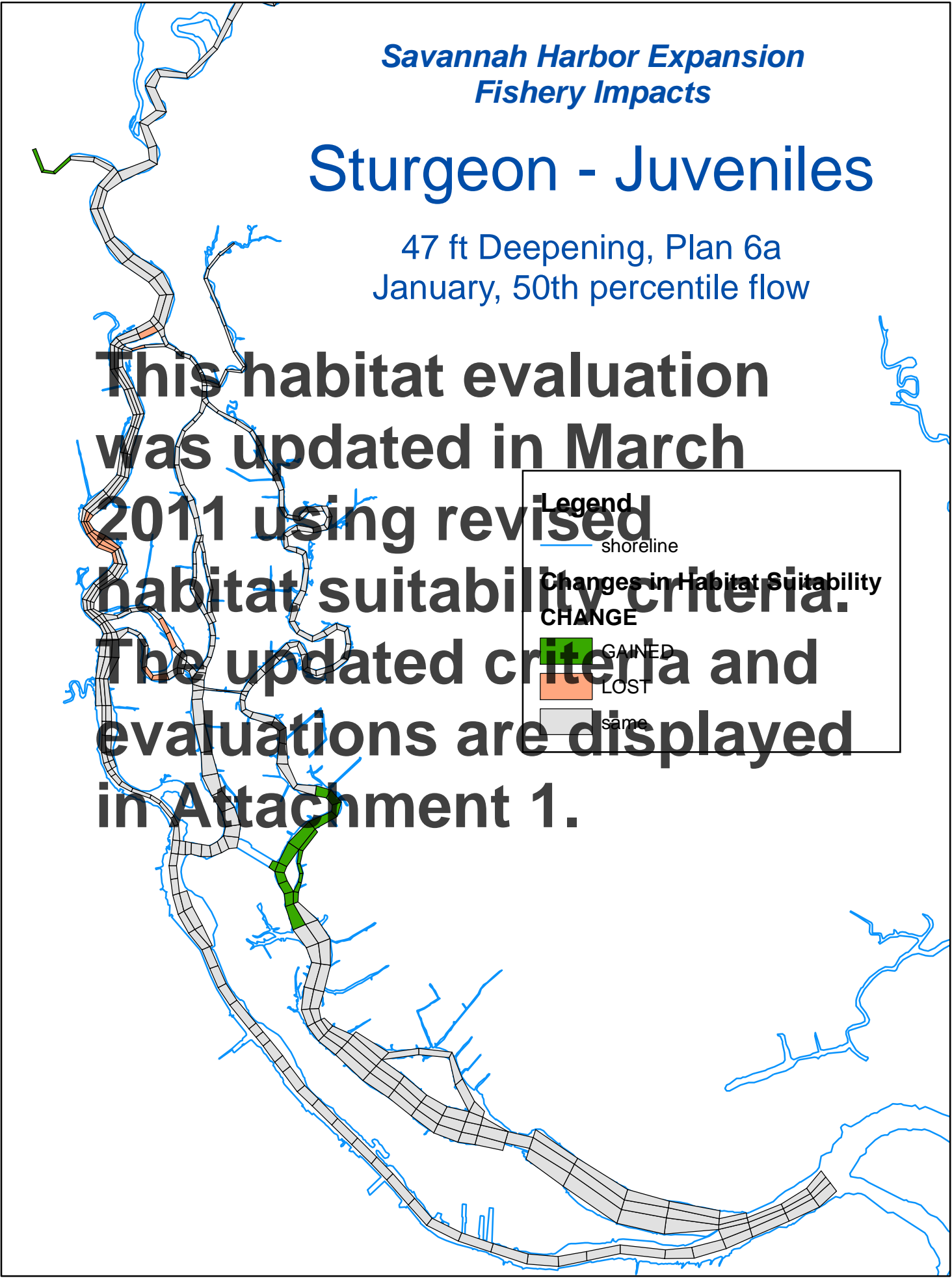
Sturgeon - Juveniles

47 ft Deepening, Plan 6a
January, 50th percentile flow

This habitat evaluation was updated in March 2011 using revised habitat suitability criteria. The updated criteria and evaluations are displayed in Attachment 1.

Legend

- shoreline
- Changes in Habitat Suitability**
- CHANGE**
- GAINED
- LOST
- same



*Savannah Harbor Expansion
Fishery Impacts*

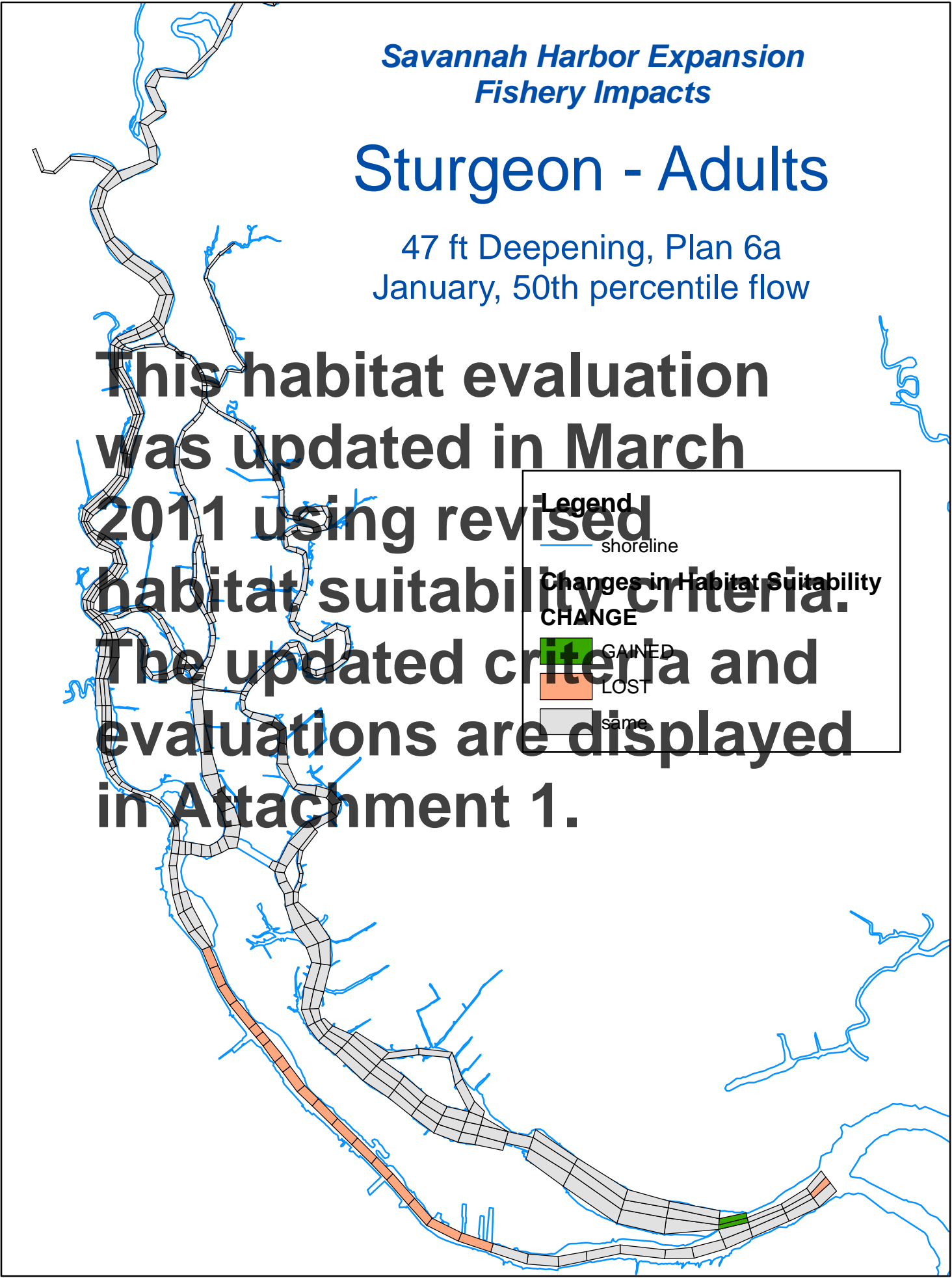
Sturgeon - Adults

47 ft Deepening, Plan 6a
January, 50th percentile flow

This habitat evaluation was updated in March 2011 using revised habitat suitability criteria. The updated criteria and evaluations are displayed in Attachment 1.

Legend

- shoreline
- Changes in Habitat Suitability**
- CHANGE**
- GAINED
- LOST
- same



*Savannah Harbor Expansion
Fishery Impacts*

Sturgeon - Adults

47 ft Deepening, Plan 6a
August, 1997 (Average) Flows

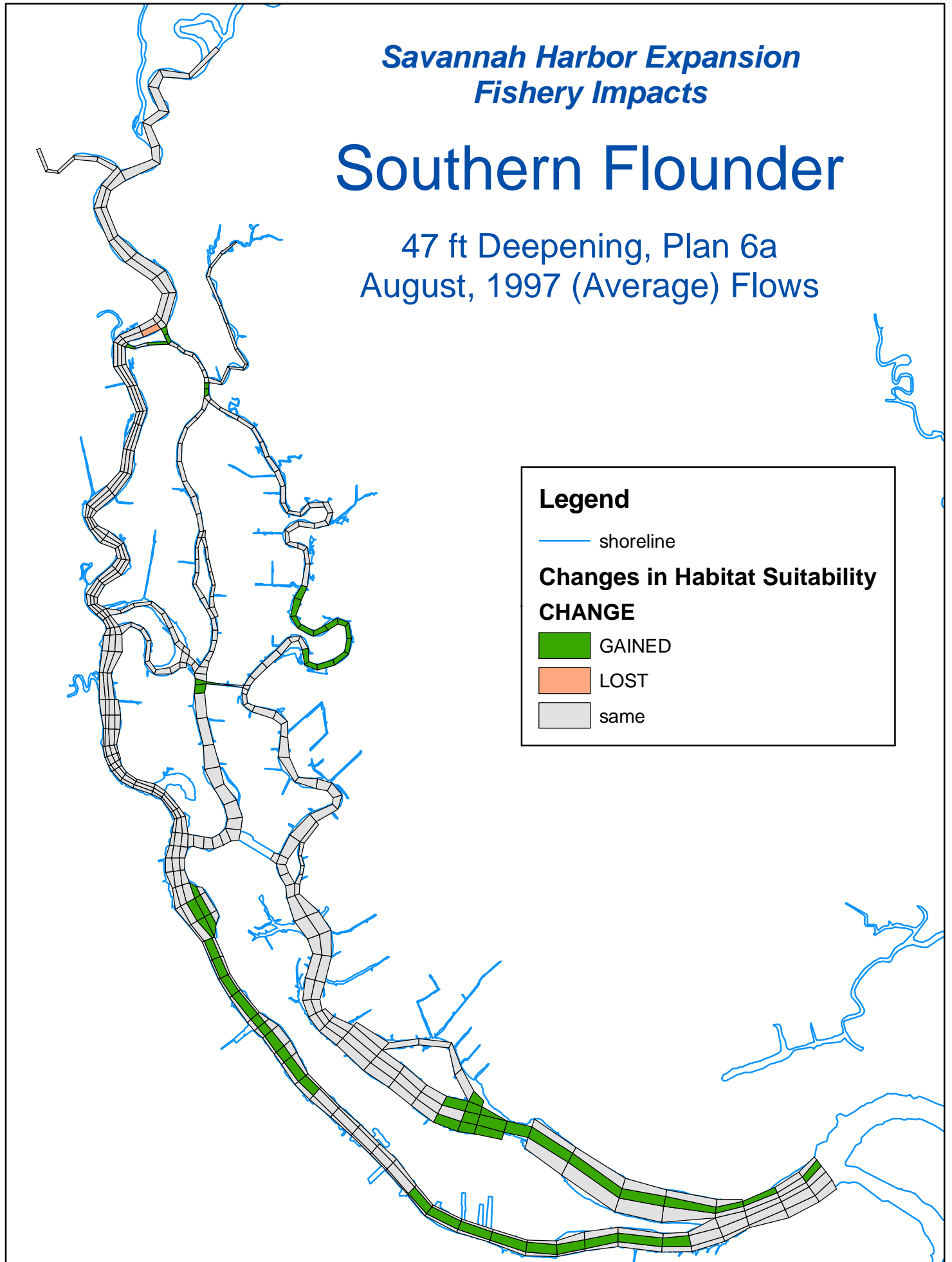
This habitat evaluation was updated in March 2011 using revised habitat suitability criteria. The updated criteria and evaluations are displayed in Attachment 1.



*Savannah Harbor Expansion
Fishery Impacts*

Southern Flounder

47 ft Deepening, Plan 6a
August, 1997 (Average) Flows



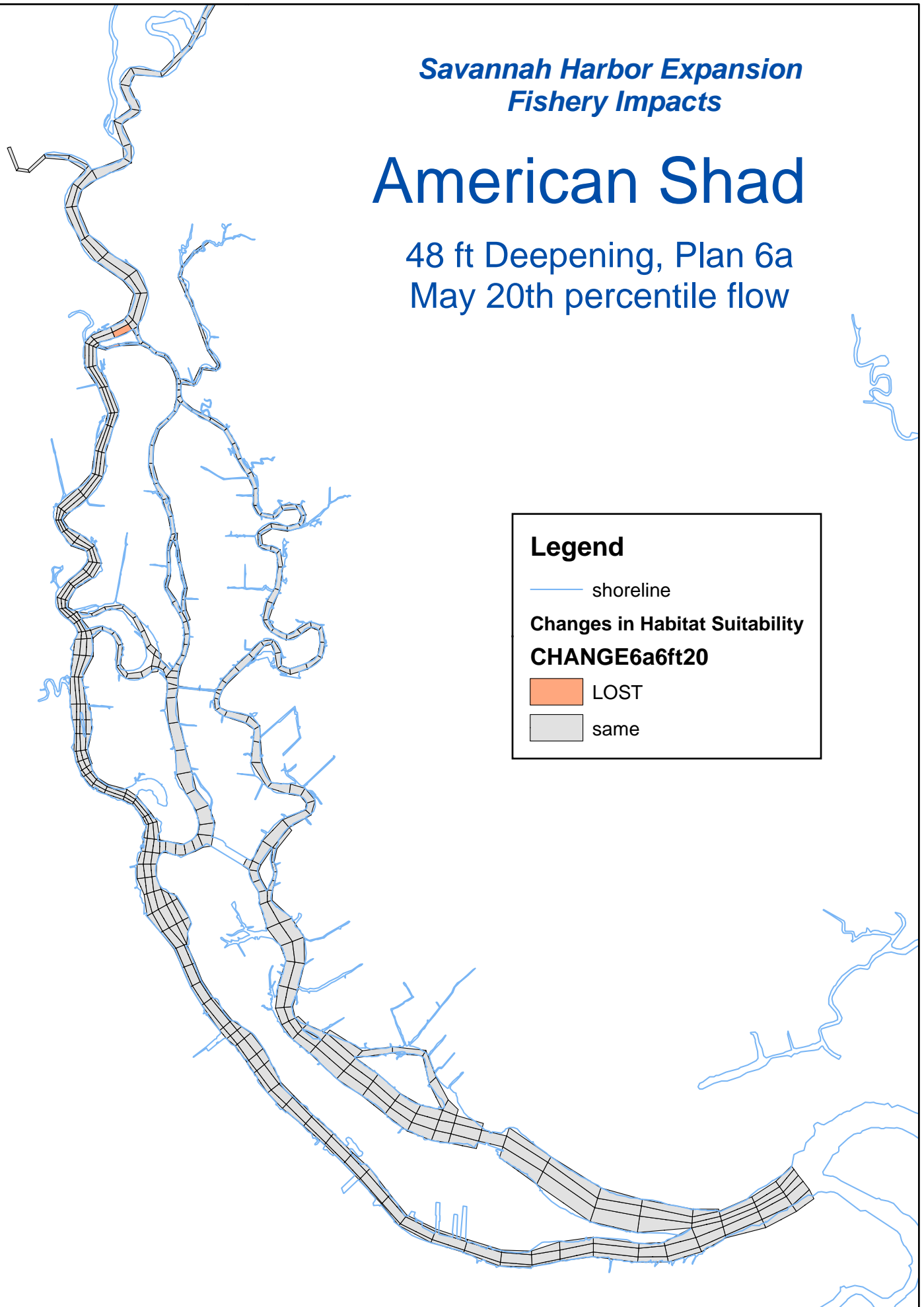
48 ft Channel Depth

Mitigation Plan 6a

*Savannah Harbor Expansion
Fishery Impacts*

American Shad

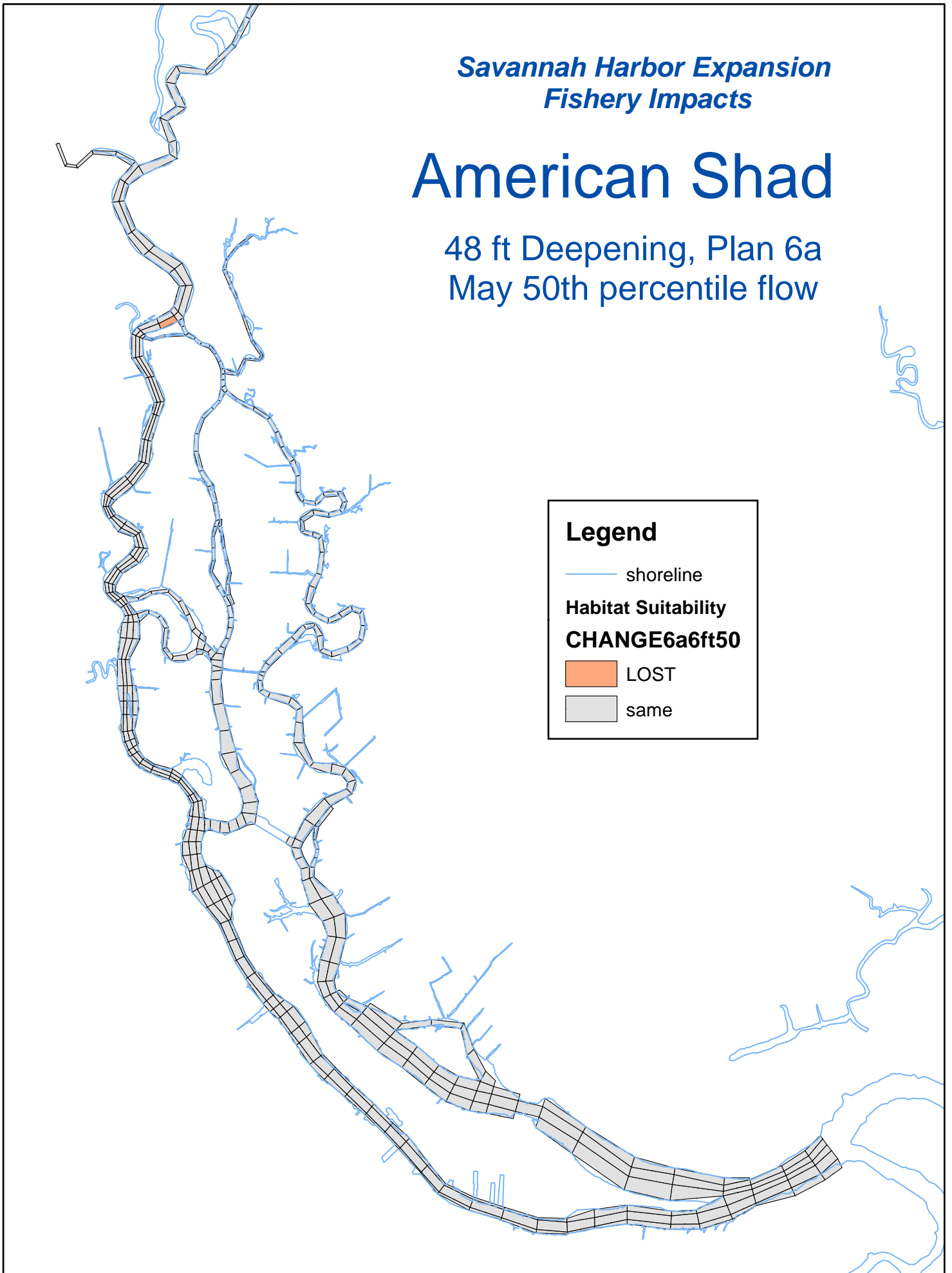
48 ft Deepening, Plan 6a
May 20th percentile flow



*Savannah Harbor Expansion
Fishery Impacts*

American Shad

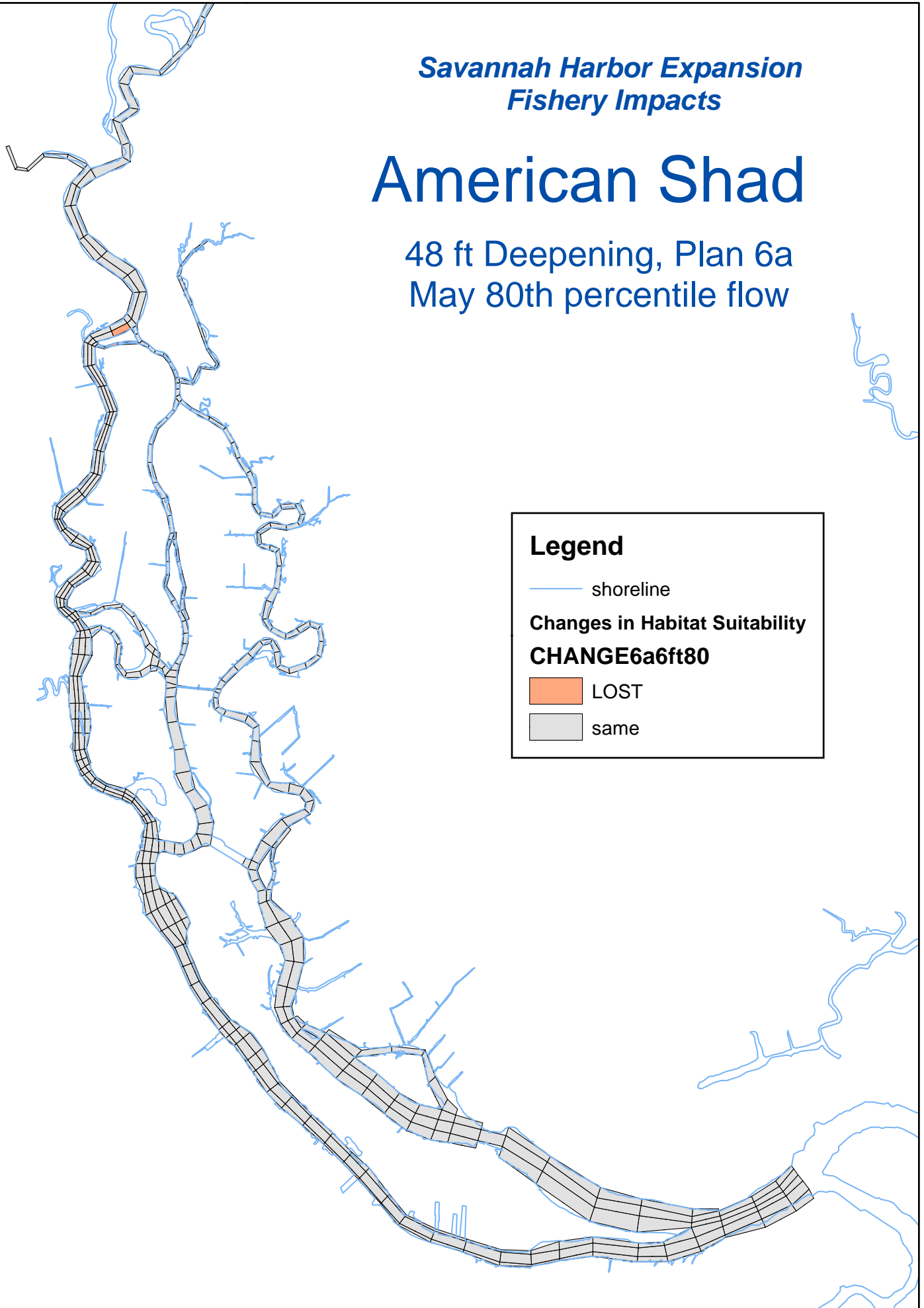
48 ft Deepening, Plan 6a
May 50th percentile flow



*Savannah Harbor Expansion
Fishery Impacts*

American Shad

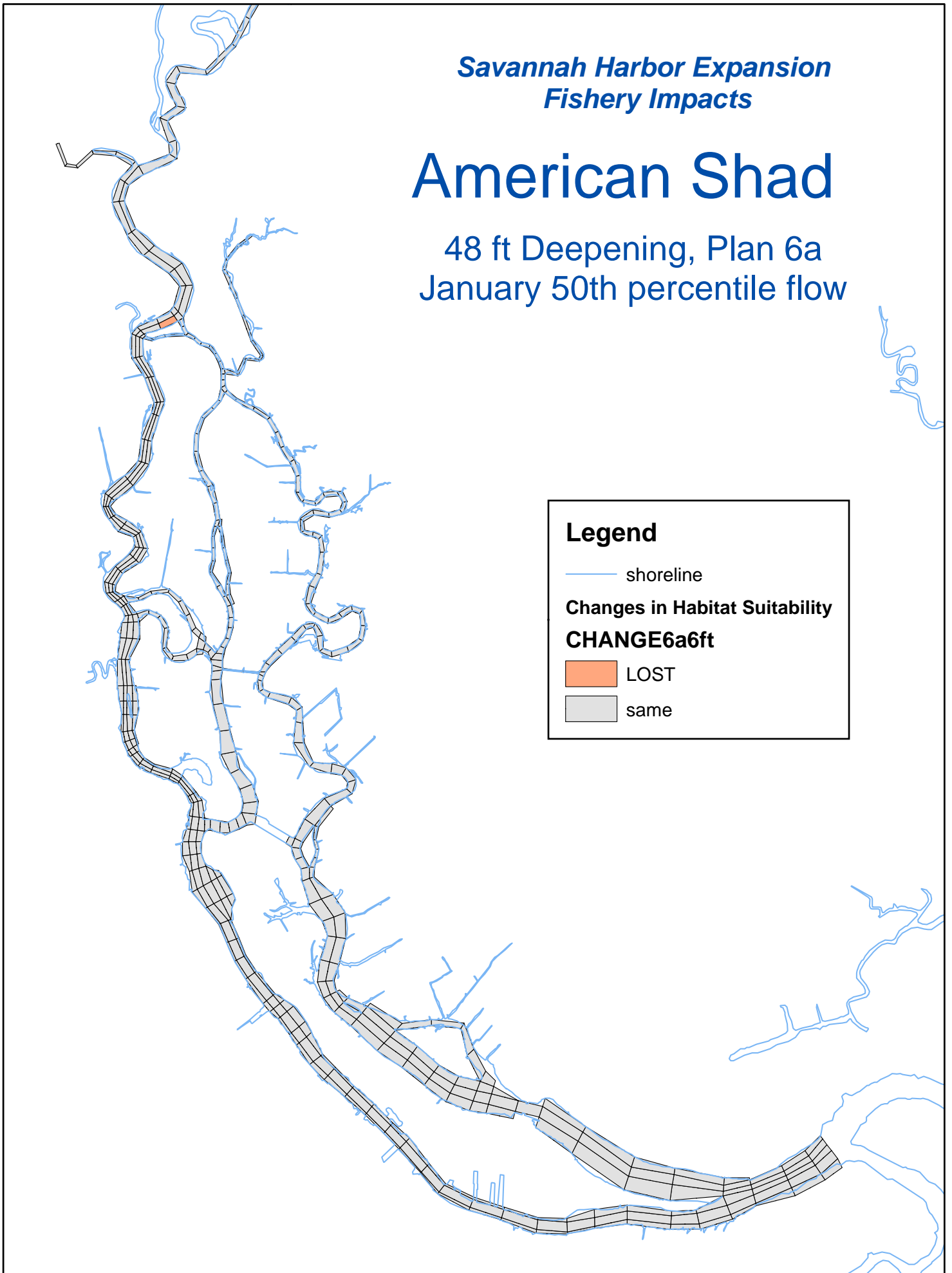
48 ft Deepening, Plan 6a
May 80th percentile flow



*Savannah Harbor Expansion
Fishery Impacts*

American Shad

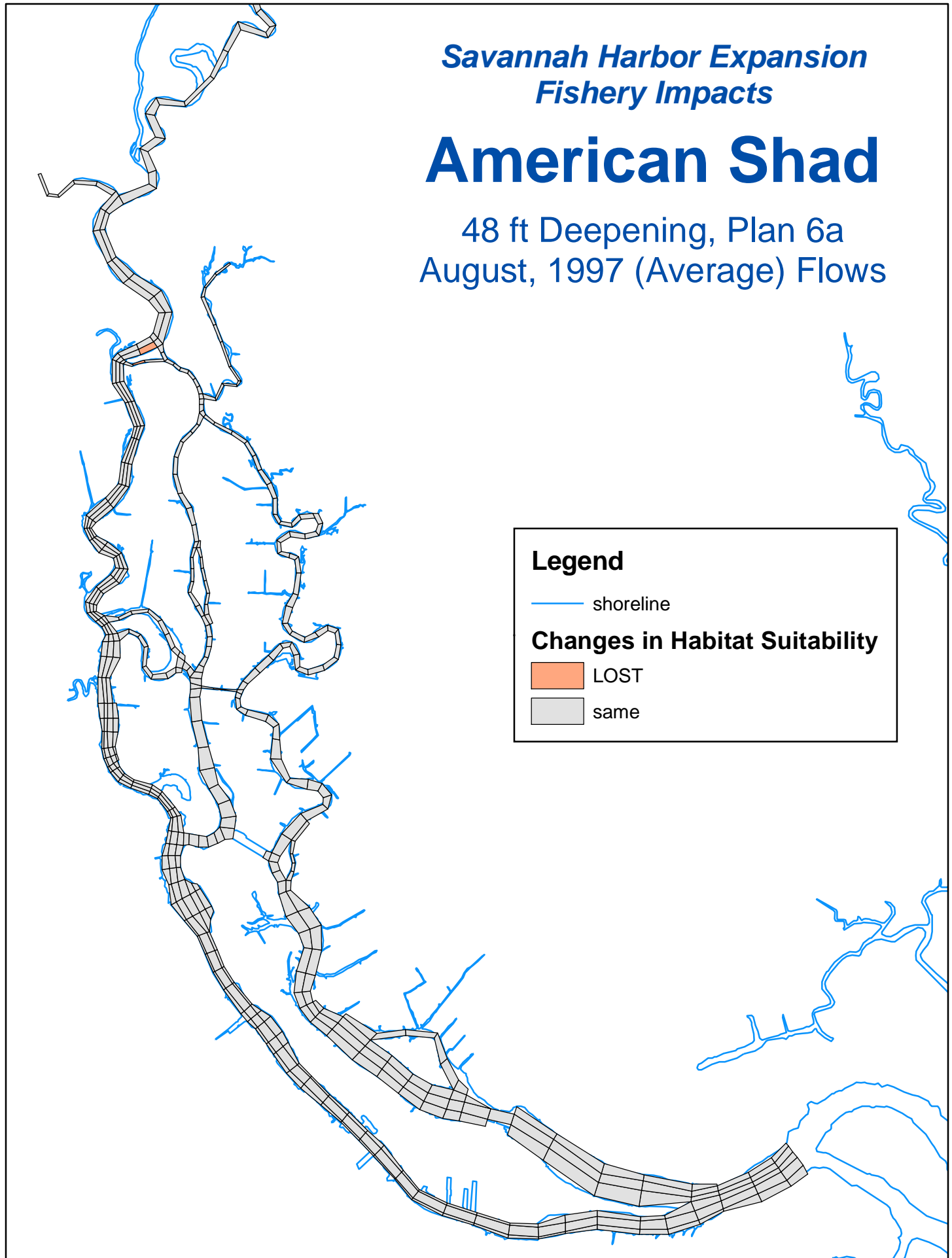
48 ft Deepening, Plan 6a
January 50th percentile flow



*Savannah Harbor Expansion
Fishery Impacts*

American Shad

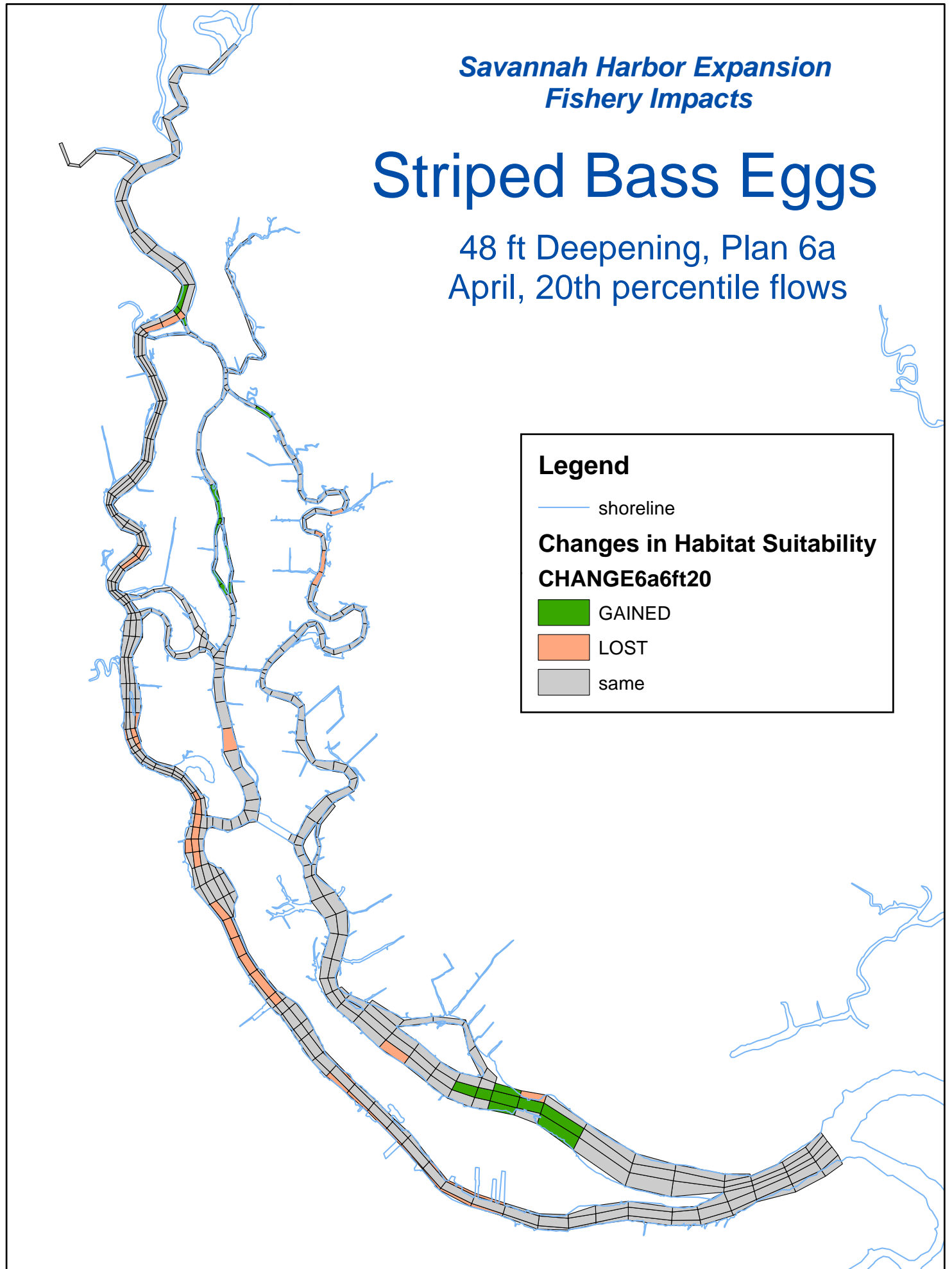
48 ft Deepening, Plan 6a
August, 1997 (Average) Flows



*Savannah Harbor Expansion
Fishery Impacts*

Striped Bass Eggs

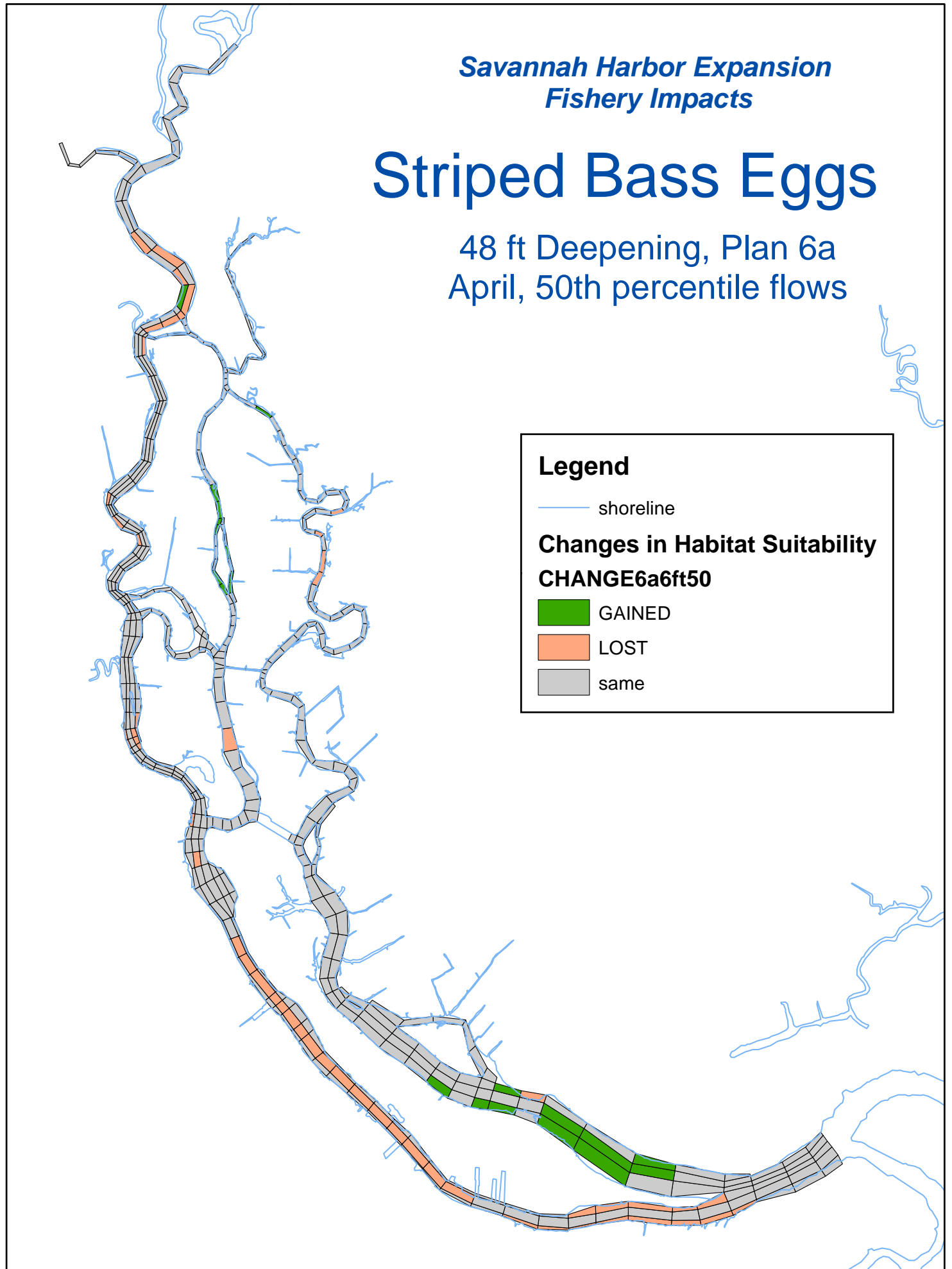
48 ft Deepening, Plan 6a
April, 20th percentile flows



*Savannah Harbor Expansion
Fishery Impacts*

Striped Bass Eggs

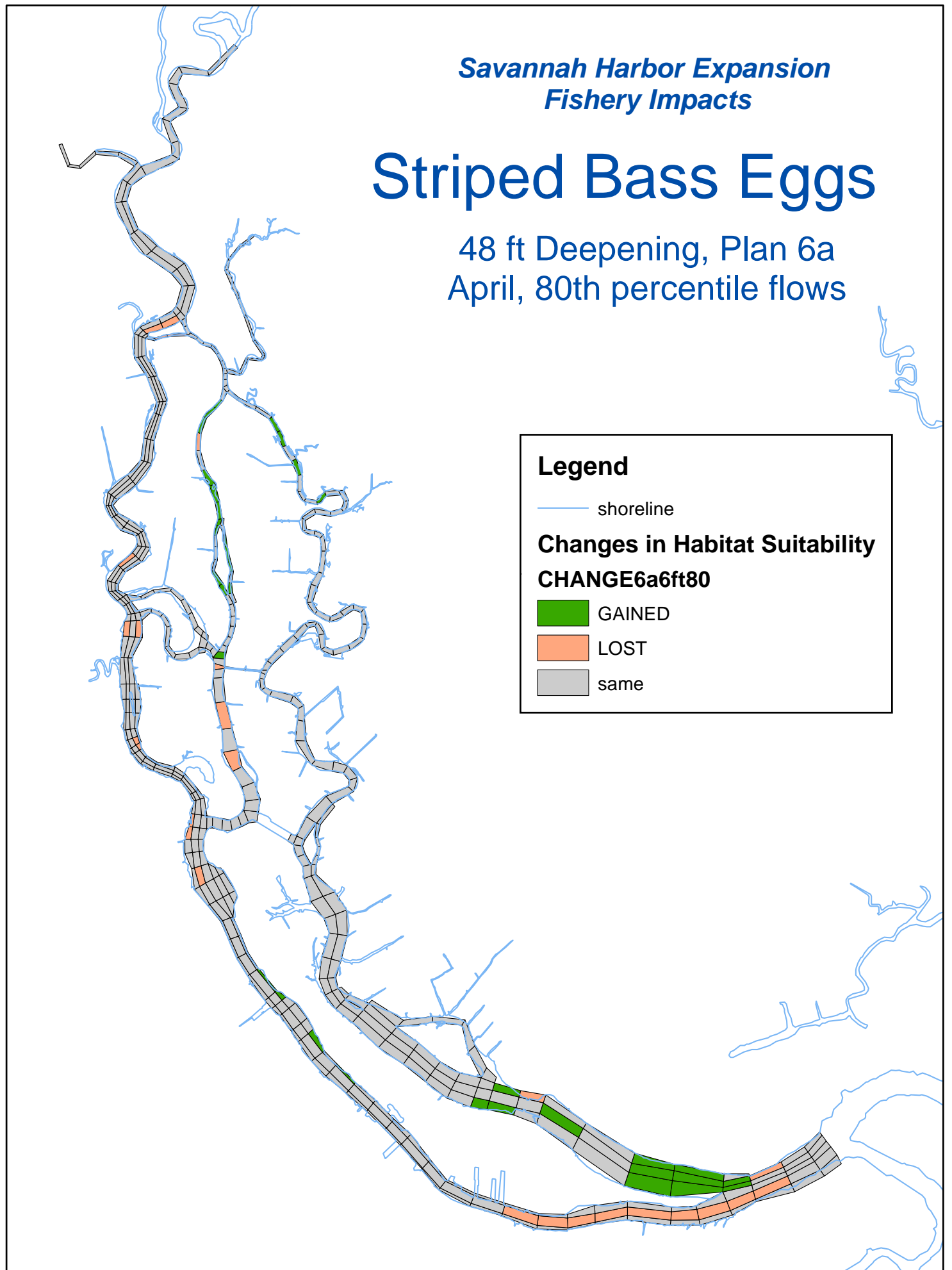
48 ft Deepening, Plan 6a
April, 50th percentile flows



*Savannah Harbor Expansion
Fishery Impacts*

Striped Bass Eggs

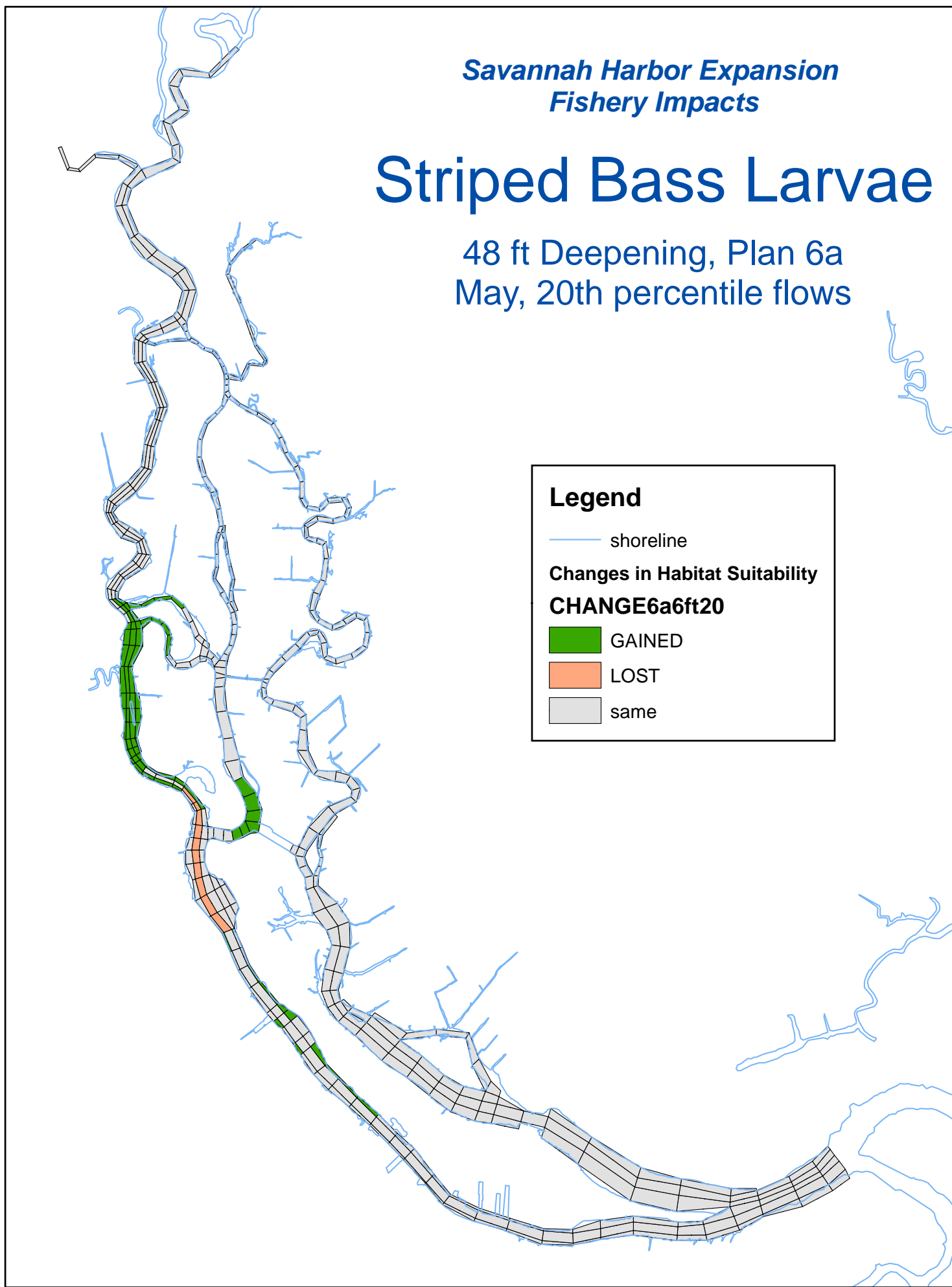
48 ft Deepening, Plan 6a
April, 80th percentile flows



*Savannah Harbor Expansion
Fishery Impacts*

Striped Bass Larvae

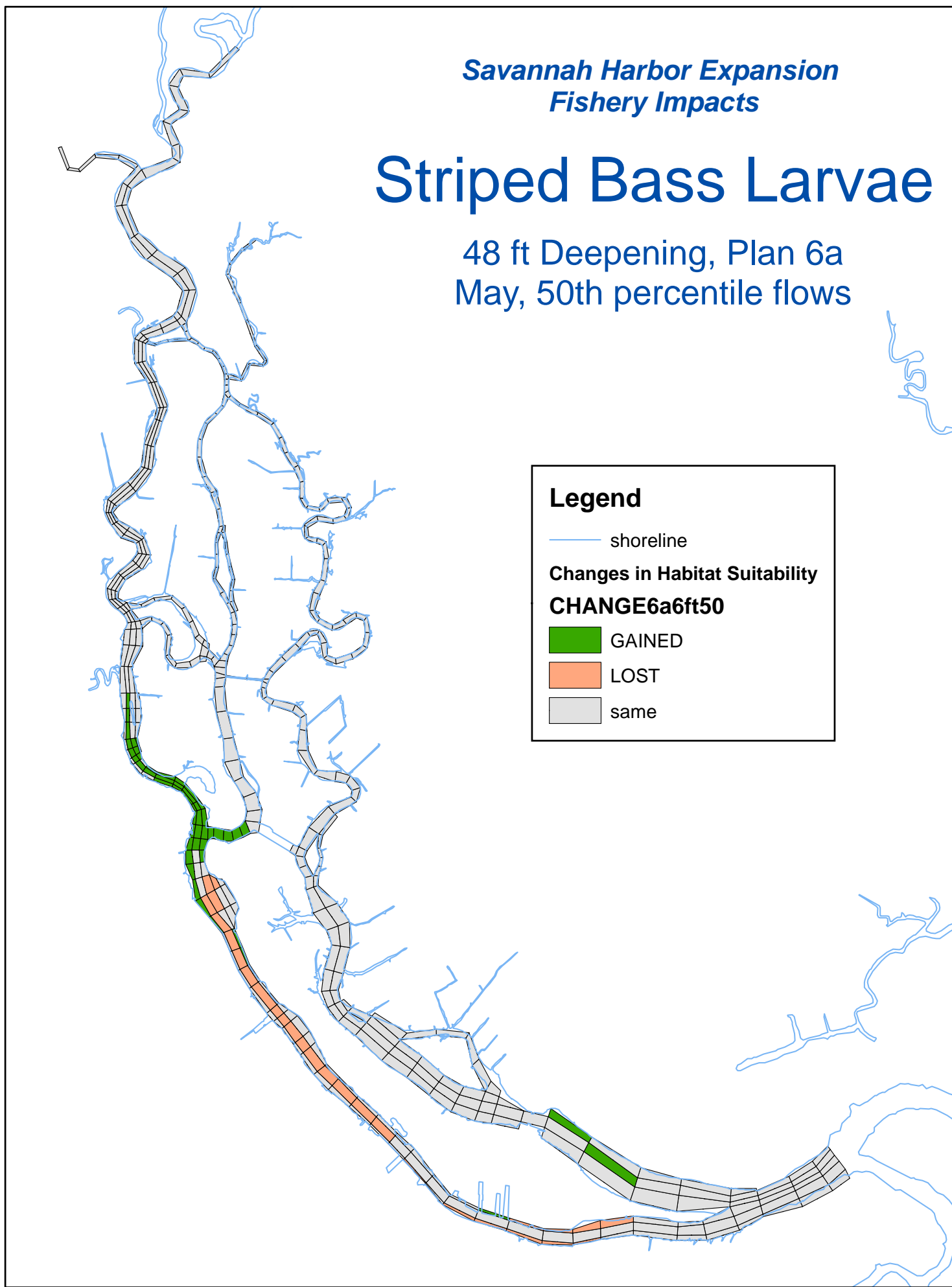
48 ft Deepening, Plan 6a
May, 20th percentile flows



*Savannah Harbor Expansion
Fishery Impacts*

Striped Bass Larvae

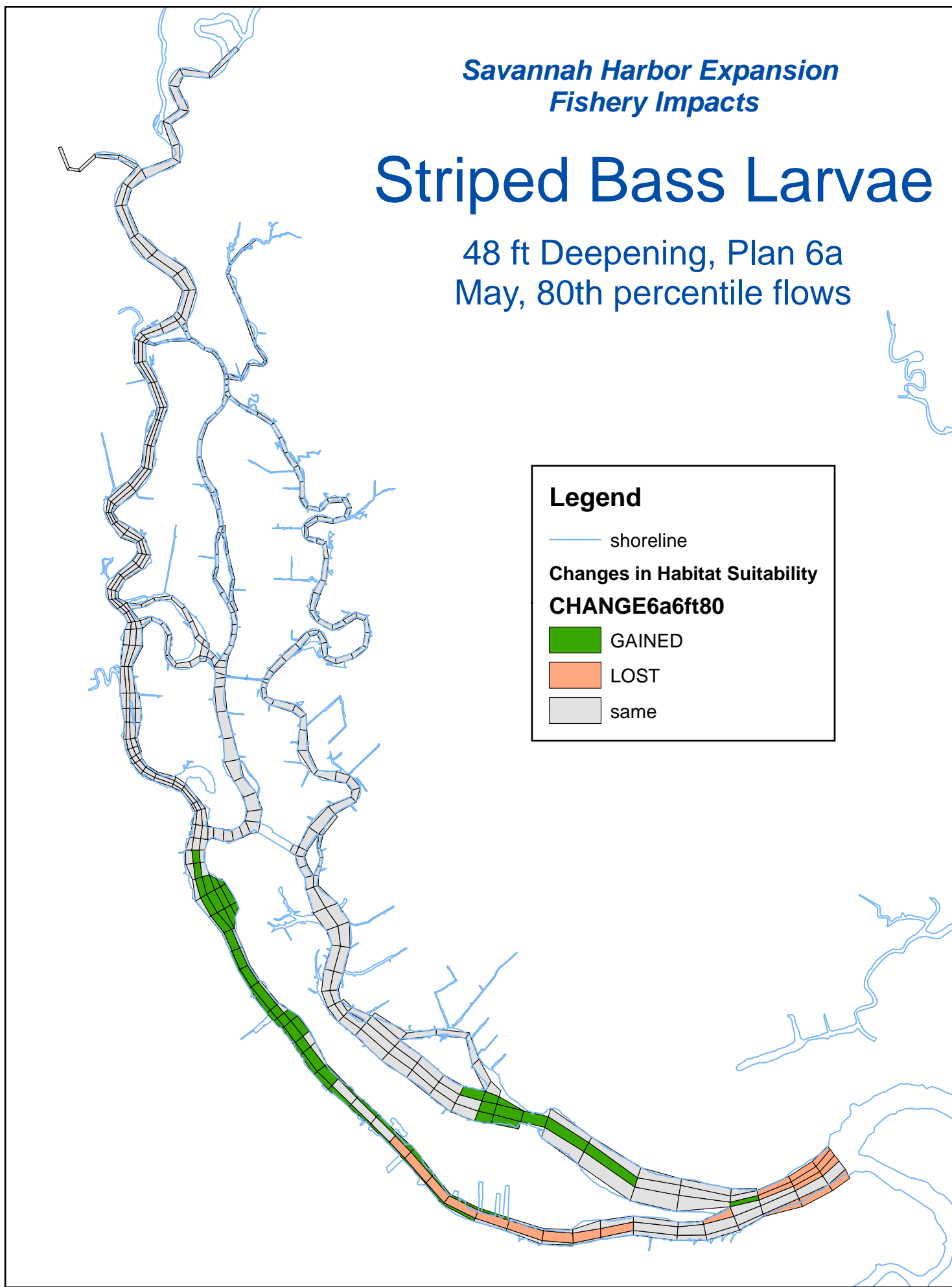
48 ft Deepening, Plan 6a
May, 50th percentile flows



*Savannah Harbor Expansion
Fishery Impacts*

Striped Bass Larvae

48 ft Deepening, Plan 6a
May, 80th percentile flows



*Savannah Harbor Expansion
Fishery Impacts*




Striped Bass Spawning

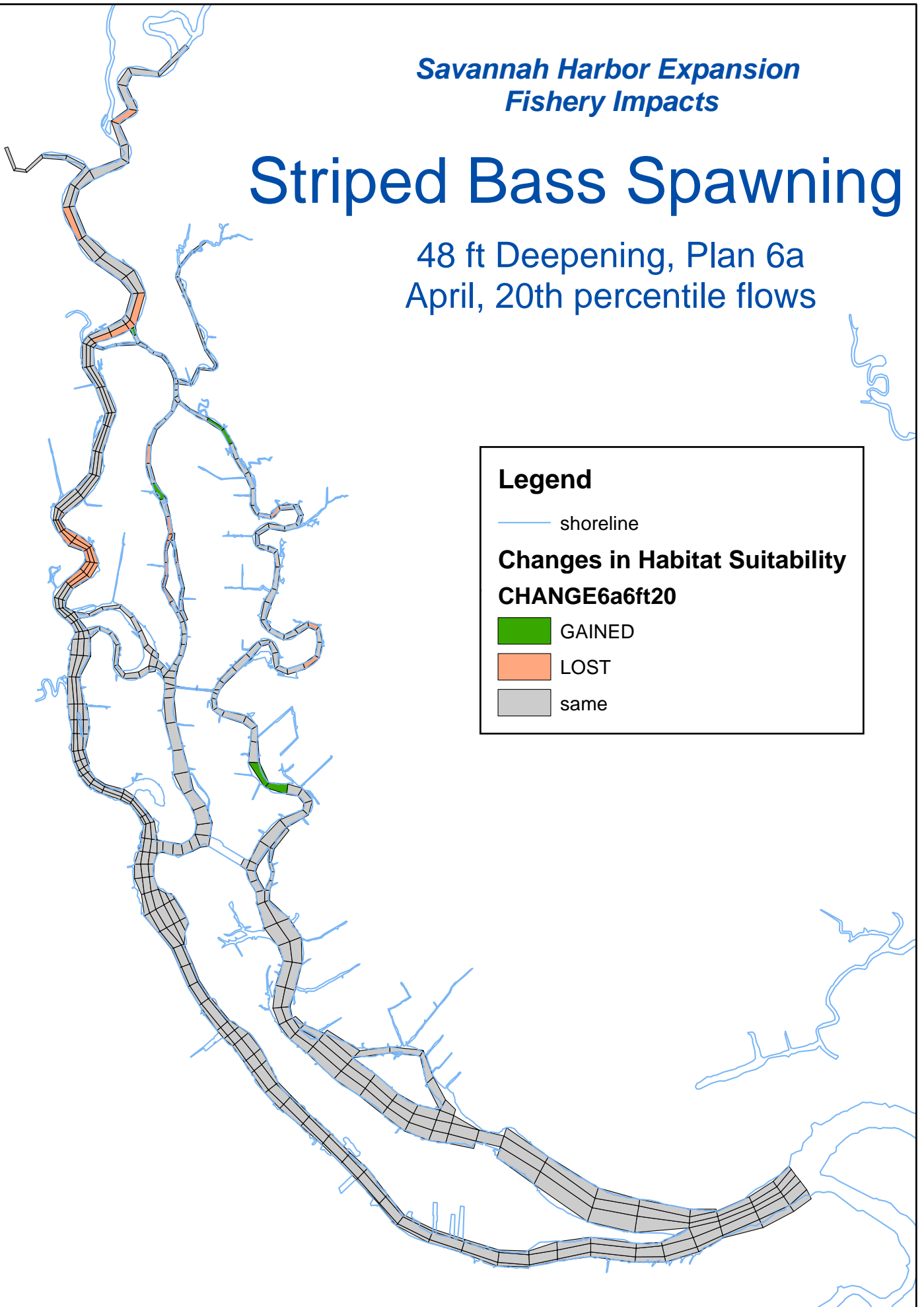
48 ft Deepening, Plan 6a
April, 20th percentile flows

Legend

— shoreline

Changes in Habitat Suitability
CHANGE6a6ft20

	GAINED
	LOST
	same



*Savannah Harbor Expansion
Fishery Impacts*




Striped Bass Spawning

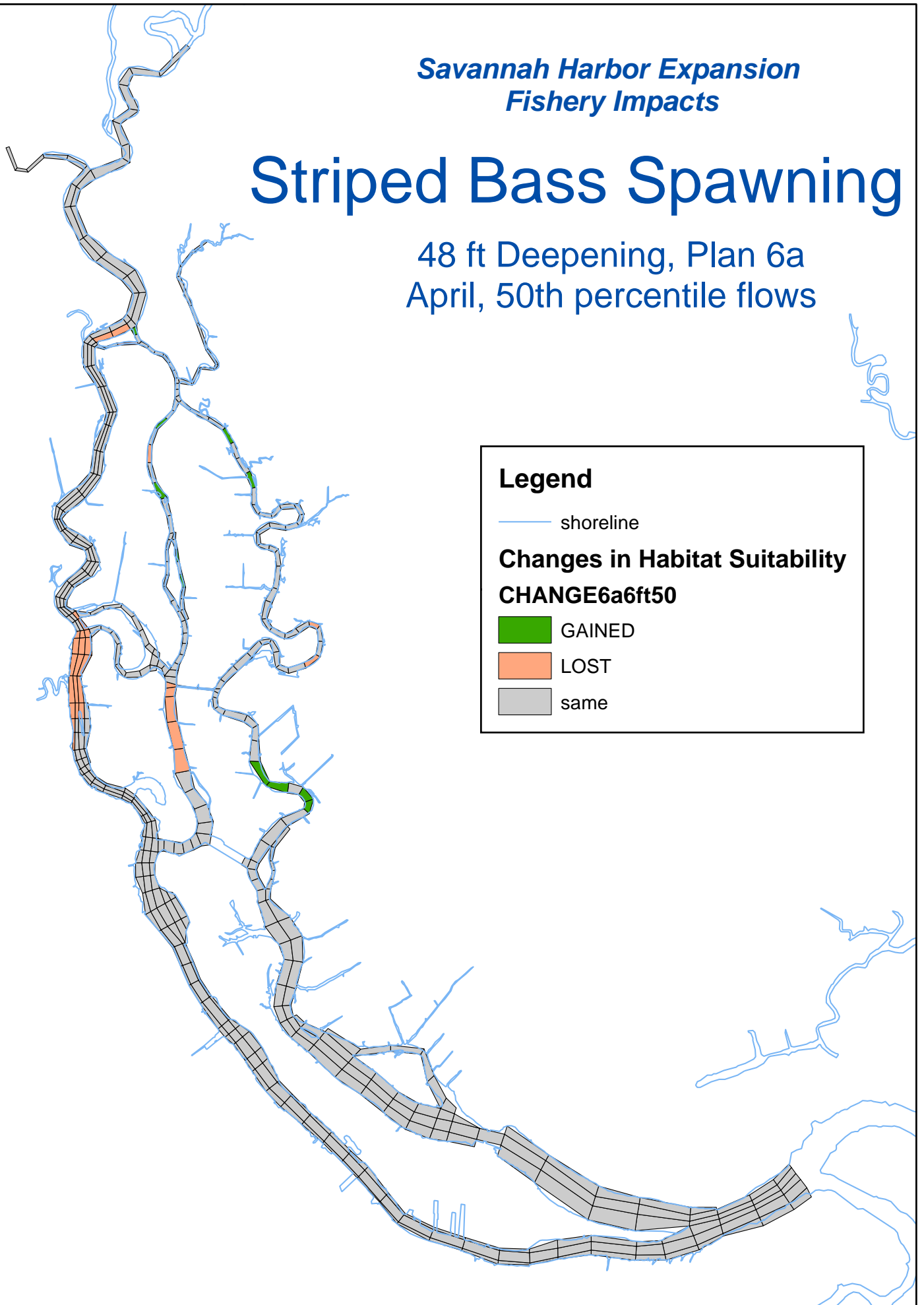
48 ft Deepening, Plan 6a
April, 50th percentile flows

Legend

— shoreline

Changes in Habitat Suitability
CHANGE6a6ft50

	GAINED
	LOST
	same



*Savannah Harbor Expansion
Fishery Impacts*

Striped Bass Spawning

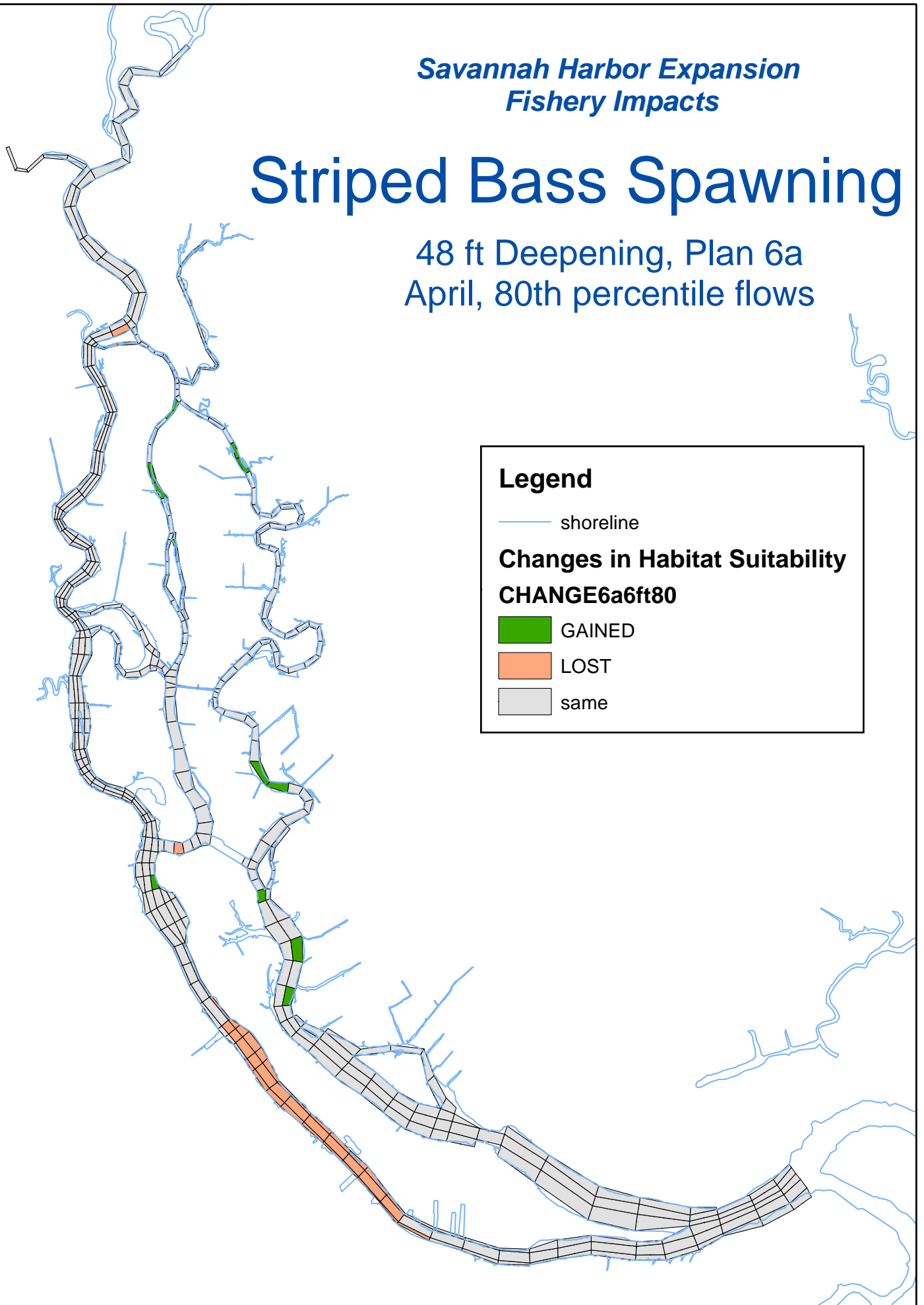
48 ft Deepening, Plan 6a
April, 80th percentile flows

Legend

— shoreline

Changes in Habitat Suitability
CHANGE6a6ft80

- GAINED
- LOST
- same



*Savannah Harbor Expansion
Fishery Impacts*

Sturgeon - Juveniles

48 ft Deepening, Plan 6a
January, 50th percentile flows

This habitat evaluation was updated in March 2011 using revised habitat suitability criteria. The updated criteria and evaluations are displayed in Attachment 1.

Legend

shoeline

Changes in Habitat Suitability

CHANGE 6a6f

GAINED

LOST

same

*Savannah Harbor Expansion
Fishery Impacts*

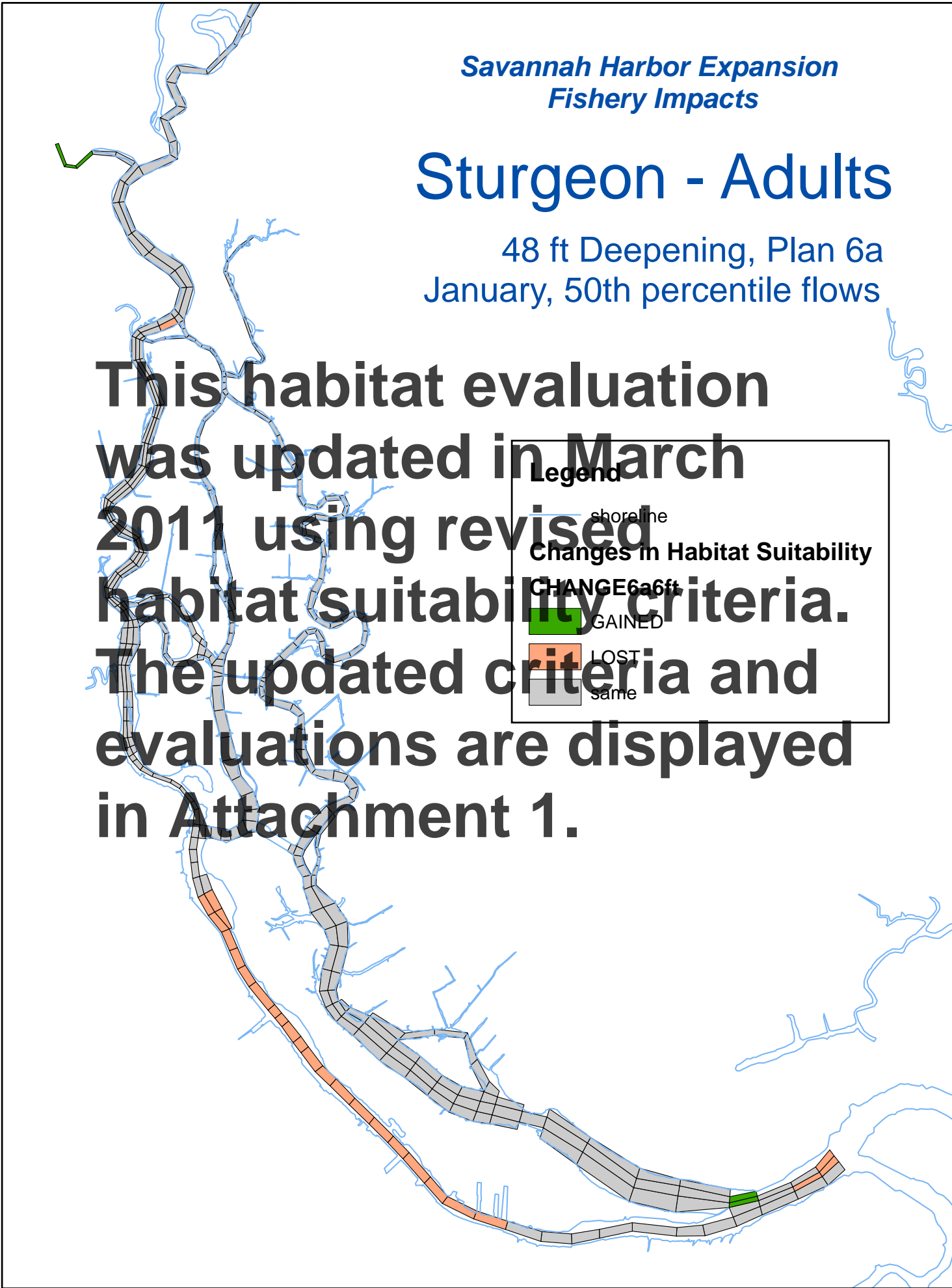
Sturgeon - Adults

48 ft Deepening, Plan 6a
January, 50th percentile flows

This habitat evaluation was updated in March 2011 using revised habitat suitability criteria. The updated criteria and evaluations are displayed in Attachment 1.

Legend

- shoreline
- Changes in Habitat Suitability
- CHANGE6a6ft
- GAINED
- LOST
- same



*Savannah Harbor Expansion
Fishery Impacts*

Sturgeon - Adults

48 ft Deepening, Plan 6a
August, 1997 (Average) Flows

**This habitat evaluation
was updated in March
2011 using revised
habitat suitability criteria.
The updated criteria and
evaluations are displayed
in Attachment 1.**



*Savannah Harbor Expansion
Fishery Impacts*

Southern Flounder

48 ft Deepening, Plan 6a
August, 1997 (Average) Flows


Legend

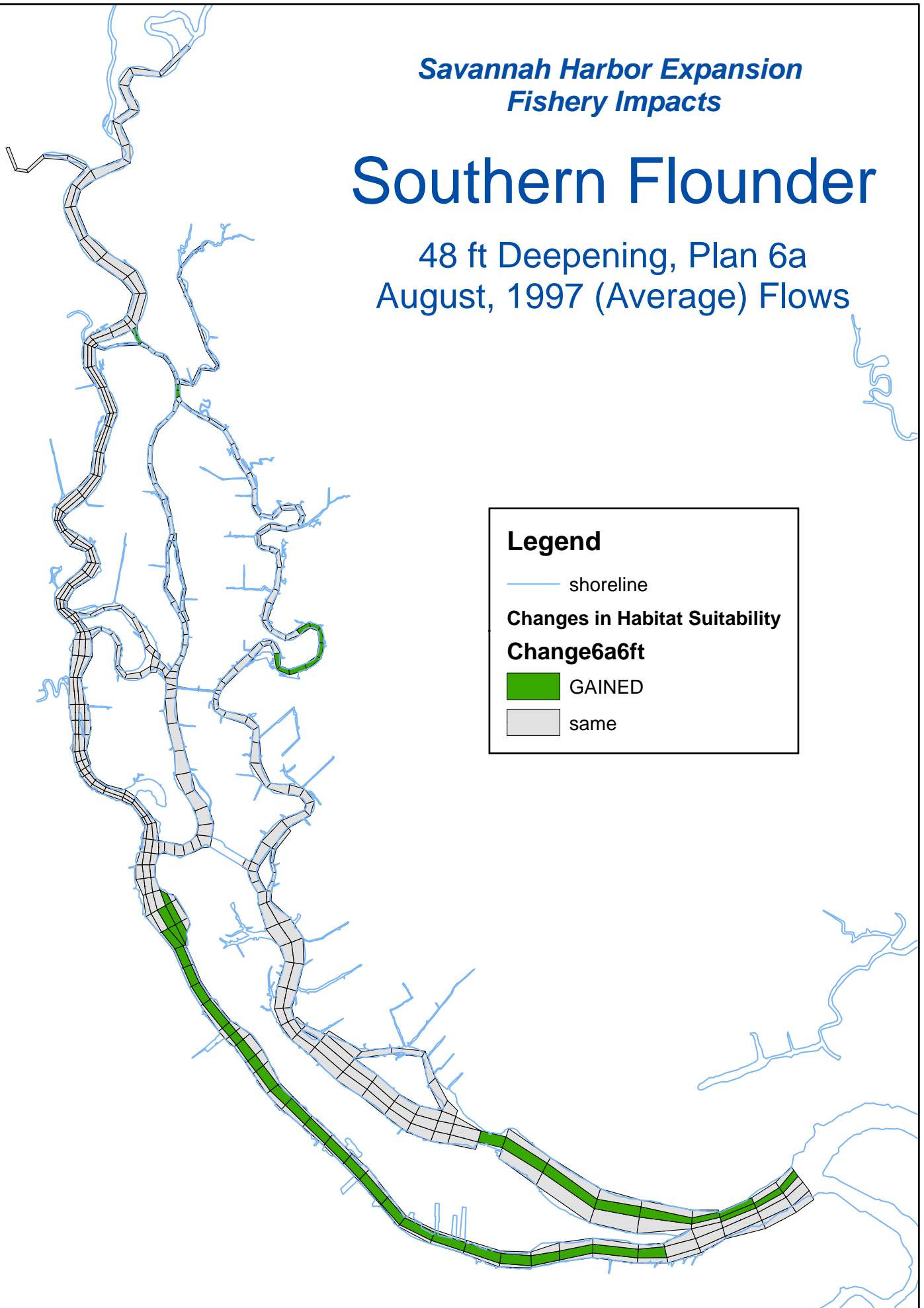
— shoreline

Changes in Habitat Suitability

Change6a6ft

 GAINED

 same



ENVIRONMENTAL IMPACT STATEMENT

APPENDIX P: Fishery Habitat Maps

SAVANNAH HARBOR EXPANSION PROJECT

Chatham County, Georgia and Jasper County, South Carolina

January 2012

ATTACHMENT 1

Revised Shortnose Sturgeon Habitat Maps
March 2011



**US Army Corps
of Engineers**
*Savannah District
South Atlantic Division*

This page intentionally blank

After release of the draft EIS in November 2010, the Corps coordinated with NMFS and the Fisheries Interagency Coordination Team to perform expanded modeling analyses on Shortnose sturgeon habitat. As a result of the coordination, the habitat suitability criteria for juvenile Shortnose sturgeon during the winter was revised to define “suitable” as the following:

Species & Life Stage	Freshwater Flow Conditions	Simulation Period	Habitat Criteria
Shortnose Sturgeon (juvenile)	50%-tile of Long Term	January	Suitable habitat when DO >= 3.5 mg/l at 90% exceedance (10th percentile), >=3.0 at 95% (5th percentile), and >=2.0 at 99% (1 percentile) Suitable habitat when 50% exceedance of the Max Salinity is <= 14.9 ppt

In addition to the flow conditions specified in the table above, the point source discharges from 2004 were also utilized for the three Shortnose sturgeon simulation periods (Adult January, Adult August, and Juvenile January). The point source discharge information was obtained from USEPA Region 4 and is based on the Discharge Monitoring Reports. The use of the 2004 loadings in the impact analysis is conservative in light of EPA’s Revised Draft TMDL for D.O. in Savannah Harbor, which will require a reduction in loading from about 600,000 lbs/day to 130,000 lbs/day. For the August runs, the simulations were also run with and without the proposed D.O. injection loads that are a component of the proposed mitigation for impacts to habitat as outlined in Section 5 of the EIS. Reports detailing the revised Shortnose sturgeon model simulations and predicted impacts are included as supplemental materials to the Engineering Appendix of the GRR.




**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.

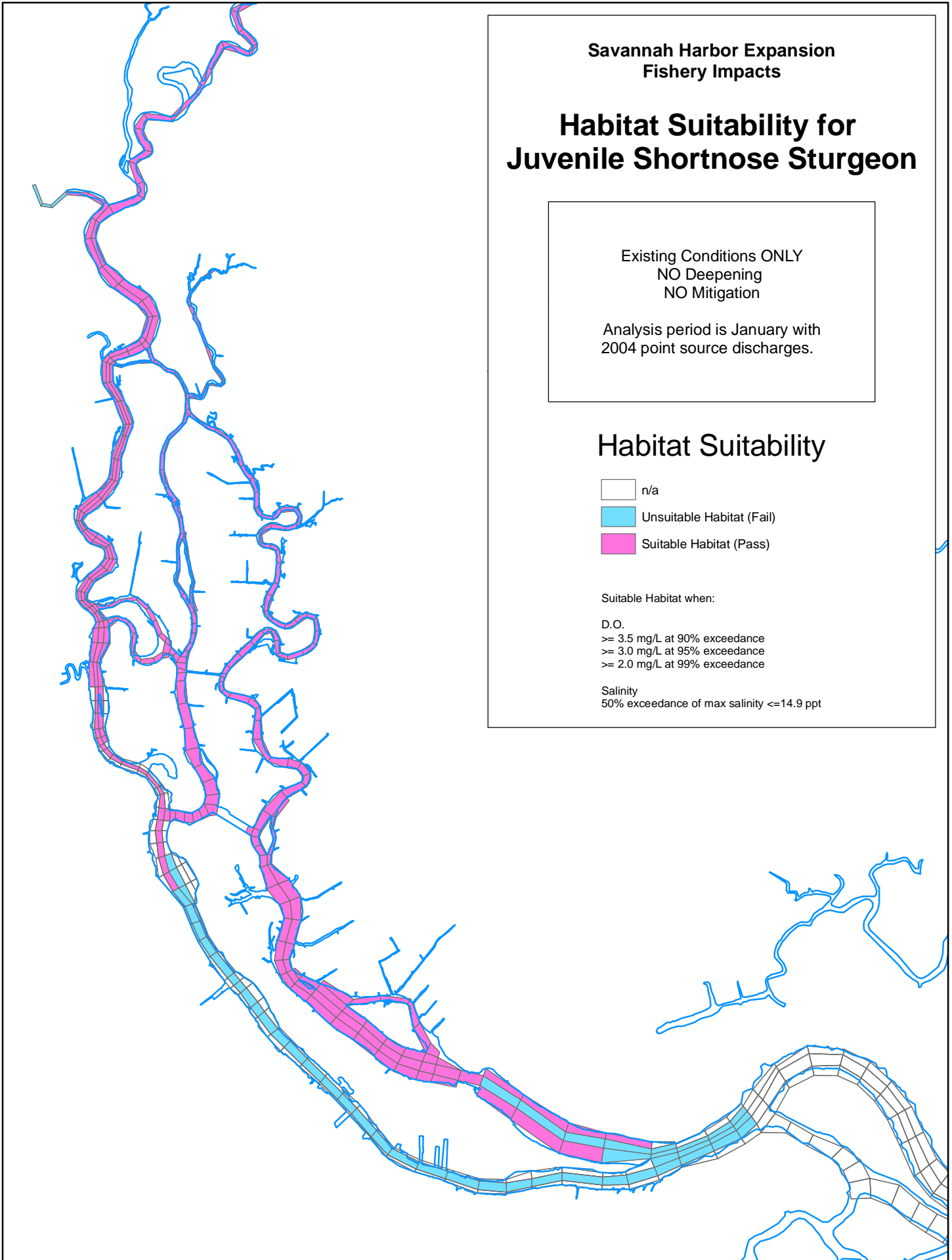
Habitat Suitability

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

Suitable Habitat when:

- D.O.
- ≥ 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 44 ft below MLLW (2 ft)
with Mitigation Plan 6b

Analysis period is January with
2004 point source discharges.

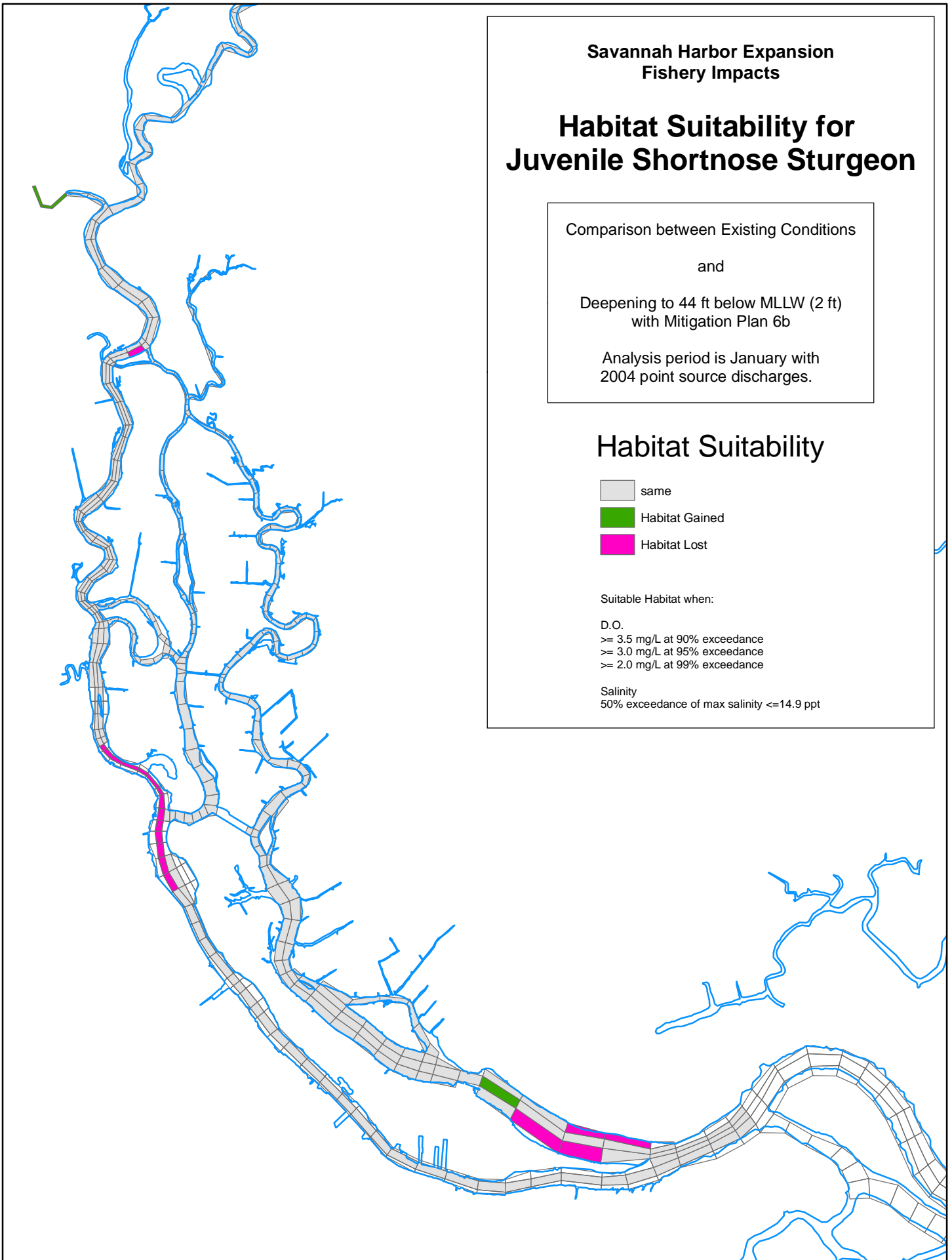
Habitat Suitability

-  same
-  Habitat Gained
-  Habitat Lost

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

Analysis period is January with
2004 point source discharges.

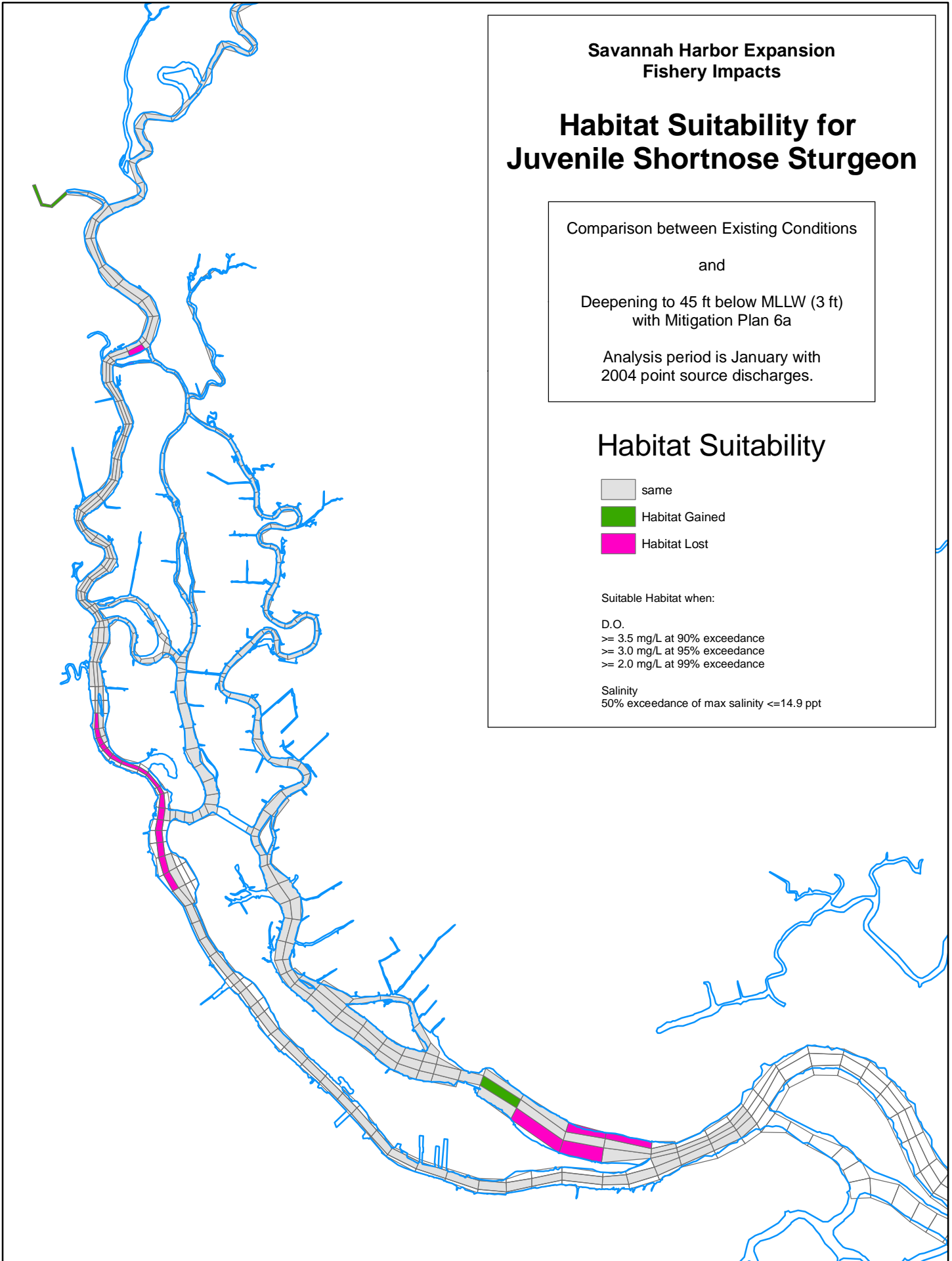
Habitat Suitability

-  same
-  Habitat Gained
-  Habitat Lost

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

Analysis period is January with
2004 point source discharges.

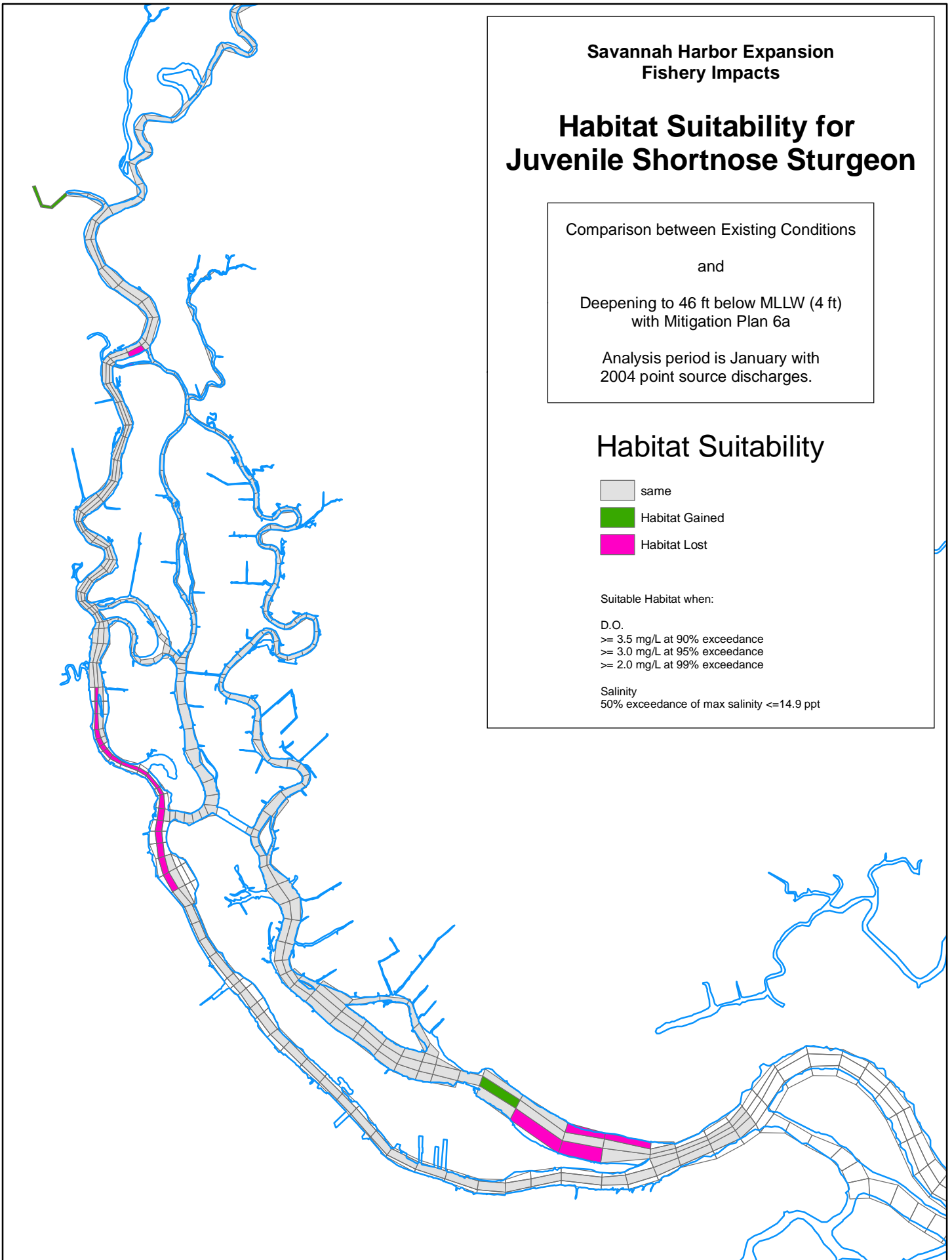
Habitat Suitability

-  same
-  Habitat Gained
-  Habitat Lost

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

Analysis period is January with
2004 point source discharges.

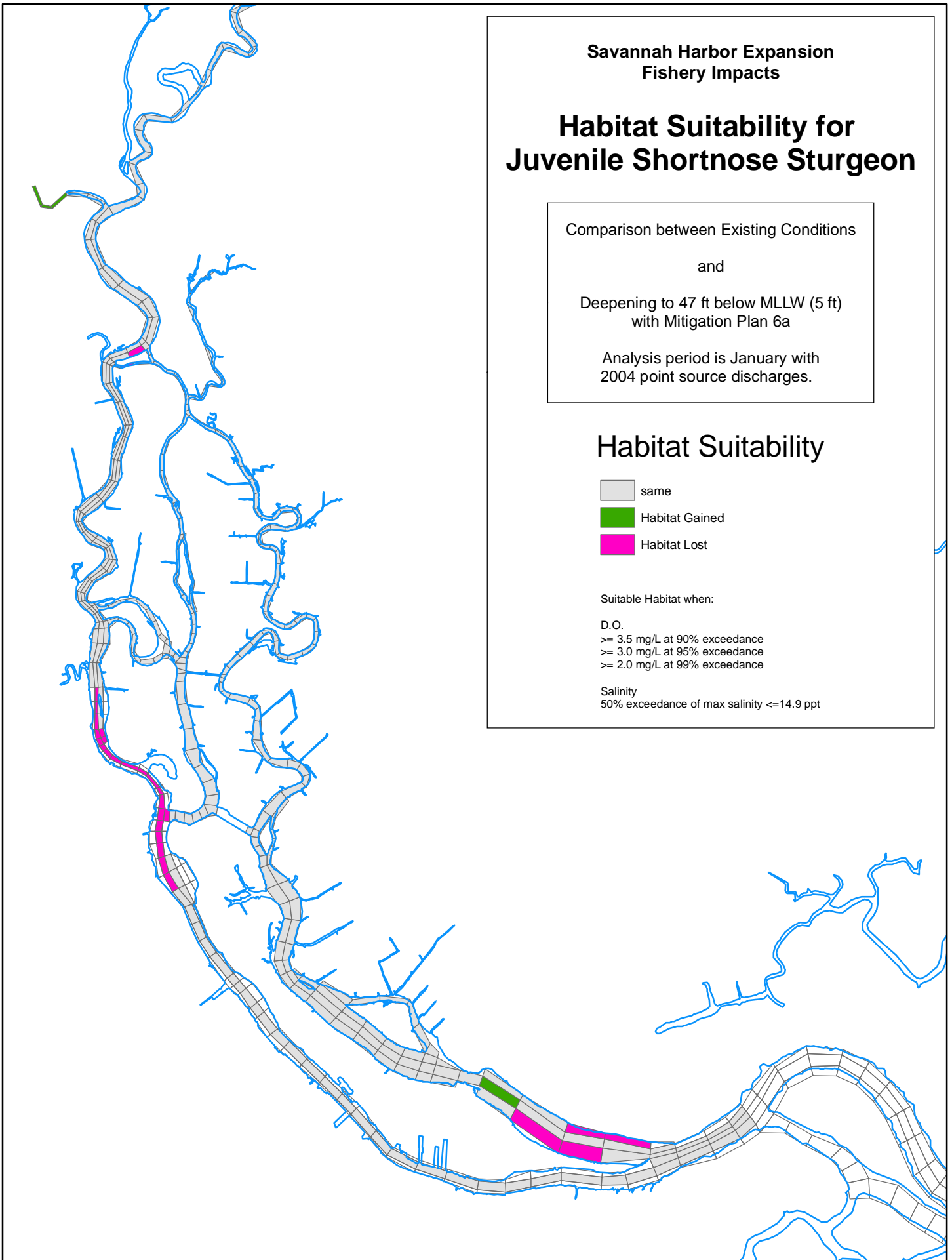
Habitat Suitability

-  same
-  Habitat Gained
-  Habitat Lost

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

Analysis period is January with
2004 point source discharges.

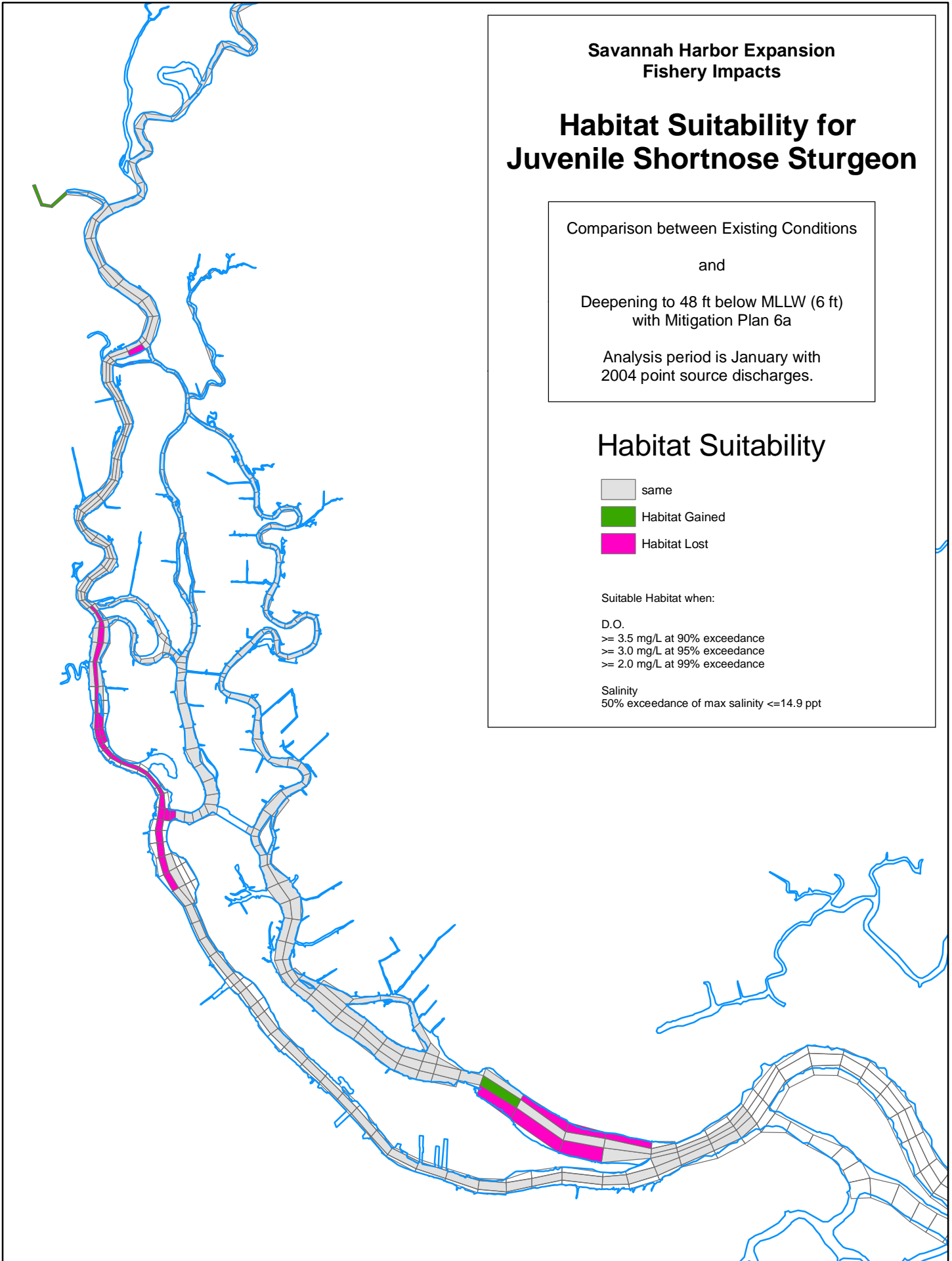
Habitat Suitability

- same
- Habitat Gained
- Habitat Lost

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 Project

Shortnose Sturgeon Habitat Suitability

Existing Conditions

NO Deepening
NO Mitigation

Analysis period is August with
2004 Point Source Discharges

Habitat Suitability

Habitat Criteria:



D.O. August:

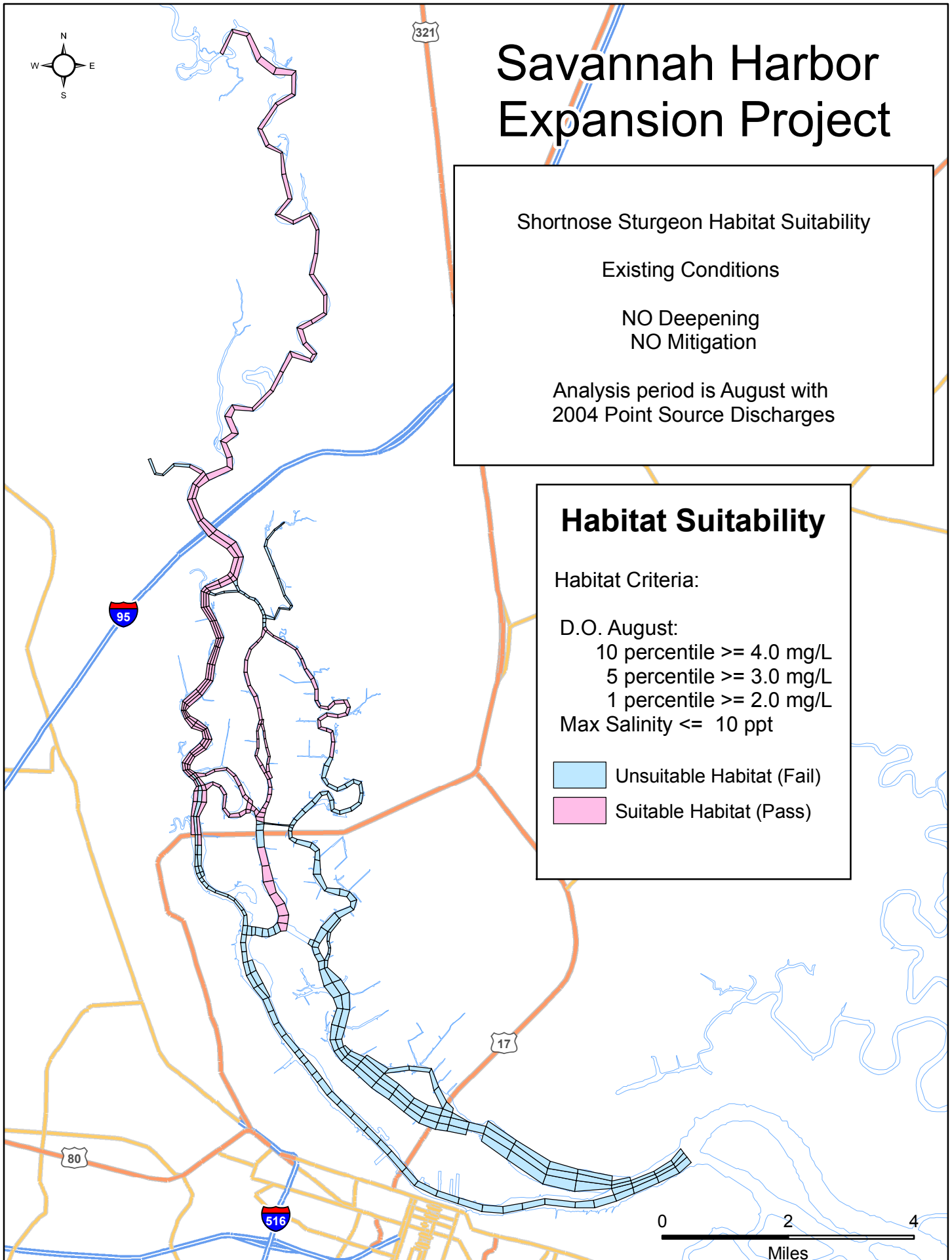
10 percentile ≥ 4.0 mg/L

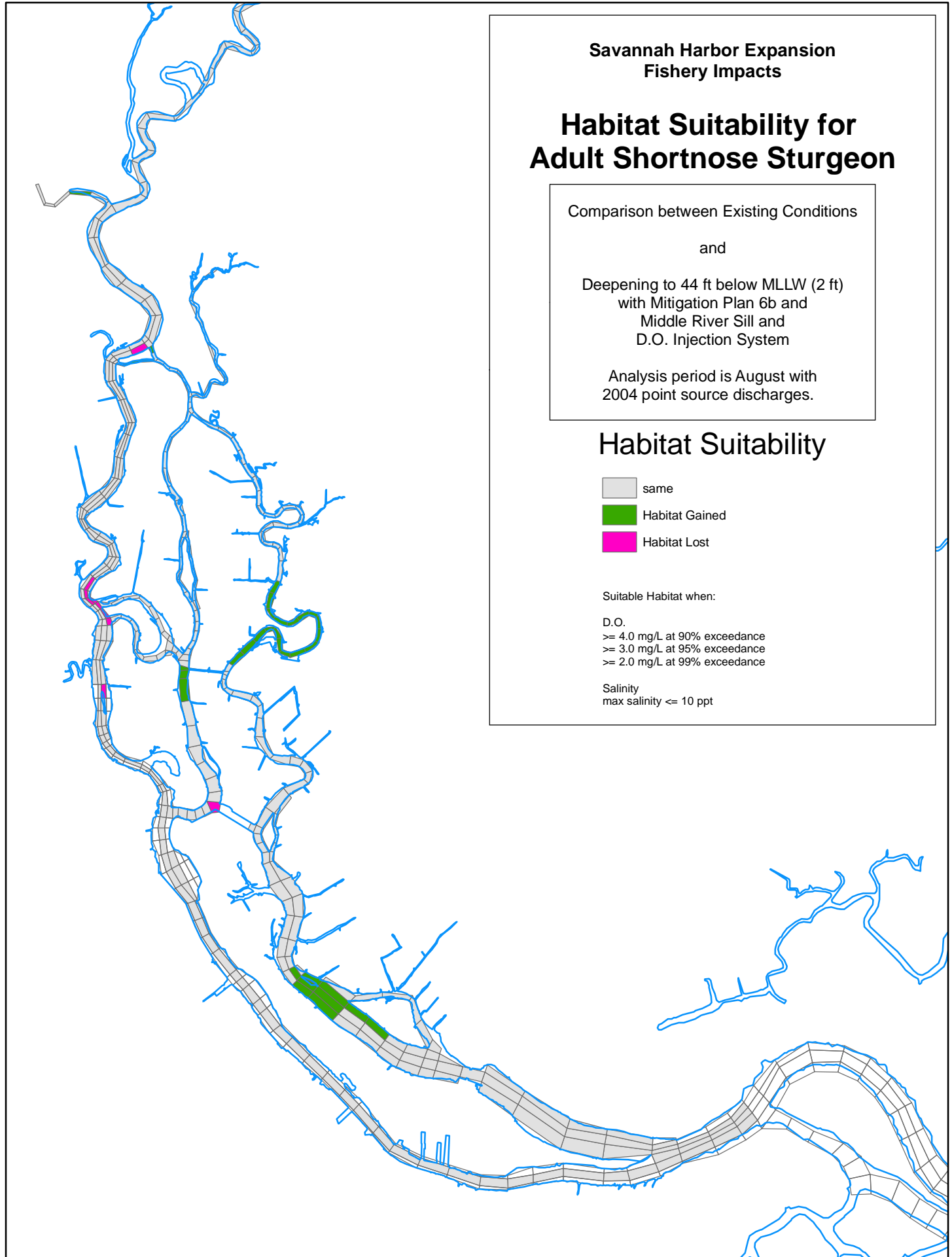
5 percentile ≥ 3.0 mg/L

1 percentile ≥ 2.0 mg/L

Max Salinity ≤ 10 ppt

-  Unsuitable Habitat (Fail)
-  Suitable Habitat (Pass)





**Savannah Harbor Expansion
Fishery Impacts**

**Habitat Suitability for
Adult Shortnose Sturgeon**

Comparison between Existing Conditions
and
Deepening to 44 ft below MLLW (2 ft)
with Mitigation Plan 6b and
Middle River Sill and
D.O. Injection System

Analysis period is August with
2004 point source discharges.

Habitat Suitability

- same
- Habitat Gained
- Habitat Lost

Suitable Habitat when:

D.O.
 ≥ 4.0 mg/L at 90% exceedance
 ≥ 3.0 mg/L at 95% exceedance
 ≥ 2.0 mg/L at 99% exceedance

Salinity
 max salinity ≤ 10 ppt

Savannah Harbor Expansion Fishery Impacts

Habitat Suitability for Adult Shortnose Sturgeon

Comparison between Existing Conditions

and

Deepening to 45 ft below MLLW (3 ft)
with Mitigation Plan 6a and
Middle River Sill and
D.O. Injection System

Analysis period is August with
2004 point source discharges.

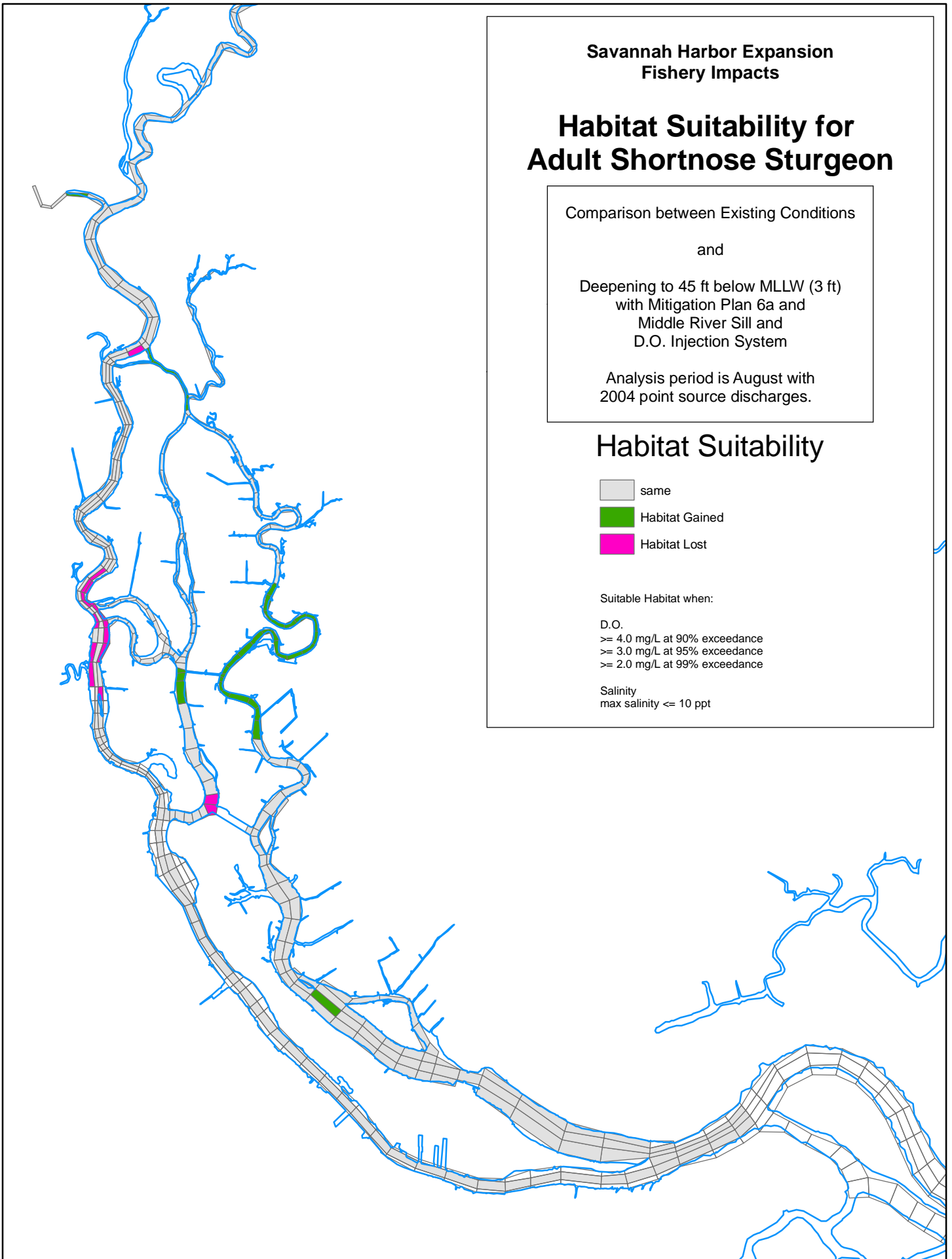
Habitat Suitability

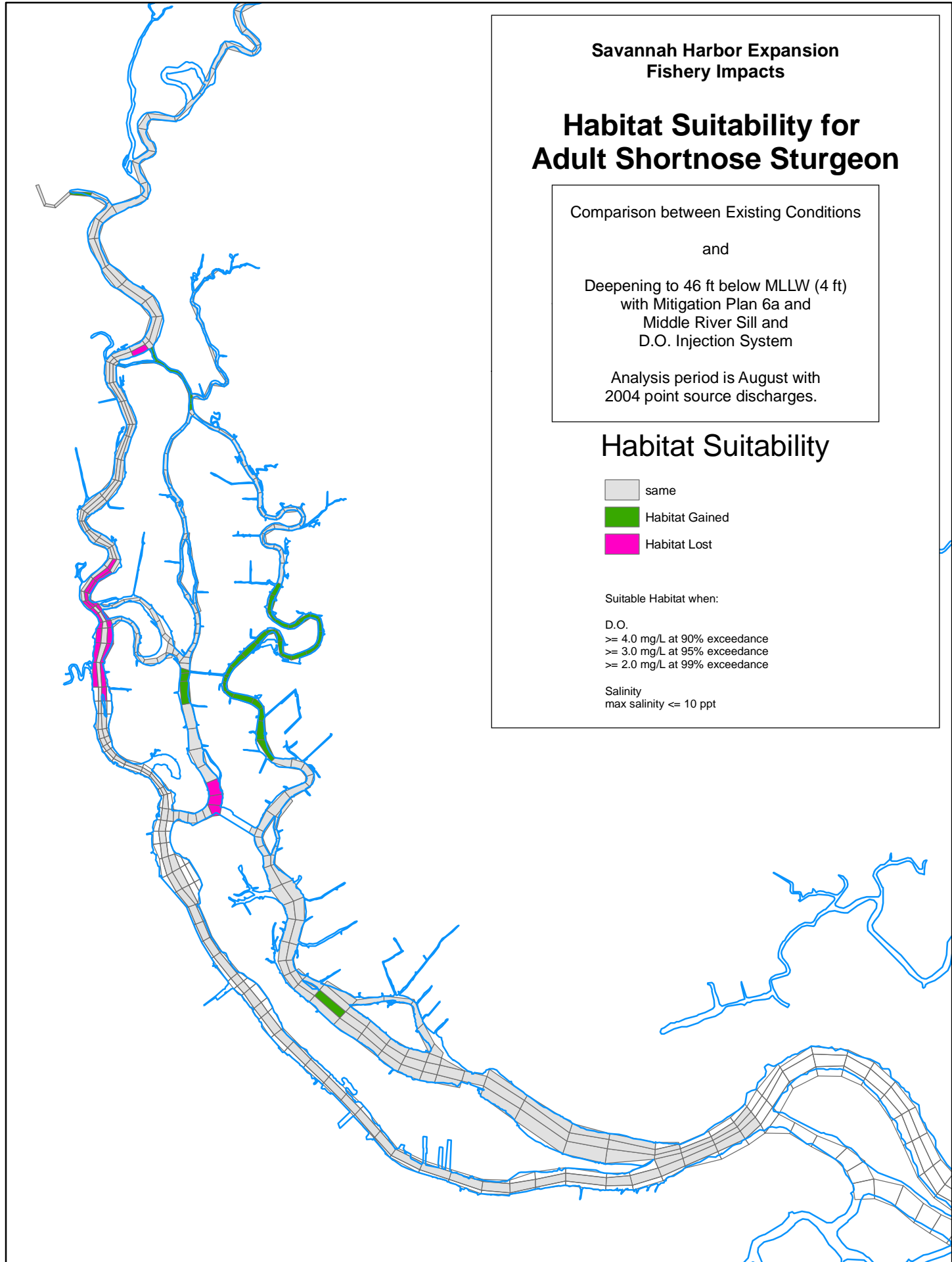
-  same
-  Habitat Gained
-  Habitat Lost

Suitable Habitat when:

- D.O.
- ≥ 4.0 mg/L at 90% exceedance
- ≥ 3.0 mg/L at 95% exceedance
- ≥ 2.0 mg/L at 99% exceedance

Salinity
max salinity ≤ 10 ppt





Savannah Harbor Expansion Fishery Impacts

Habitat Suitability for Adult Shortnose Sturgeon

Comparison between Existing Conditions

and

Deepening to 47 ft below MLLW (5 ft)
with Mitigation Plan 6a and
Middle River Sill and
D.O. Injection System

Analysis period is August with
2004 point source discharges.

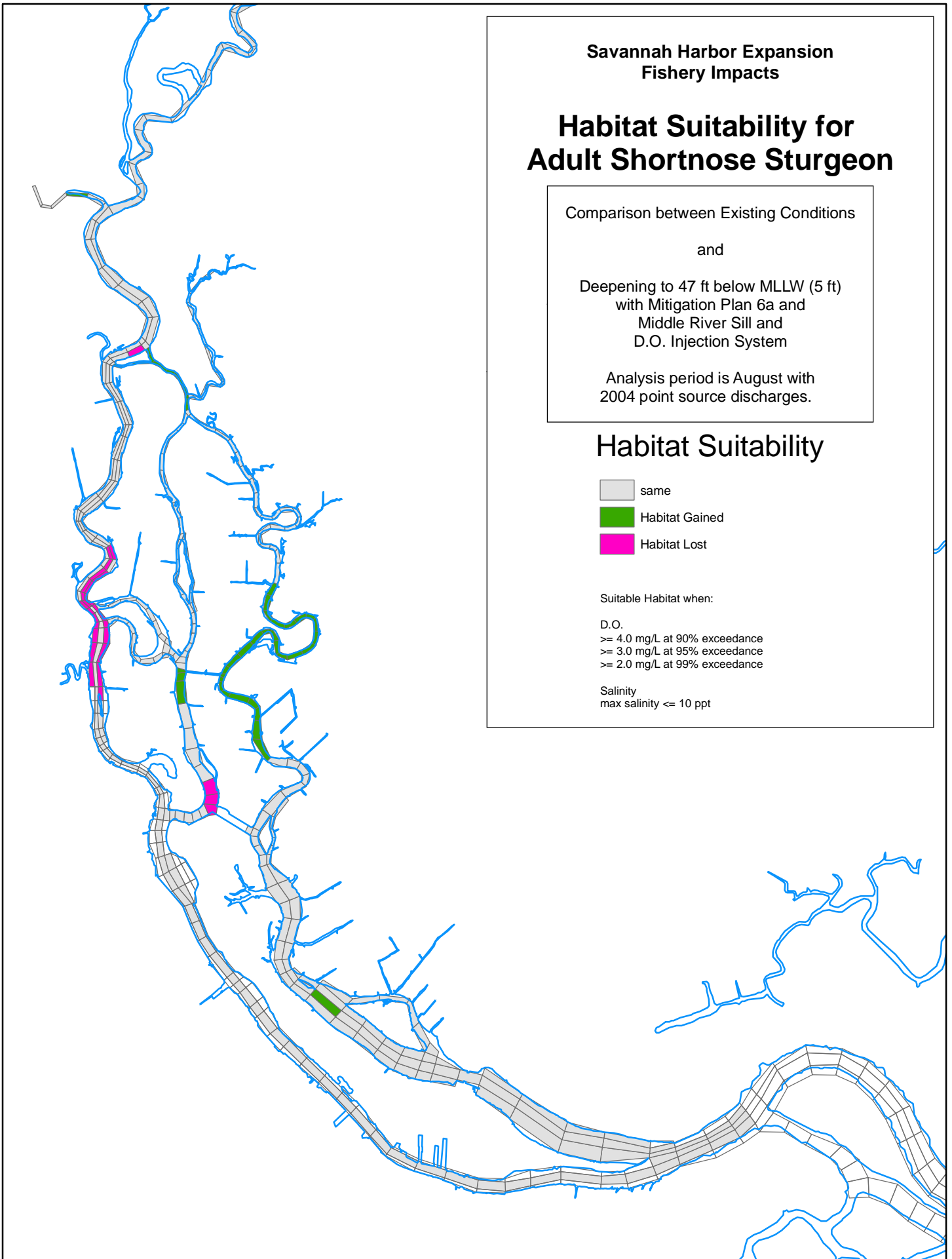
Habitat Suitability

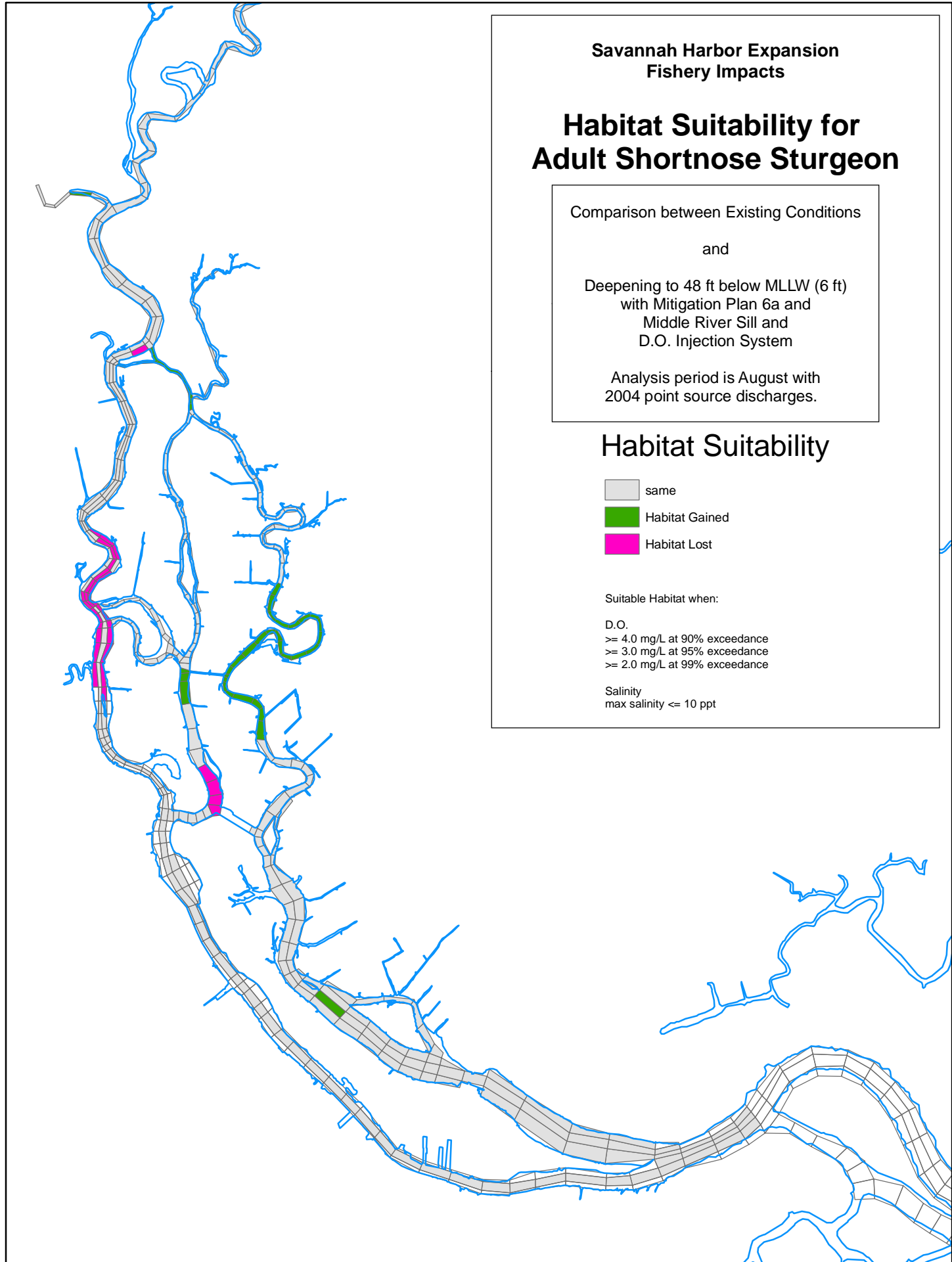
-  same
-  Habitat Gained
-  Habitat Lost

Suitable Habitat when:

- D.O.
- ≥ 4.0 mg/L at 90% exceedance
- ≥ 3.0 mg/L at 95% exceedance
- ≥ 2.0 mg/L at 99% exceedance

Salinity
max salinity ≤ 10 ppt





**Savannah Harbor Expansion
Fishery Impacts**

**Habitat Suitability for
Adult Shortnose Sturgeon**

Comparison between Existing Conditions
and
Deepening to 48 ft below MLLW (6 ft)
with Mitigation Plan 6a and
Middle River Sill and
D.O. Injection System

Analysis period is August with
2004 point source discharges.

Habitat Suitability

- same
- Habitat Gained
- Habitat Lost

Suitable Habitat when:

D.O.
 >= 4.0 mg/L at 90% exceedance
 >= 3.0 mg/L at 95% exceedance
 >= 2.0 mg/L at 99% exceedance

Salinity
 max salinity <= 10 ppt




**Savannah Harbor Expansion
Fishery Impacts**

**Habitat Suitability for
Adult Shortnose Sturgeon**

Existing Conditions ONLY
NO Deepening
NO Mitigation

Analysis period is January with
2004 point source discharges.

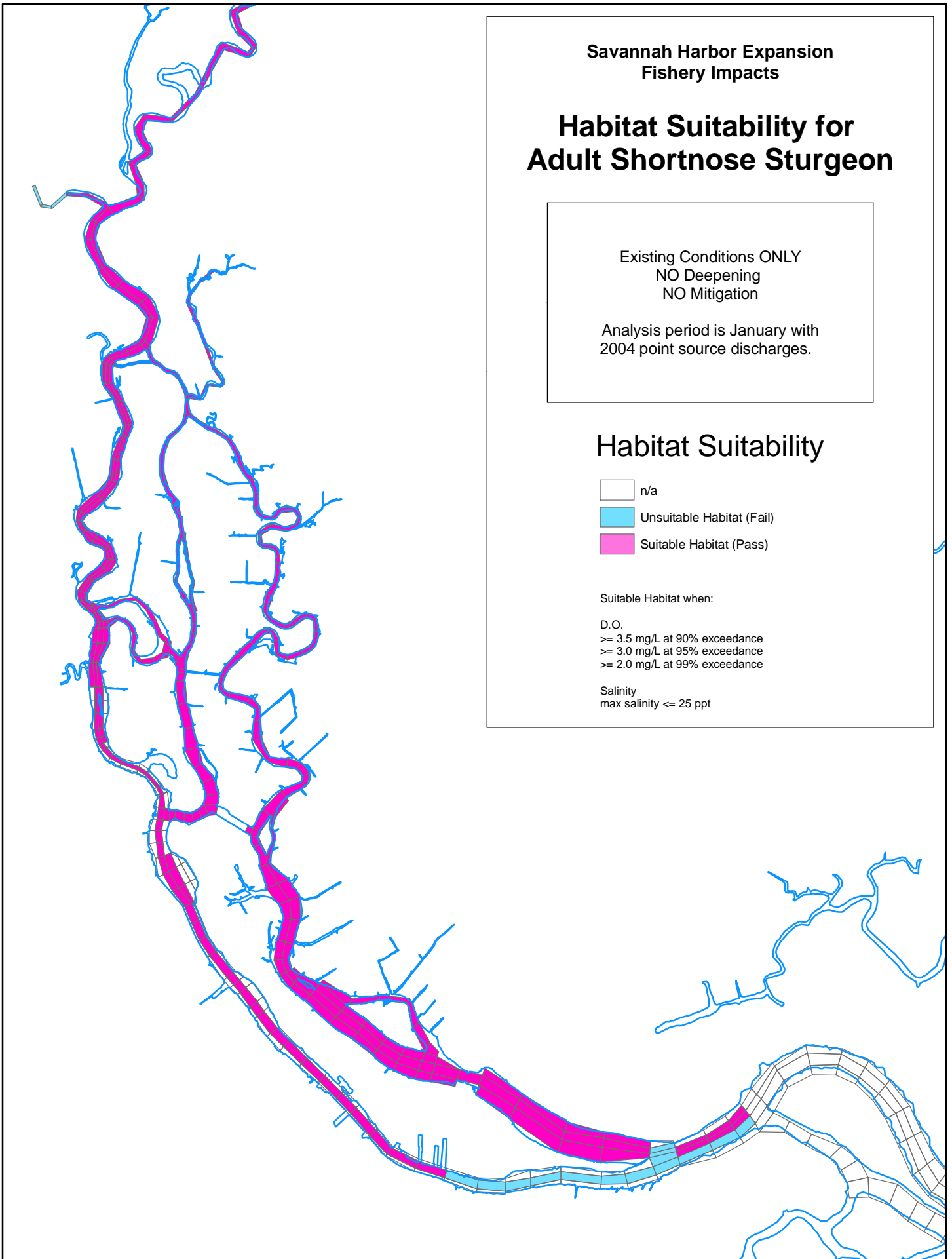
Habitat Suitability

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

Suitable Habitat when:

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

Salinity
max salinity ≤ 25 ppt



Savannah Harbor Expansion Fishery Impacts

Habitat Suitability for Adult 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.

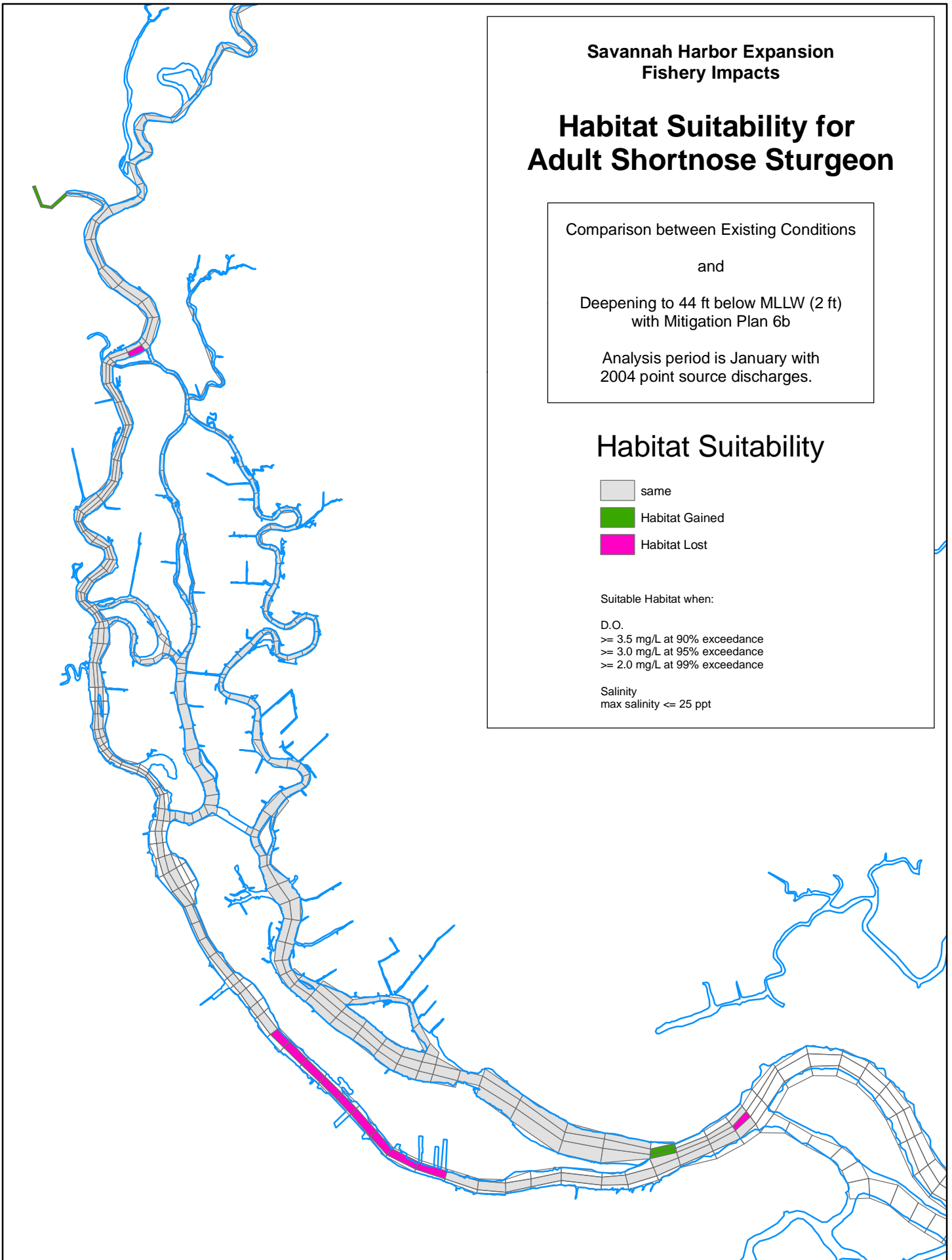
Habitat Suitability

-  same
-  Habitat Gained
-  Habitat Lost

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
max salinity ≤ 25 ppt



Savannah Harbor Expansion Fishery Impacts

Habitat Suitability for Adult 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.

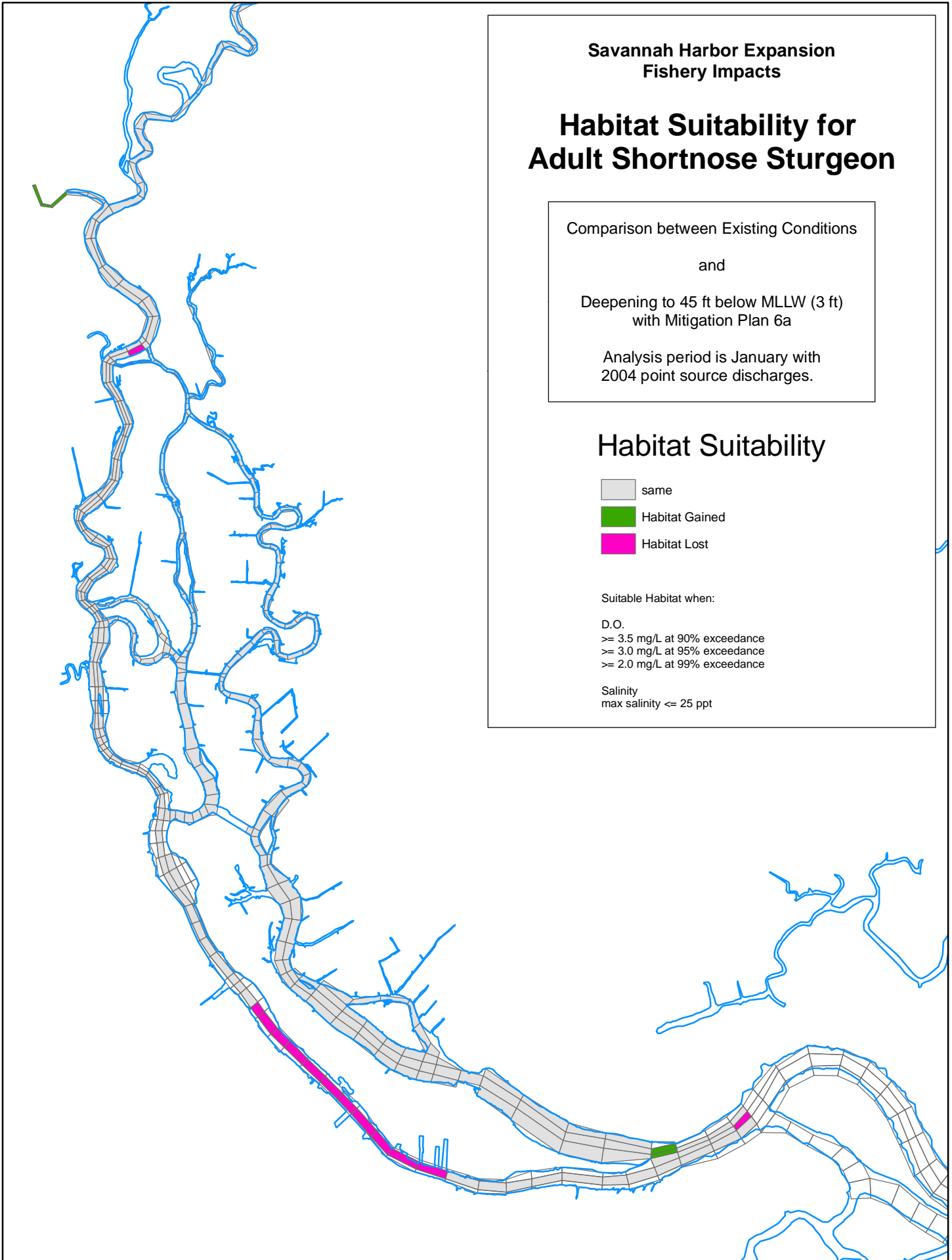
Habitat Suitability

-  same
-  Habitat Gained
-  Habitat Lost

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
max salinity ≤ 25 ppt



Savannah Harbor Expansion Fishery Impacts

Habitat Suitability for Adult 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.

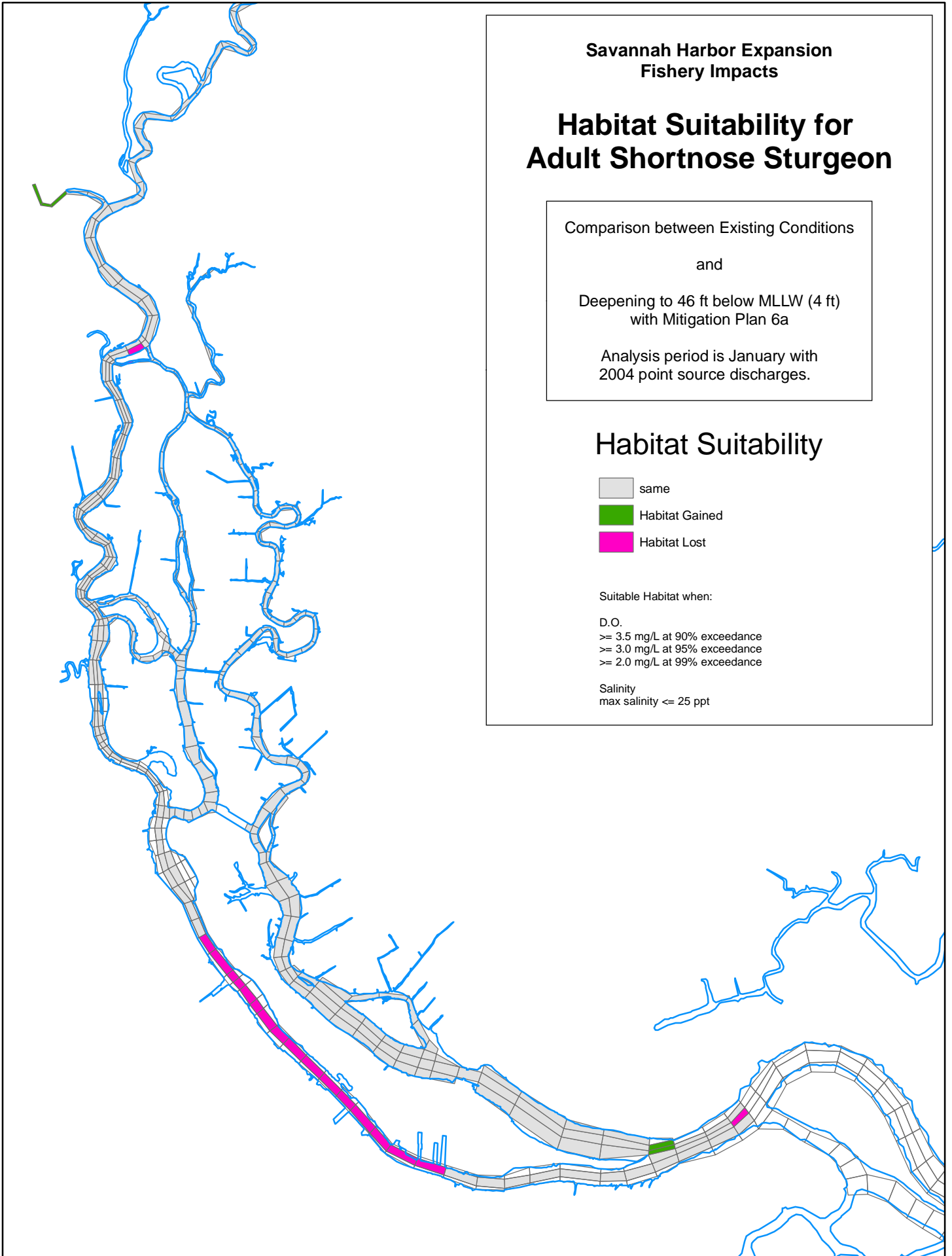
Habitat Suitability

- same
- Habitat Gained
- Habitat Lost

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
max salinity ≤ 25 ppt



Savannah Harbor Expansion Fishery Impacts

Habitat Suitability for Adult 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.

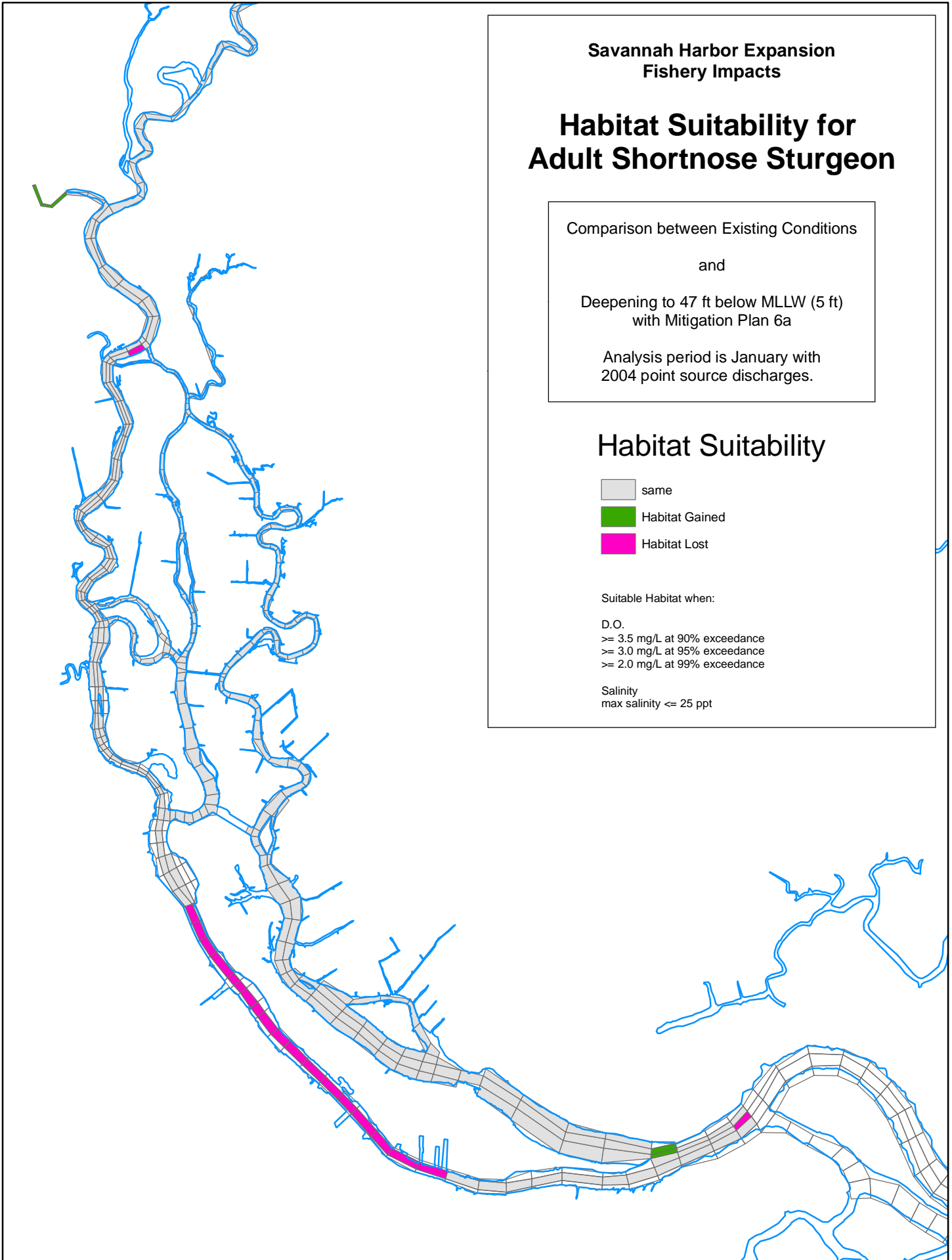
Habitat Suitability

-  same
-  Habitat Gained
-  Habitat Lost

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
max salinity ≤ 25 ppt



Savannah Harbor Expansion Fishery Impacts

Habitat Suitability for Adult 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

- same
- Habitat Gained
- Habitat Lost

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
max salinity ≤ 25 ppt

