



— BUREAU OF —  
RECLAMATION

Long-Term Operation – Initial Alternatives

# **Appendix Q – Georgiana Slough Barrier Non-Physical Barrier**

Central Valley Project, California

Interior Region 10 – California-Great Basin

## **Mission Statements**

The U.S. Department of the Interior protects and manages the Nation's natural resources and cultural heritage; provides scientific and other information about those resources; honors its trust responsibilities or special commitments to American Indians, Alaska Natives, and affiliated Island Communities.

The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.

Long-Term Operation – Initial Alternatives

# **Appendix Q – Georgiana Slough Barrier Non-Physical Barrier**

Central Valley Project, California

Interior Region 10 – California-Great Basin

Page Intentionally Left Blank

# Contents

	Page
1. Introduction.....	1
2. Performance Metrics.....	3
2.1 Biological.....	3
2.2 Water Supply .....	3
2.3 NEPA Resources.....	3
3. Lines of Evidence .....	5
4. Initial Options Analysis .....	7
5. Conclusions.....	9
6. References.....	11

Page Intentionally Left Blank

# 1. Introduction

The Georgiana Slough Non-Physical Barrier addresses the effects of releases and exports on the migration of Sacramento River-origin salmon and steelhead.

Reclamation's management questions for the formulation of an alternative include:

- How does the presence of the barrier influence routing of salmonids in the interior Delta?
- What is the difference in survival to Chipps Island with or without the barrier?
- What is the difference in salvage at the Tracy Fish Collection Facility and Skinner Delta Fish Protective Facility with or without the barrier?
- What is the effect of routing at Georgiana Slough on salmonid population viability?

Contrary to other variable components, initial alternatives for Georgiana Slough Non-Physical Barrier address whether to include or exclude the barrier from consideration, and not a range of options.

Page Intentionally Left Blank



## **2. Performance Metrics**

Performance metrics describe criteria that can be measured, estimated, or calculated relevant to informing trade-offs for alternative management actions.

### **2.1 Biological**

Biological metrics consider direct observations and environmental surrogates including:

- Juvenile survival probability to Chipps Island.

### **2.2 Water Supply**

Water supply metrics consider the multi-purpose beneficial uses of CVP reservoirs including:

- South-of-Delta agricultural deliveries (average and critical/dry years)

CalSim II would support the evaluation of water supply metrics.

### **2.3 NEPA Resources**

Analysis of the range of alternatives, as required by the National Environmental Policy Act is anticipated to describe changes in multiple resource areas. Key resources are anticipated to include: surface water supply, water quality, air quality, groundwater resources, aquatic resources, terrestrial biological resources, regional economics, land use and agricultural resources, recreation, hazards and hazardous materials, cultural resources, socioeconomics, environmental justice, and climate change.

Page Intentionally Left Blank

### **3. Lines of Evidence**

Juvenile salmonids from the Sacramento River Basin must pass the entrance to Georgiana Slough during outmigration. Those that remain in the Sacramento River have a much higher survival rate than those that are entrained into Georgiana Slough and subsequently end up in the interior and/or south Delta. The California Department of Water Resources (DWR) was required to consider engineering solutions to reduce the diversion of juvenile salmonids from the Sacramento River into the interior and south Delta (National Marine Fisheries Service 2009). In 2011 and 2012, DWR conducted an experiment to test the effectiveness of a behavioral Bio-Acoustic Fish Fence (BAFF) in preventing outmigrating juvenile Chinook salmon and steelhead from entering Georgiana Slough (California Department of Water Resources 2015). Juveniles were tagged with acoustic transmitters and released upstream of the BAFF both when it was on and when it was off. In 2014, a similar experiment using a physical barrier called a Floating Fish Guidance Structure (FFGS) was tested instead of a BAFF.

The BAFF was shown to have a higher protection efficiency (89.2%) and overall efficiency (89.4%) compared to the FFGS protection efficiency (72.8%) and overall efficiency (77.7%) (California Department of Water Resources 2016).

Page Intentionally Left Blank

## 4. Initial Options Analysis

Based on the results stated above, DWR will be implementing the Georgiana Slough Salmonid Migratory Barrier (GSSMB) project. From 2023 through 2030, a BAFF will be deployed at the Georgiana Slough junction during the time of year when juvenile salmonids are outmigrating from the Sacramento River. Like previous experiments, varying levels of monitoring will be conducted each year to determine the level of protection the BAFF provides to juvenile salmonids. The GSSMB project will again use acoustic-tags and release salmonids upstream of the BAFF to determine the proportion of fish that the BAFF prevents from entering the interior and south Delta via Georgiana Slough. Additional methods will be used in some years, including a predatory fish experiment to determine if predators or predation increases in the vicinity of Georgiana Slough when the BAFF is in place.

Page Intentionally Left Blank

## **5. Conclusions**

DWR determined a non-physical barrier is effective and is consulting through the U.S. Army Corps of Engineers to implement the GSSMB project. From 2023 through 2030, a BAFF will be deployed at the Georgiana Slough junction during the time of year when juvenile salmonids are outmigrating from the Sacramento River.

Page Intentionally Left Blank



## 6. References

California Department of Water Resources. 2015. *2012 Georgiana Slough Non-Physical Barrier Performance Evaluation Project Report*. California Department of Water Resources, Sacramento, CA.

California Department of Water Resources. 2016. *2014 Georgiana Slough Floating Fish Guidance Structure Performance Evaluation Project Report*. California Department of Water Resources, Sacramento, CA.

National Marine Fisheries Service. 2009. *Biological Opinion and Conference Opinion on the Long-Term Operations of the Central Valley Project and State Water Project*. June 4. Southwest Regional Office, Long Beach, CA.