The Temporary Barriers Project 2012

Environmental Permit Compliance Report

Department of Water Resources

Bay Delta Office

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Table of Contents

Introduction 1

Project Location: 2

Project Description: 4

Middle River Barrier (MR) 4

Old River near Tracy Barrier (ORT) 4

Grant Line Canal Barrier (GLC) 4

Head of Old River Barrier (HOR) 5

Pre-Construction 5

Construction 5

Biological Monitoring 5

Swainson's Hawk Monitoring 6

Water Quality Monitoring 6

Dissolved Oxygen 6

Sound Monitoring 7

Post Construction 7

MMRP Table 7

Conclusions 7

Representative Site Photographs 8

Post Construction Photos 9

Table 1: 2012 Temporary Barriers Project Installation and Removal Schedule 2

Figure 1: Project Location and Water Quality Sampling Stations 3

Appendix 1: Swainsons Hawk Survey and Monitoring Report
Appendix 2: Botanical Survey Report
Appendix 3: Biological Monitoring Data Sheets
Appendix 4: Worker Environmental Awareness Program Outline and Handouts
Appendix 5: Water Quality Monitoring Data
Appendix 6: Dissolved Oxygen Data
Appendix 7: Sound Monitoring Data
Appendix 8: MMRP Table
Appendix 9: Mitigation Purchase Receipts

Introduction

The purpose of this report is to fulfill the annual reporting requirements of the following permits:

- The Department of Fish and Wildlife 2081 Incidental Take Permit and Streambed Alteration Agreement 1600 permit,
- The Central Valley Regional Water Quality Control Board 401 Water Quality Certification,
- The Army Corps of Engineers 404 Permit,
- The National Marine Fisheries Service Biological Opinion, and
- The United States Fish and Wildlife Service Biological Opinion.

The South Delta Temporary Barriers Project (TBP) is an ongoing project which installs up to four rock barriers in channels located in the southern portion of the Sacramento - San Joaquin Delta near the cities of Tracy and Lathrop in San Joaquin County, California. The South Delta TBP was initiated in 1991 in response to a 1982 lawsuit filed by the South Delta Water Agency (SDWA) against the Department of Water Resources (DWR). DWR agreed to install these barriers to ensure that local agricultural diverters within the SDWA do not experience adverse water level and circulation impacts caused by the State Water Project (SWP) and Central Valley Project (CVP) Delta export operations.

The project consists of agricultural rock barriers in Old River near Tracy (ORT), Middle River (MR), and Grant Line Canal (GLC) near the Tracy Boulevard Bridge which are designed to act as flow control structures, "trapping" tidal waters behind them following a high tide. These barriers improve water levels and circulation for local south Delta farmers. A fourth barrier, installed at the Head of Old River (HOR), is designed to improve migration conditions for Central Valley fall-run Chinook salmon in the San Joaquin River watershed during adult and juvenile migrations.

All of the barriers are typically installed during the period between March and November. The three agricultural barriers (ORT, MR and GLC) help control water levels upstream of the barriers so that agricultural pumps will have sufficient head to operate efficiently during each tidal cycle. The channel sections upstream of the barriers will fill with water when the flood tide moves into the south Delta and overtops the barrier weirs. On the falling ebb tide, the water will be retained behind the barriers, maintaining sufficient depth to continue agricultural pumping without loss of service. Water quantities are not increased for the south Delta farmers; however, the availability of adequate pump draft and pumping efficiency is improved with the barriers in place.

At the HOR, a fourth barrier is installed in the spring in order to reduce the loss of out-migrating San Joaquin River basin Central Valley fall-run Chinook salmon smolts by significantly decreasing their diversions down Old River, consequently reducing their entrainment at the SWP and CVP pumps. California Central Valley steelhead also benefit from this protective action. The HOR may remain in place yearly from April 1 through May 31 at the discretion of the U.S. Fish and Wildlife Service (USFWS) and the California Department of Fish and Wildlife (CDFW). In 2009 and 2010 a Non-Physical Barrier (NPB) at

the HOR was installed as an alternative to the rock barrier because of a court order issued in 2008 mandating not to install the rock barrier citing a concern for the Delta smelt. The studies conducted using the NPB tested its efficiency in keeping the out-migrating salmon smolts in the San Joaquin River (SJR) and deterring them from going into Old River which may increase their chance of being lost in the interior Delta or entrained at the SWP and the CVP export pumps. In 2011, high flows on the SJR and safety concerns prevented the installation of the already planned NPB; nevertheless, DWR implemented the 2011 head of Old River fish study and data was collected on fish behavior at the divergence with no barrier in place.

The HOR rock barrier may also be reinstalled in the fall in an effort to improve dissolved oxygen (DO) levels in the San Joaquin River between its confluence with Old River and Medford Island, 25.5 miles downstream. The fall installation is a physical rock barrier at the HOR and is intended to increase the volume of San Joaquin River flow passing downstream through the Port of Stockton in order to raise the low DO sag that can occur there and thereby aid the adult salmon upstream migration in the San Joaquin River basin.

In 2012, a physical rock barrier was placed at the HOR and DWR implemented the 2012 head of Old River fish study for which data was collected on fish behavior at the HOR with a rock barrier in place.

Table 1: 2012 Temporary Barriers Project Installation and Removal Schedule

	Installation			Notched	Removal		
Barrier	Started	Closed	Completed		Started	Breached	Completed
Old River near Tracy	03/18/12	03/31/12	04/06/12	09/14/12	10/16/12	10/22/12	11/08/12
Middle River	03/12/12	03/14/12	03/16/12	09/14/12	10/29/12	10/30/12	10/30/12
Grant Line Canal	04/06/12	05/05/12	05/05/12	09/14/12	10/16/12	10/22/12	11/06/12
Head of Old River	03/16/12	04/01/12	04/09/12	No Notch	06/01/12	06/04/12	06/22/12

Project Location:

The South Delta Temporary Barriers (Project) is located in four distinct locations (Figure 1):

- Middle River (MR) near Victoria Canal, San Joaquin County. Latitude 37.8857 N, Longitude 121.4822 W, Section 36, Township 1N, Range 4E, U.S. Geological Survey (USGS) map Holt, Assessor's Parcel Number 189-250-22 and 131-120-04

- Old River (ORT) near the city of Tracy, San Joaquin County. Latitude 37.8103 N, Longitude 121.5428 W, Section 28, Township 1S, Range 4E, U.S. Geological Survey (USGS) map Clifton Court Forebay, Assessor's Parcel Number 258-041-01 and 189-050-43

- Grant Line Canal (GLC) near the Tracy Boulevard Bridge in San Joaquin County. Latitude 37.8199 N, Longitude 121.4483 W, Section29, Township 1S, Range 5E, U.S. Geological Survey (USGS) map Union Island, Assessor's Parcel Number 189-240-20 and 189-170-07

- Head of Old River (HOR) near the Sacramento-San Joaquin River Delta in San Joaquin County. Latitude 37.8078 N, Longitude 121.3307 W, Section 32, Township 1S, Range 6E, U.S. Geological Survey (USGS) map Lathrop, Assessor's Parcel Number 191-180-02 and 213-240-01.

Figure 1: Project Location and Water Quality Sampling Stations

Agricultural Barriers

1 **Middle River Barrier**

2 **Old River Near Tracy Barrier**

3 **Grant Line Canal Barrier**

Fish Barrier

4 **Head of Old River Barrier**

● **Location of the water quality measurement**

Project Description:

The 2012 TBP consisted of installing the three temporary agricultural rock barriers at Middle River near Victoria Canal, Old River near Tracy, and Grant Line Canal near Tracy Boulevard Bridge and installation of the spring rock barrier at the head of Old River. The 2012 Head of Old River Fish Monitoring Study was implemented to study fish with a rock barrier in place. This study evaluated smolts and predator behavior in the vicinity of the head of Old River with the intent of improving salmon smolts survival past the HOR during spring outmigration.

Additionally, in 2012 the option of raising by one foot the MR barrier to increase water level and improve circulation was exercised on July 3, 2012. Also in 2012, the GLC flashboard structure was replaced on June 14 and 15.

Middle River Barrier (MR)

Approximately 2,300 cubic yards of rock formed a 270 foot long berm, 50 feet wide at the base (0.31 acre). Six 48-inch diameter culverts with tidally-operated flap gates were embedded in the abutments of the barrier. The barrier abutments and culverts remained in place throughout the year. The center section of the barrier had a 140-foot long, 18-foot wide weir. The weir crest elevation was 3.3 feet based on the North American Vertical Datum of 1988 (NAVD88) until July 3 when the weir crest was raised by one foot to 4.3 feet (NAVD88).

On September 19, 2012, a notch that was 10 feet wide allowing a minimum depth of 6 inches of water to pass over the barrier during low-high tide was excavated to permit adult migrating Chinook salmon to pass the barrier.

Old River near Tracy Barrier (ORT)

Approximately 5,000 cubic yards of rock formed a 250-foot long barrier that is 60 feet wide at the base (0.34 acre). The center section of the barrier is equipped with nine 48-inch diameter culverts with flap-gates. A ramped boat portage facility is located at this site.

On September 14, 2012, a notch that was 10 feet wide allowing a minimum depth of 6 inches of water to pass over the barrier during low-high tide was excavated to permit adult migrating Chinook salmon to pass the barrier.

Grant Line Canal Barrier (GLC)

Approximately 12,600 cubic yards of rock formed a 300-foot long barrier that is 50 feet wide at its base (0.68 acres). The south end of the barrier is equipped with six 48-inch diameter culverts, 60 feet long, with flap-gates built into the barrier abutment. The culverts and barrier abutment remained in place throughout the year. A ramped boat portage facility is also located at this site at the north levee.

The existing flashboard structure had reached its service life and was replaced in 2012. The area of disturbance associated with the culvert replacement was approximately 100 square feet (<0.01 acre) within the existing project footprint. On September 14, 2012, enough flashboards were removed to

allow a minimum depth of 6 inches of water to pass over the barrier during low-high tide was excavated to permit adult migrating Chinook salmon to pass the barrier.

Head of Old River Barrier (HOR)

The spring HOR rock barrier is intended to prevent downstream-migrating salmon smolts in the San Joaquin River from entering Old River, which would expose them to State Water Project (SWP) and Central Valley Project (CVP) diversion operations and unscreened agricultural diversions. The spring HOR rock barrier is constructed with approximately 12,500 cy of rock to form a 225-foot long and 85-foot wide (at the base) berm (0.44 acre) and it has a crest elevation of 12.3 feet (NAVD88). Construction at the south end of the barrier includes the placement of eight, 48-inch diameter culverts with slide-gates into the barrier abutment. The middle section includes a 75-foot clay capped weir at an elevation of 8.3 feet. Unlike the ORT and GLC barriers, there is no boat portage facility at this barrier.

Based on recommendations from the NMFS and the USFWS, DWR facilitated changes to the barrier installation schedule and culvert number for the 2012 installation of the HORB. The HORB installation began two weeks early on March 16 and achieved the NMFS deadline of an April 1 closure of the barrier. In addition to this, the number of culverts placed in the barrier was raised from six to eight based on the USFWS recommendations to offset any early installation impacts to Delta smelt.

The fall HOR Barrier was not installed in 2012.

Pre-Construction

Biological surveys were performed by qualified biologists in the staging areas and access roads within 24 hours of the start of construction. These surveys focused on special status plants and animals and occurred prior to the start of construction. For complete details of preconstruction environmental monitoring, see Appendix 1: Swainson's Hawk Survey and Monitoring Report, Appendix 2: Botanical Survey of the Temporary Barriers Project Sites and Appendix 3: Biological Monitoring Data Sheets.

Worker Environmental Awareness Program (WEAP) training was held for all construction and DWR staff by an approved biologist. Topics covered included the biology and listing status of winter and spring run chinook salmon, steelhead, green sturgeon, delta smelt, longfin smelt, Swainson's hawk, and western pond turtle. Additionally, best management practices were discussed that would protect the species and their habitats. Additional training was performed for new workers entering the site for the duration of the project. For complete details on the WEAP, see Appendix 4.

Construction

Biological Monitoring

On-site biological monitoring was performed by agency approved biologists as required. Field Reports were completed periodically during the project see Appendix 3: Biological Monitoring Data Sheets. Site conditions were recorded periodically during the installation and removal of the barriers using

photographs (photos 1 through 4 are representative). Biologists were on site every day during construction to monitor and observe the construction activities.

Based on the on-site biological monitoring of the construction activities, there was no indication that construction activities had any significant detrimental effects to the environment.

Swainson's Hawk Monitoring

Swainson's Hawk surveys in 2012 were initiated on April 5 at all temporary barriers construction sites and their corresponding storage facilities. Surveys, construction monitoring and post-construction monitoring continued through June 1, 2012. For complete details, see Appendix 1: (Swainson's Hawk Survey and Monitoring Report).

Although 2012 was a difficult year for nesting raptors, there was no indication that construction activities at the barrier sites had any detrimental effects on the nesting raptors.

Water Quality Monitoring

Eight water quality monitoring stations were established for this project; one upstream and one downstream of each barrier (See Figure 1: Project Location and Water Quality Sampling Stations). Water quality measurements including turbidity and settleable solids were taken, at a minimum, every 4 hours during in-water work. The water quality objectives, as outlined in the Water Quality Certification number (WDID#5B39CR00191) issued May 6, 2011, were met on most occasions; however, there were five occasions when turbidity increased more than 15 NTU above background levels. This occurred on 10/29/2012, 11/5/2012, and 11/7/2012 at ORT, on 10/24/2012 at GLC and on 10/24/2012 at MR. No turbidity increases greater than 15 NTU were observed at the head of Old River during construction. At no point during the construction of the barriers did the turbidity reach the 150 NTU agreed upon background turbidity threshold for the Delta. The highest recorded turbidity measurement of 57.8 NTU occurred during the construction of the ORT barrier on 11/5/2012. This measurement was 24.7 NTU above the background measurement of 33.1 NTU. For complete water quality data see Appendix 5 (Water Quality Monitoring Data) which includes data collected during the installation and removal of the 2012 Temporary Barriers.

Overall, water quality measured during construction was well below the thresholds set by the CVRWQCB, however, there were five instances when measured turbidity increases were greater than 15 NTU.

Dissolved Oxygen

In 2012, DWR continued its South Delta water quality sampling program, which consisted of continuous monitoring. Continuous water quality monitoring includes dissolved oxygen and other parameters.

DWR started discrete sampling two weeks before the barriers were installed and concluded sampling two weeks after all the barriers were removed. Staff conducted sampling every Tuesday morning to target the time when dissolved oxygen concentrations tend to be lowest.

The information collected by this program is required for compliance with a 401 Water Quality Certification (5B39CR00191) issued by the Central Valley Regional Water Quality Control Board. For complete detailed information see Appendix 6.

Sound Monitoring

The analysis of the effects of the TBP anticipated that the construction and removal of each barrier would result in acoustic noise generated in the aquatic environment that exceeds typical ambient background conditions for the action area. Based on the types of vehicles and equipment to be used, the methods described for the construction and removal of the barriers and the effects analysis conducted for consultation, the amount of sound generated in the aquatic environment associated with the construction and removal of each barrier was monitored to ensure that these noise levels did not exceed threshold set by the National Marine Fisheries Service. For complete detailed information on the sound monitoring see Appendix 7.

Based on the underwater noise levels measured and observed during the monitoring, the ecological surrogate threshold was not exceeded and it was determined that the monitoring adequately characterizes the noise level trends attributable to the construction of the TBP. Based on these observations, it is anticipated that further monitoring of sound levels should not be necessary for the placement of rock barriers.

Post Construction

Upon completion of the project, all materials installed in the water were removed and sites were restored to their pre-project conditions. All reusable barrier materials were relocated to their staging area and stored for next season.

MMRP Table

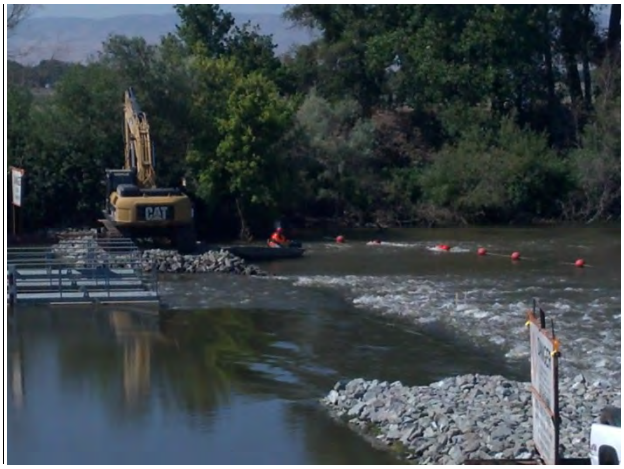
Appendix 8 contains the Mitigation, Monitoring and Reporting Program (MMRP) table specifying the mitigation measures, their source, the implementation schedule, the responsible party and the status of each task.

Conclusions

The terms and conditions of the environmental permits were met during the construction and operation of the agricultural barriers and the HOR rock barrier. On-site environmental disturbance of the surroundings were minimal due to the small foot print of the barriers. Also, in addition to the minimization and avoidance measures, Swainson's Hawk and shallow water disturbances have been compensated for through the purchase of mitigation credits at approved mitigation banks (Appendix 9). All sites were successfully restored to pre-project conditions after the removal of the barriers took place.

Representative Site Photographs

2012 Middle River Barrier



2012 Grant Line Canal Barrier

2012 Old River near Tracy Barrier

2012 Head of Old River Barrier

Post Construction Photos

Middle River

Grant Line Canal

Head of Old River

Old River Tracy

Appendix 1: Swainsons Hawk Survey and Monitoring Report

Swainson's Hawk Survey and Monitoring Report
Temporary Barriers Project
2012 Construction Season

The following is the compliance report on Swainson's Hawk surveys and monitoring for the Temporary Barriers Project construction activities in the 2012 nesting season. All observations and conclusions were made by Michael Bradbury, Staff Environmental Scientist for DWR, unless otherwise noted. Swainson's Hawks typically return to traditional nest sites in late March, and begin to lay eggs around the April 20. Great Horned Owls and Red-tailed Hawks typically nest 2 months and 1 month earlier, respectively.

<u>Head of Old River Barrier</u>

The construction of the Head of Old River Barrier began March 15 and was completed on April 1. Swainson's Hawk surveys were conducted beginning April 5, and completed on June 1. No Swainson's Hawks were nesting at the time the barrier was constructed. One Great Horned Owl nest was found near the construction site (Figure 1), but well away from those activities.

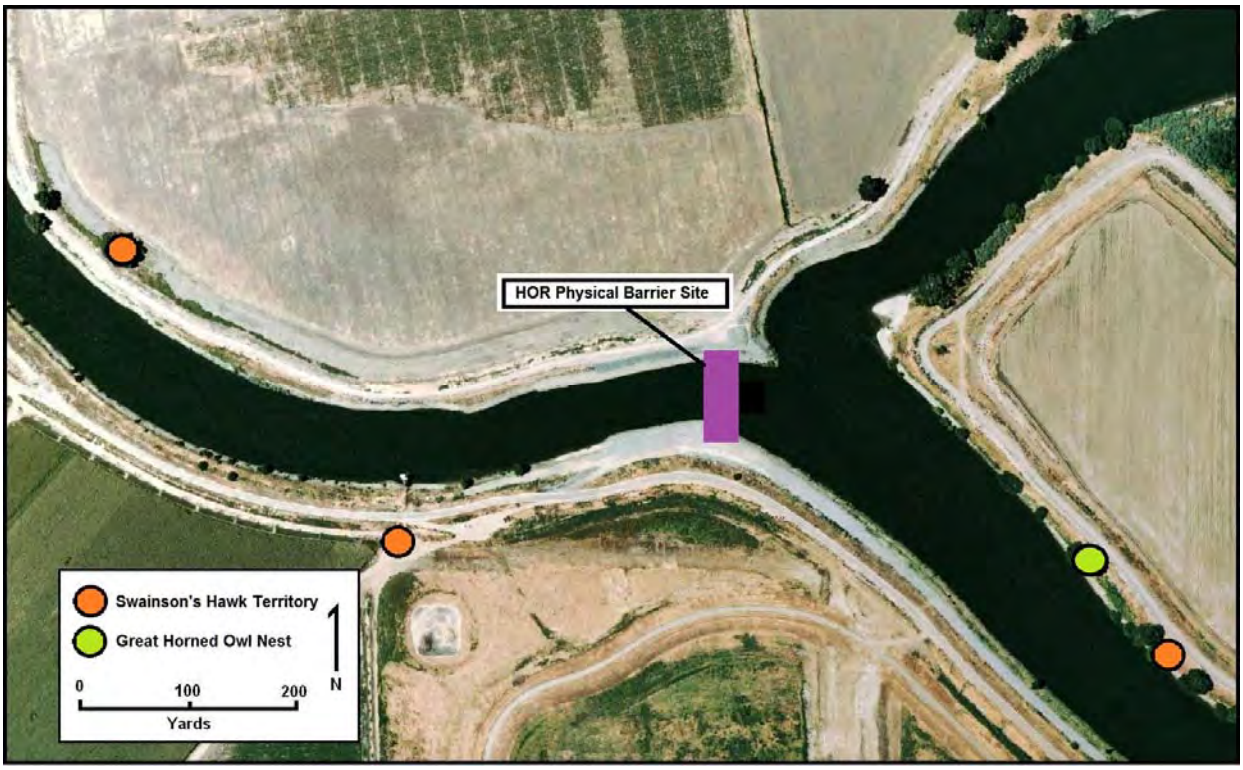


Figure 1. Swainson's Hawk nests at the Head of Old River barrier site in 2012.

The HOR barrier was removed from June 1 to June 21. Three Swainson's Hawk territories had been identified prior to the removal of the barrier, but none of the Swainson's Hawks there nested within ¼ mile of the construction activities.

Middle River Barrier

Construction on the Middle River (MR) barrier was begun on March 12 and was completed on March 16. Additional work was conducted at the barrier site in the first week of July. The barrier site was surveyed and monitored beginning in the second week of March by DWR Environmental Scientist Mike Cane. Swainson's Hawk surveys were not conducted until after the barrier was constructed when the birds had returned from their wintering grounds.

A pair of Swainson's Hawks constructed a nest on the island west of the barrier site (Figure 2) and were incubating eggs on April 30, but by July 1 and prior to additional construction at the Middle River Barrier, the nest had failed according to observations made by Mike Cane and DWR Environmental Scientist Danika Tsao.

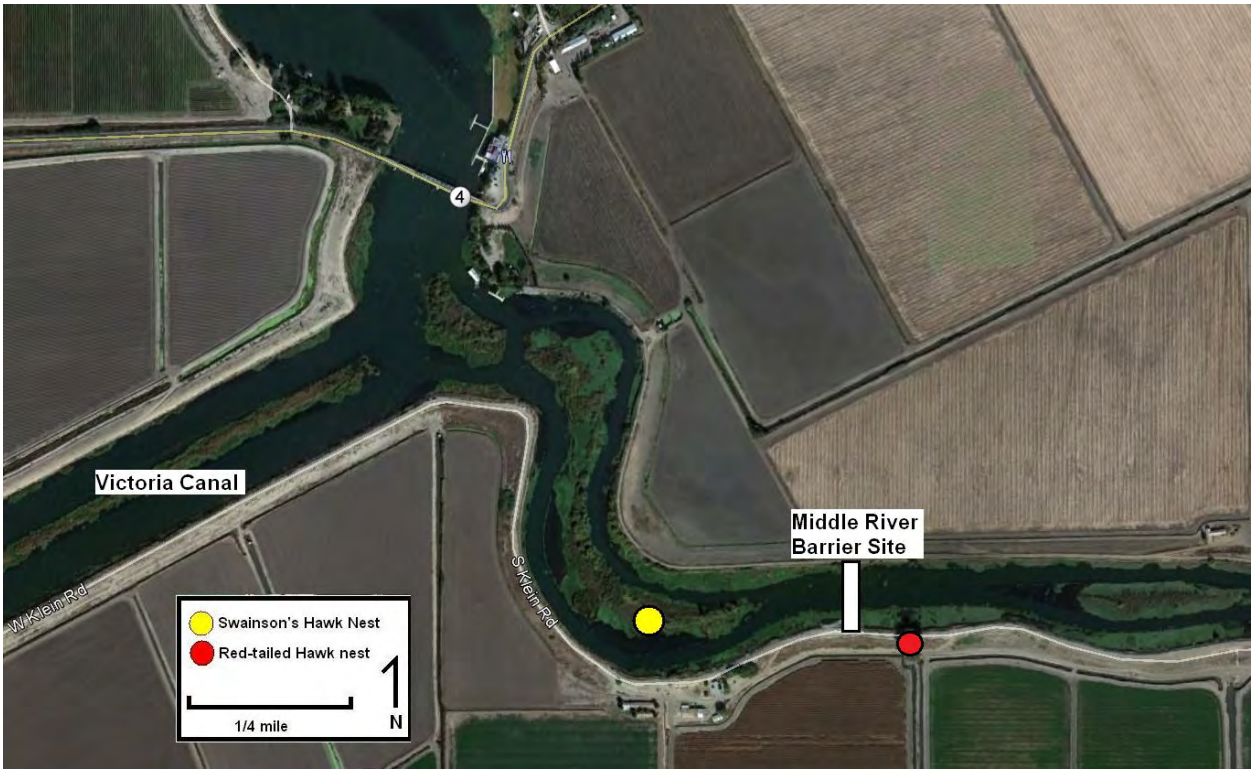


Figure 2. Raptor nests at Middle River barrier site in 2012.

An active Red-tailed Hawk nest was identified in the second week of March, and observations on July 1 and 2 indicate that at least one young fledged from the nest.

Old River/Tracy Barrier

The Old River Tracy barrier was constructed from March 15 to April 6. Swainson's Hawk surveys were conducted from April 5 to April 30. No Swainson's Hawks nested near the barrier site prior to the completion of the construction activities. A Red-tailed Hawk pair and Great Horned Owl pair each nested across the river from the ORT rock storage area (Figure 3). On April 30, the Red-tailed Hawks had at least 1 chick and the Great Horned Owls had at least 2 chicks. A Great Horned Owl pair nested in the eucalyptus tree on the in-stream island upstream of the barrier site. On April 5, an owl was seen on the nest incubating. On April 30, the nest was empty and had apparently failed.

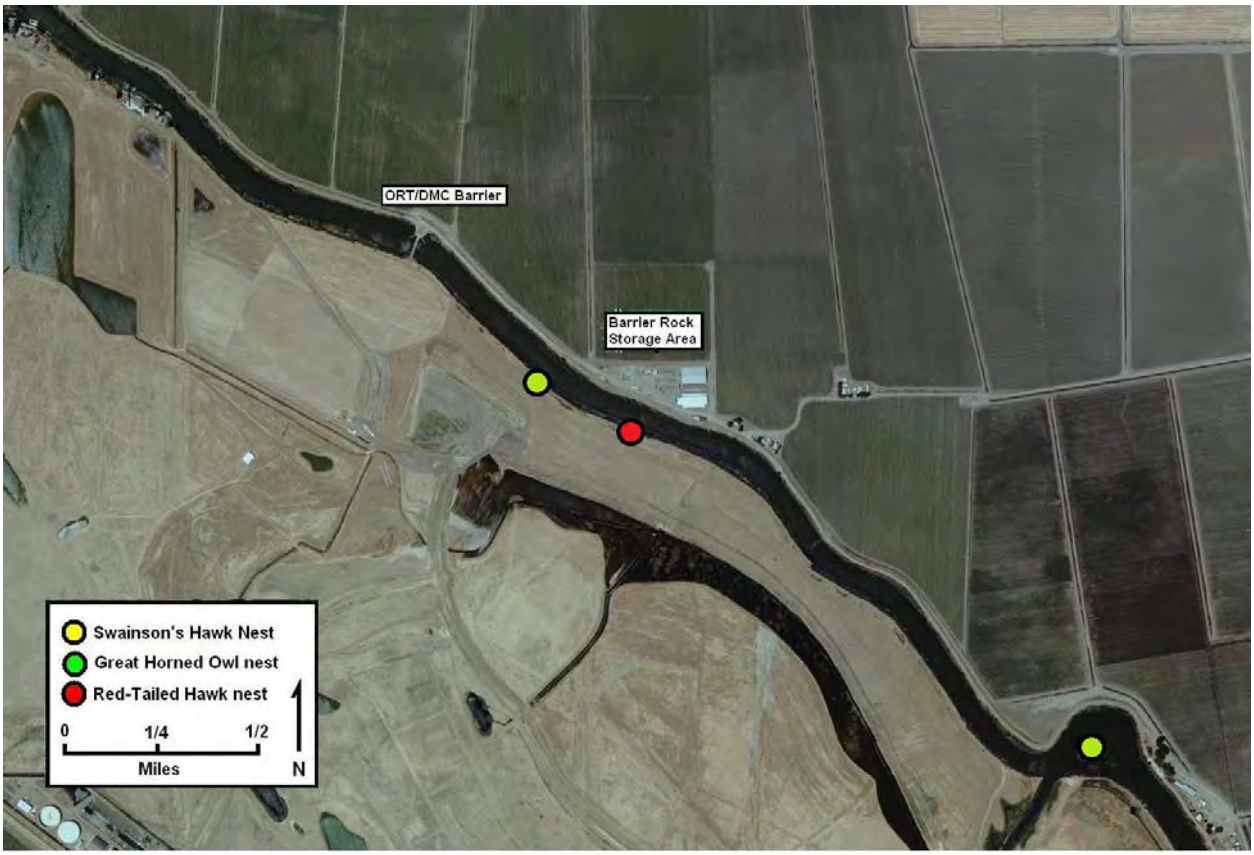


Figure 3. Raptor nests at Old River, Tracy barrier site in 2012.

Grant Line Canal Barrier and Accessory Areas

Construction of the Grant Line Canal barrier began in the second week of April and was completed May 5; construction activities ended on May 7. Swainson's Hawk surveys were initiated on April 5 and surveys and monitoring were completed on June 1, with an incidental observation of the Grant Line Canal nest in mid-June. Seven raptor nests and one nest territory were found and monitored during the nesting and construction season (Figure 4) near the barrier site, haul road and rock-storage site.

Three pairs of Swainson's Hawks nested in the project area, and a fourth pair of Swainson's Hawks had a nest territory but did not nest. All three pairs of nesters were late laying eggs, which didn't occur until the first week of May. Nest one (1) was in a willow tree along the north portion of the haul road; it was built on an old Red-tailed Hawk nest which was in danger of falling out of the tree even before the female hawk laid eggs. By mid-May, the nest collapsed and failed. Nest (2) was constructed in a walnut tree at the south end of the haul road. As of June 1 (post-construction), the female was still on eggs, and no additional observations were made of the nest. Nest (3) was built at the top of an oak tree on Grant Line Canal, 250 meters east of the barrier. On June 1, the female appeared to be on eggs, and in mid-June, date unknown, one young chick was observed on the nest, being fed by the female. A pair of Swainson's Hawks occupied a territory 400 meters west of the barrier on the in-channel island. Although the pair aggressively defended its territory, they did not build a nest.

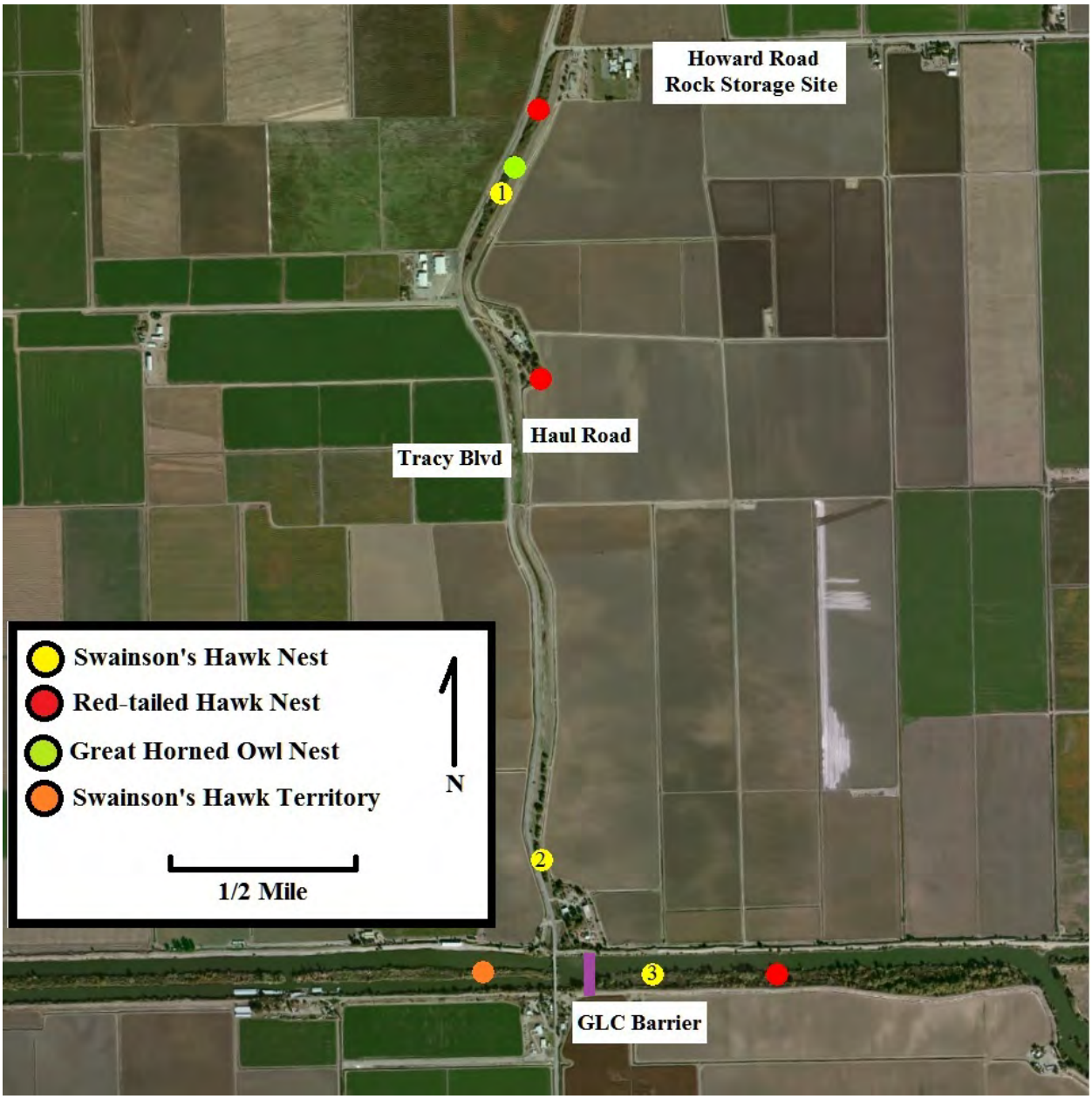


Figure 4. Raptor nests near the Grant Line Canal construction facilities in 2012.

Three Red-tailed Hawks nested in the vicinity of project activities, 2 along the haul road and one on Grant Line Canal. Each of the three nesting pairs produced at least one chick, which were observed post-project. One pair of Great Horned Owls also nested along the haul road and produced at least 2 chicks. The nest they used was used the previous year, an old Red-tailed Hawk nest, and the nest collapsed before the chicks fledged. At least one chick managed to stay in the tree or adjacent trees for several days, but it is unclear if it survived.

Two issues were noted for the last day of construction (5-05-12): Flatbed trucks carrying mats for the boat ramp were parked immediately across Grant Line Canal from the Swainson's Hawk nest on Grant Line Canal, and there was some human activity as those trailers were prepared for

off-loading and removal. Disturbance near Swainson's Hawks nests must be limited to the greatest extent possible, so no parking zones should be established within 200 yards of an active nest. In future years these no parking zones will be clearly demarcated. Also, dust abatement measures were not in place when this was observed. Dust was being carried toward the active nest, which can cause nest abandonment. Although the dust did not impair observations of the nest and did not cause abandonment, dust abatement measures should be followed to prevent dust from being transported toward active nests.

Conclusions and Additional Information

The 2012 nesting season was another bad year for Swainson's Hawks, as well as Red-tailed Hawks and Great Horned Owls. At the initiation of surveys it was noted that all raptor species observed in the South Delta and locations around the Sacramento Valley were late in egg laying; some were very late. According to available migration data, Swainson's Hawks were late returning from wintering grounds, and left California very early for areas south of the US border. Nest failure was high for all three species, and those that successfully raised young typically only had one chick. The pattern and results of nesting for the three species indicates that food resources were limited, although it is not clear why that is, whether a natural cycle for the prey species, or weather related.

Although 2012 was a difficult year for nesting raptors, there was no indication that construction activities at the barrier sites had any detrimental effects on the nesting raptors.

Appendix 2: Botanical Survey Report

Botanical Survey of the Temporary Barrier Project Sites (May 2011)

Botanical surveys were conducted on May 23, 2011 by DWR botanists, Lesley Hamamoto and Jean Witzman, at the Temporary Barrier sites at Old River at Tracy, Grant Line Canal, and Middle River. A CNDDB search lists six sensitive riparian plant species potentially occurring in the project area: Mason's lilaeopsis, rose-mallow (California hibiscus), delta mudwort, delta tule pea, marsh skullcap, and Suisun aster. The Streambed Alteration Agreement for this project also protects willows, oaks, cottonwood, box elder and other native plants.

Rock barriers have been installed annually since the 1990's and the work area at each site is well defined by the rock that remains on the banks from the year before. Therefore, the work area is heavily disturbed and mostly unvegetated, except for scattered weedy species and one box elder seedling that have sprouted between the rocks. Mitigation has compensated for the loss of riparian vegetation at these sites and for the loss of Mason's lilaeopsis upstream of the Old River barrier.

Although the work area is not expected to expand beyond the already disturbed area, the adjacent areas were surveyed. The species observed at each site are listed below. No sensitive species were found at the sites. Mason's lilaeopsis and delta mudwort are species with habitat in the intertidal zone, so surveys for them should be done at low tide. Because this survey had to be scheduled during a high tide, the survey for those species is not conclusive. However, based on years of experience with Mason's lilaeopsis and delta mudwort in the South Delta, the habitat conditions at and adjacent to the barrier sites are unlikely to support either species due to the rock substrate and/or shading by dense vegetation.

In conclusion, no sensitive plants or other native plants will be affected by the seasonal construction activities at the Temporary Barrier sites as long as the work is confined to the established work area.

<u>Old River at Tracy</u>:

Himalayan blackberry (*Rubus discolor*)
Ripgut brome (*Bromus diandrus*)
Box elder (*Acer negundo*)
California wild rose (*Rosa californica*)
Coyote brush (*Baccharis pilularis*)
Sandbar willow (*Salix exigua*)
Hardstem bulrush (*Schoenoplectus acutus*)
Water Iris (*Iris pseudacorus*)
Indian hemp *(Apocynum cannabinum*)
Wild mustard (*Brassica* sp.)

<u>Grant Line</u>

White alder (*Alnus rhombifolia*)
Himalayan blackberry (*Rubus discolor*)

Box elder (*Acer negundo*)
Sandbar willow (*Salix exigua*)
Arroyo willow (*Salix lasiocarpus*)
Milk thistle (*Silybum marianum*)
Ripgut brome (*Bromus diandrus*)
Buttonbush (*Cephalanthus occidentalis*)

Middle River
Buttonbush (*Cephalanthus occidentalis*)
Hardstem bulrush (*Schoenoplectus acutus*)
Water iris (*Iris pseudacorus*)
Marsh pennywort (*Hydrocotyle umbellata*)

Appendix 3: Biological Monitoring Data Sheets

Summary of Nesting Raptor and Western Pond Turtle Surveys for ORB, ORT and MR barrier sites

Head of Old River:

-Surveyed on both sides of Old River (OR), but not on the opposite side of the San Joaquin River (SJR).

-Surveys lasted around three hours (10:40 AM to 2:00 PM) for this site, two hours South of OR and one hour North of OR.

-South of OR: Two pairs of Red-tailed hawks were constructing/restoring nests in the immediate vicinity of the construction site (See Breeding Raptor Survey Maps, *RTHw Nest 1* and *RTHw Nest 2*). These two pairs displayed heavily and vocalized often in their displays. Both pairs were downstream (North) of the OR/SJR divergence, however, they were on different sides of the SJR. Several other Red-tailed hawks came into the area, including one pair which was there when I arrived but quickly left (*RTHw Pair 3*) and a single bird that was chased off by the pair on the West side of the SJR (near *RTHw Nest 1*).

-North of Old River: I verified the nesting sites for the two pairs I had been watching from the South. Along the SJR a single Red-tailed hawk flew from some willows as I drove by (*RTHw in Willows*), a White Tailed Kite displayed (WTKt display) above a large area of cottonwoods, a pair of Swainson's hawks displayed and vocalized above a field but soon flew off far to the west (*SwHw pair display*)and a female Northern Harrier flew over the same field in typical foraging behavior.

-No Western Pond Turtles were seen.

-Phainopepla pair seen foraging in Elderberry bush on East side of SJR.

Old River Tracy:

-Surveys conducted from North side of OR.

-Conducted Surveys for about one hour from 2:15 to 3:15.

-Several SwHw were seen soaring and displaying along Finck Road over Alfalpha fields as the road approaches the levy, but none were within a half mile of the barrier. After the Staging area, as the road goes up to the levy there was a hunting RTHw on a utility pole (RTHw 1 hunting) that flew as I drove onto the levy. It landed in a tree near the staging area (RTHw 1). Immediately across OR from where the road pulls onto the levy an active GHOw nest could be seen (GHOw in tree). Several NHar were seen flying over the adjacent fields in typical foraging behavior. A nest box with a nesting BrOw is extremely close to the barrier construction site (BrOw in nest box) and an unidentified raptor was perched in a tree around west of the construction site along OR (UNID rator in tree).

-No Western Pond Turtles were seen.

Middle River:

-Surveys conducted from Sorth side of MR.

-Conducted Surveys for about one hour from 3:30 to 4:30.

-There is a great egret, black crowned night heron and great blue heron colony on the islands in the middle of MR (see "MR Nesting Raptor Map"). A single RTHw flew from a Eucalyptus grove (RTHw potential nest and Merl) and landed on top of one of the trees. It stayed there for three minutes and then flew off to the West. After it had flown away I approached the small grove to look for signs of nesting. In one of the trees was a nest with freshly added material, but no hawk could be seen. I continued to look around when a female Merl flew around and landed on a branch still within the grove. After observing the Merl for a few minutes I exited the grove and a farmer came to work on a pump nearby. As he drove under a tree a second RTHw flew out. I assume this bird was in the nest but I cannot verify.

	Department of Water Resources **Biological Monitoring Field Report** **Project: Temporary Barriers Project**			
Biologist Name	Michael Cane		**Date**	3/12/12
	Start Time	7:00	**End Time**	1:30

Comments for all Concerns Noted Above/Species Observed/ General Comments:
- Conducted Env. Awareness training.
- Monitored RT Hw nest adjacent to MR. Hawks were curious, but remained in their nest tree and appeared calm
- Surveyed Haul Rd along MR and Roads around Tracy Blvd, that will be used to move materials to GLC and MR.
- Visited ORT to monitor nests. Found an additional nest
- looked for WRT, non found

Construction Activities Performed:
- MR construction began

	Department of Water Resources Biological Monitoring Field Report Project: Temporary Barriers Project			
Biologist Name	Michael Cane		Date	3/13/12
	Start Time	7:30	End Time	11:00

Comments for all Concerns Noted Above/Species Observed/ General Comments:
- Observed nesting RTHw's near MR.
They appear to be accostomed to
construction activities. I instructed
truckers not to stop under trees.
- Looked for WPT's none found

Construction Activities Performed:
- Work on MR.

	Department of Water Resources **Biological Monitoring Field Report** **Project: Temporary Barriers Project**		
Biologist Name	Michael Cane	**Date**	3/14/12
	Start Time 7:00	**End Time**	

Comments for all Concerns Noted Above/Species Observed/ General Comments:
- Saw GHOw and RTHw on
island with heron/egret colony.
GHOw may be nesting in the dense
willows. Crows were harassing it.
- nesting RTHw's were seen mating near
construction site.

Construction Activities Performed:
- Constructing MR

	Department of Water Resources Biological Monitoring Field Report Project: Temporary Barriers Project			
Biologist Name	Mike Cam		Date	3/15/12
	Start Time	9:00	End Time	11:30

Comments for all Concerns Noted Above/Species Observed/ General Comments:

- Visited site w/ Mike Bradbury and Danika Tsao. They confirmed my previous nest surveys at ORT, HOR and MR. We togeather checked out GLC and found anesting RTHw greater than 500 ft from the barrier and a pair of WTKt's displaying right near the barrier construction site
- A group of SwTw (8) were seen in a stand of trees less than 1/2 mile from the barrier site. They are likely migrants passing through avoiding the rainy weather

Construction Activities Performed:

MR construction

	Department of Water Resources Biological Monitoring Field Report Project: Temporary Barriers Project			
Biologist Name	Mike Cave		Date	3/16
	Start Time	8:30	End Time	10:30

Comments for all Concerns Noted Above/Species Observed/ General Comments:
- Observed RTHw hunting near
nesting tree. Appeared to be
accustomed to the work.
- Visited HOR to check site out
pre constructed.

Construction Activities Performed:
- Start pad preparation at HORB
- Finish MRB

	Department of Water Resources Biological Monitoring Field Report Project: Temporary Barriers Project			
Biologist Name	Danielle Ingrassia		Date	3/18/2011
	Start Time	08:30	End Time	~~3/18/2011~~ 11:45

Comments for all Concerns Noted Above/Species Observed/ General Comments:

- VISITED HOR confirmed w/ construction lead that water quality analysis was conducted on 3/17/2011, and was being conducted for 3/18/2011 as well. observed a RTH near nest 2, but did not observe any near nest 1. NO TRUCKS parked, OR WORK was done on the opposite side of the levee road near, or under nest one.
- construction started at ~~near~~ ORT GHO was observed in nest, did not seem disturbed.
- Construction at MR completed / work site clear. observed a RTH in the area weather was overcast and light drizzle.

Construction Activities Performed:

Pad Prep at HOR continued
ORT construction started (rocks dumped on side of levee)

	Department of Water Resources Biological Monitoring Field Report Project: Temporary Barriers Project		
Biologist Name	Michael Cane	Date	3/19/12
	Start Time 8:00	End Time	11:30

Comments for all Concerns Noted Above/Species Observed/ General Comments:

- Checked on RTHw at MR. The pair was seen foraging along levy near nest tree but no activity was occurring in the nest.
- Checked on HOR Hawk nests are far enough to have no disturbance from construction activities.
- ORT construction continued with a single OffRoad Hauler and the GHOw seemed to be aware but not too concerned.
- BaOw not observed.
- Swainsons hawk seen with nest building material along MacArthur

Construction Activities Performed:

- HOR pad preparation
- ORT rock placement.

	Department of Water Resources Biological Monitoring Field Report Project: Temporary Barriers Project			
Biologist Name	Michael Cane		Date	3-20-12
	Start Time	8:00	End Time	1:30

Comments for all Concerns Noted Above/Species Observed/ General Comments:

- I observed all four of the barriers sites with April McEwen to show her the concerns and what to keep an eye out for.
- MR nesting pair was back in the tree and fought off a passing Swainsons hawk.
- ORT had much construction activity but there seemed to be no adverse effects on any of the nesting pairs
- HOR finished pad preparation and is going to start rock placement. No work was conducted near nest sites.

Construction Activities Performed:

- ORT rock placement
- HOR pad preparation

	Department of Water Resources Biological Monitoring Field Report Project: Temporary Barriers Project			
Biologist Name	Michael Cane		Date	3-21-12
	Start Time	6:00	End Time	

Comments for all Concerns Noted Above/Species Observed/ General Comments:
- All placement today is being conducted
with the crane on the barge and no
access is happening on the North
side of the river.
- An otter swam near construction
activities (w/in 100 meters) and
then continued down the San Joaquin

Construction Activities Performed:
- HOR rock placement

	Department of Water Resources Biological Monitoring Field Report Project: Temporary Barriers Project			
Biologist Name	Mike Cane		Date	3-22-12
	Start Time	8:00	End Time	12:00

Comments for all Concerns Noted Above/Species Observed/ General Comments:

- HOR work being completed. No concerns.
- ORT work. The GHOW was still sitting on its nest watching the trucks go by. It did not seem overly concerned and I do not expect the work to impact the nest.
- The Red-Tail Hawk was far enough away from construction and I have no concerns.
- A Northern Harrier pair is hanging around a wetland area to the west of the project. No nesting material being place yet so I am not concerned.
- MR Red Tailed Hawk nest had the female sitting on the nest.

Construction Activities Performed:

- HORB Pad Preparation
- ORT Rock Placement.

	Department of Water Resources **Biological Monitoring Field Report** **Project: Temporary Barriers Project**			
Biologist Name	Danielle Ingrassia		**Date**	3/23/2012
	Start Time	9:00 am	**End Time**	1:45 pm

Comments for all Concerns Noted Above/Species Observed/ General Comments:
-HOR - Rock placement in progress, work conducted
from barge, no impacts to nesting birds.
water quality analysis and sound monitoring
was being conducted. water truck was deployed
for dust control.
-ORT - both GHO and RTH were alert and watching
construction activities but remained in nests and
did not display signs of distress.
-MR - observed RTH in nest.
-GLC- observed trucks at site but no
construction activities occuring

Construction Activities Performed:
-ORT - Rock placement.
-HOR - Rock placement.

	Department of Water Resources Biological Monitoring Field Report Project: Temporary Barriers Project			
Biologist Name	APRIL McEWEN		Date	3/26/12
	Start Time	8AM	End Time	12PM

Comments for all Concerns Noted Above/Species Observed/ General Comments:

HOR - using barge (crane) to place gravel in river. Using track-ho on N side of old river to move and place rock. Track-ho is fairly stationary on bank during 30-min observation period. No work near Nest 1 - no birds observed. PWS conducted fish surveys above construction site near Nest 1 (NE side of SJ Riv) RTH's observed in tree downstream SJ and hunting in fields near const. site. Sound and water qual. monitoring has been conducted per Personeni.

ORT - GHO and RTH were in nests. Big plumes of dust from road were blowing over nests due to rock-hauler activity, speed, and wind direction. Talked to J. Personeni who said dust-control measures (watering truck) had been cancelled because it was supposed to rain today. The weather forecast today says rain is not expected until tomorrow. Observed turbidity plumes from barge activities; no water qual. monitoring at time of observation but sound monitoring was being conducted. High noise levels across from nests @ storage site due to rock transfer into hauling trucks.

Construction Activities Performed:

HOR - rock placement

ORT - rock transfer from storage area to barrier site; rock placement and rock movement from littoral area to mid-channel by ~~bag~~ crane.

	Department of Water Resources Biological Monitoring Field Report Project: Temporary Barriers Project		
Biologist Name	Mike Cane	Date	3-27-12
	Start Time 8:00	End Time	1:00

Comments for all Concerns Noted Above/Species Observed/ General Comments:

HOR - Observed RTHw nest on North Side of OR as construction (excavator) activities were occurring there. The pair was in the same grove of trees and one left and caught a meadow vole near the construction site and returned to the grove. They did not seem to be harrassed by the construction activities at all.

ORT - Observed GHOw in nest and RTHw in nest. Water truck was there and had no other concerns.

Construction Activities Performed:

HOR - Pad preparation, spur on N side of Old River

ORT - Drag-lining and Rock placement.

	Department of Water Resources Biological Monitoring Field Report Project: Temporary Barriers Project			
Biologist Name	APRIL McEWEN		Date	3-28-12
	Start Time	8:30	End Time	12:30

Comments for all Concerns Noted Above/Species Observed/ General Comments:
ORT - roads muddy from recent rain
GHOW on nest, RTH not observed on nest - unident. hawk observed in barren tree ~700' downstream - flew b/w this area and over levee behind marsh for ~45 mins
2 Northern Harriers hunting in marshy rip. area 500' upstream of construction
Swainson's hawk perched in tree another 500' past the marsh area.
HOR - No concerns / no - minimal disturbance due to construction activities
Light adult SwH circling downstream HOR near trees on N bank

Construction Activities Performed:
ORT - dredging mid-channel
HOR - pad prep, no activities on N side of river

	Department of Water Resources Biological Monitoring Field Report Project: Temporary Barriers Project		
Biologist Name	Mike Cam	Date	3-29-12
	Start Time 8:00	End Time	12:00

Comments for all Concerns Noted Above/Species Observed/ General Comments:

- HORB: Saw White tailed kite, swainsons hawk and RTHs's foraging near construction. They seemed not to be bothered by activities

- ORT: GHOW was still in nest and was not bothered by periodic truck traffic. A single off Road Hauler was making loops to dump gravel for the culvert pad. A drag line was being used to place gravel.

Construction Activities Performed:

- HORB - Gravel being placed over culverts
- ORT - Pad being prepped for culvert placement.

	Department of Water Resources Biological Monitoring Field Report Project: Temporary Barriers Project			
Biologist Name	Michael Cane		Date	3-30-12
	Start Time	8:00	End Time	12:00

Comments for all Concerns Noted Above/Species Observed/ General Comments:

- HOR - Swainson's Hawk pair copulating and vocalizing w/in a 1/4 mile of construction along SJR. (Upstream ~~on~~ East side of river)
  - Swainsons Hawk pair seen with nesting material along ~~access rd~~ Old river where the road comes up onto the levy.

- ORT - GHOw and RTHw were not concerned with construction activities
  - Sea Lion went through construction area and seemed minorly concerned with activity.

Construction Activities Performed:

- HOR: Placed Rock and opened culvert slide gates.
- ORT: Placed culverts and Rock

	Department of Water Resources Biological Monitoring Field Report Project: Temporary Barriers Project			
Biologist Name	~~3-31-12~~ Mike Cane		Date	3-31-12
	Start Time	8:00	End Time	12:00

Comments for all Concerns Noted Above/Species Observed/ General Comments:
HOR: No concerns. Placement was not disturbing Raptors.
ORT - Monitored nests. The RTHAWK was sitting on the nest and was not disturbed by activities. The GHOW was also sitting on the nest and did watch as trucks went by but did not leave the nest.

Construction Activities Performed:
HOR - Rock placement
ORT - Rock placement

	Department of Water Resources **Biological Monitoring Field Report** **Project: Temporary Barriers Project**			
Biologist Name	Danielle Ingrassia		**Date** 4/1/2012	
	Start Time	9:00	**End Time**	11:30

Comments for all Concerns Noted Above/Species Observed/ General Comments:
HOR -
saw multiple hawks soaring near nest
1 and 2. Saw a Swainson Hawk fly through
the site. Saw a white tailed kite fly
throught the construction site.
ORT - arrived at the site there was
no visable signs of construction. GHOw
and RTHw both in nest and did not
seem disturbed

Construction Activities Performed:
HOR - Rock placement
ORT - no construction but crew could have been
at lunch.

	Department of Water Resources Biological Monitoring Field Report Project: Temporary Barriers Project			
Biologist Name	Danielle Ayasso		Date	4/4/12
	Start Time	9:000	End Time	1:45

Comments for all Concerns Noted Above/Species Observed/ General Comments:

HOR 3RT Hw Hawks observed soaring around nest 1 and 2. Observed Hawks at SJR (upstream east side of River in tree) most likely Swainsons Hawks. Sea lion swam into site.

ORT - finishing up construction GHO and RTHw both in nest not disturbed

Construction Activities Performed:

HOR - Rock placement (widening the Barrier)

ORT - matt placement

	Department of Water Resources Biological Monitoring Field Report Project: Temporary Barriers Project		
Biologist Name	Danielle Ungrassa	Date	4/6/12
	Start Time 9:00	End Time	1:30

Comments for all Concerns Noted Above/Species Observed/ General Comments:

HDR - Construction stoped because of equipment breakdown. Swainson hawks observed soaring and perched in tree upstream east side of San JR. RTHw observed soaring around nest 1 & 2

ORT - Construction Completed GHOw and RTHw in nests and not disturbed

GLC - Rock ~~placement~~ transport from staging area to site and dumped. At site four RTHw's observed soaring and perched in trees across the River one engaged in combat with a crow. RTHw nest near staging area Hawk in nest not disturbed by activities GHOw along haul route in nest not disturbed. there is a second nest in the tree in front of the GHOw nest but did not apear occupied.

Construction Activities Performed:

HDR - equipment breakdown

ORT - Construction Complete

GLC - Rock Transported from staging area to site / crews work on plateform for cofferd controls at staging area

	Department of Water Resources Biological Monitoring Field Report Project: Temporary Barriers Project		
Biologist Name	Michael Cane	Date	4/9/12
	Start Time 8:00	End Time	1:00

Comments for all Concerns Noted Above/Species Observed/ General Comments:
HOR- The Swainsons Hawk pair on the Upstream eastern side of SJR were sitting in the tree. They did not seem to be disturbed by the activities.
GLC- Monitored GHOW and RTHW nests along haul road as off road Haulers made trips to the barrier. The GHOW eggs had hatched and the owls watched as the truck went by but did not move. RTHW was still sitting and also did not move off of eggs.

Construction Activities Performed:
HOR - Pad placement, Hydrophone placement
GLC - Rock placement

	Department of Water Resources Biological Monitoring Field Report Project: Temporary Barriers Project			
Biologist Name	Mike Cane		Date	4/11/12
	Start Time	9:00	End Time	2:00

Comments for all Concerns Noted Above/Species Observed/ General Comments:

GLC - Pair ~~seen~~ of SWHA seen across river. They flew between trees getting attacked by Crows until they both landed in a nest for a minute and left to near by trees. One returned to the nest 20 minutes later and flew when 3 pairs of SWHA's flew overhead. There was displaying and vocalizations as the hawks interacted with stooping high overhead. The three pairs flew off quickly taking thermals towards the East. -Along the haul Road the GHOW nest has two young and two RTHA's are sitting on nests

Construction Activities Performed:

GLC - Rock Placement, dozer work to move rock around.

Cont. . .

One near the staging area and another near the Ranch house on the East side of the Hack Road.

ORT - RTHW seen sitting on nest.
GHOW seen with one chick on nest.

HOR - RTHW pair on NW side of SJR seen near nest. Difficult to view inside the nest but the female may be sitting on eggs. 3 SWHA territories are being set up around the Barrier site and many (>10) other SWHA were flying around, most likely due to Alphalpha harvesting in the area. The other RTHA pair was seen on a tree limb and most likely are not nesting this year.

	Department of Water Resources Biological Monitoring Field Report Project: Temporary Barriers Project		
Biologist Name	Michael Cane	Date	4/12/12
	Start Time 10:00	End Time	

Comments for all Concerns Noted Above/Species Observed/ General Comments:
GLC - The SWHA pair across the river appears to be undisturbed by construction activities. although the crows are harrassing both of them constantly. Two SWHA pairs are constructing nests along the haul Rd and a third pair is hunting across Tracy Blvd from the barrier site. The GHOW was in the nest with the two young. Both pairs of RTHW's were observed sitting on the nests.
MR - The RTHA female was observed sitting in the nest and a SWHA pair is constructing a nest on the island downstream of the barrier.

Construction Activities Performed:
GLC - Rock placement

Department of Water Resources
Biological Monitoring Field Report

Project: Temporary Barriers Project

Biologist Name	Mike Cane		**Date**	4/13/12
	Start Time	9:00	**End Time**	12:00

Comments for all Concerns Noted Above/Species Observed/ General Comments:

GLC - GHOW seen on Nest w/ two young
Both RTHA seen sitting on nest
All three pairs of SWHA seen
near or in nesting trees.
HOR - Came to the south side and viewed
for a few minutes no hawks seen, but
heavy rain likely kept them in trees.

Construction Activities Performed:

GLC - None
HOR - None

	Department of Water Resources Biological Monitoring Field Report Project: Temporary Barriers Project		
Biologist Name	Michael Cane	Date	4-17
	Start Time 2:00	End Time	4:30

Comments for all Concerns Noted Above/Species Observed/ General Comments:

GLC - RTHW near staging area sitting in nest
- GHOW nest destroyed. One juvenile was gone. One was on a branch in the tree. Adult was sitting near ground in nearby tree
- RTHW near Ranch was sitting on nest
- SWHA's were seen soaring near GHOW nest.
- SWHA's not seen @ GLC

Construction Activities Performed:

GLC - Rock Placement

	Department of Water Resources Biological Monitoring Field Report Project: Temporary Barriers Project			
Biologist Name	Danielle Ingrassia		Date	4/18/2017
	Start Time	9:00	End Time	1:00

Comments for all Concerns Noted Above/Species Observed/ General Comments:

GLC - observed RTHw on nest. proceeded to GHOw nest that was destroyed. observed male, female, and chick in nearby trees. observed SWHw COP on oak across the channel from the ~~to~~ entry of haul route on levee. Park SWHw soaring across the channel. proceeded back to RTHw ~~nests~~ nest female and male defending nest from crows. female was off the nest but it was directly related to crows. Came back and female was back on nest before going home observed SWHw soaring over trees where GHOw's were. SWHw diving down at female.
- ~~HD~~ ORT observed GHOw & chicks, RTHw on nest.

Construction Activities Performed:

GLC - Rock Placement

ORT - none

38 days

	Department of Water Resources **Biological Monitoring Field Report** **Project: Temporary Barriers Project**			
Biologist Name			**Date**	
	Start Time		**End Time**	

Comments for all Concerns Noted Above/Species Observed/ General Comments:
GLC- Land owner was discing the grass on both sides of the hunt Road. This is right next to the GHOW nesting site and the RTHW nesting site. The RTHW was standing on the edge of the nest when I arrived looking into the nest. I monitored it with my spotting scope for about 20 minutes until it flew away to a Utility pole with the other RTHW. They both flew up and soared over the tree for a minute and then flew away. The GHOW was sitting on the nest branch with the juvenile.

Construction Activities Performed:
GLC- land owner discing and rock placement.

- A single SWHA was seen soaring over the GHOWS and it eventually landed in the tree with a very poorly constructed nest that it had been seen at before.
- The RTHA near the ranch along the Haul Road was sitting in it's nest. Their was a pair of swainson's displaying above there, as well.
- I monitored construction on the levy for around an hour (9:45-10:45) a SWHA was seen soaring over the fields south of the construction for around five minutes but flew away to the south. Another SWHA was seen soaring above the canal about 1/2 mile to the East

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- I came back by GLC Haul rd to check on the RTHW. Both parents were on the nest and I may have seen some feeding but the leaves obscured visibility. It has been 38 days since initial nest sitting.
- A SWHA was sitting in the tree with the sideways falling apart nest.

	Department of Water Resources Biological Monitoring Field Report Project: Temporary Barriers Project		
Biologist Name	Michael Cane	Date	6/7/12
	Start Time 9:00	End Time	10:30

Comments for all Concerns Noted Above/Species Observed/ General Comments:

HORB-

- No dead or dying fish observed
- Hawks appear unaffected by construction activities

No construction occurring at other sites.

Construction Activities Performed:

- Rock removal and transport over levy.

9:30 - 10:00

5:00

	Department of Water Resources Biological Monitoring Field Report Project: Temporary Barriers Project			
Biologist Name	Michael Cane		Date	6-8-12
	Start Time	9:16	End Time	

Comments for all Concerns Noted Above/Species Observed/ General Comments:
HOR- A single light morph SWHA flew over the ~~sight~~ site and was undisturbed by the construction activities.
- No other concerns noted
- Checked RTHA nest on N side of Old River. Unable to see into nest, however, RTHA adult seen in tree and appeared undisturbed by construction activities

Construction Activities Performed:
- Rock Removal on N and South levies.

	Department of Water Resources Biological Monitoring Field Report Project: Temporary Barriers Project			
Biologist Name	Michael Cane		Date	
	Start Time	8:30	End Time	9:30

Comments for all Concerns Noted Above/Species Observed/ General Comments:

- A large crane is picking up the culvert frames from the water. Turbidity is increasing due to activities.
- No dead or injured fish observed
- SWHA observed flying over construction site.

Construction Activities Performed:

HORB - Removal of Culverts and Frames
- Shipping of Culverts to Howard yard.

	Department of Water Resources Biological Monitoring Field Report Project: Temporary Barriers Project			
Biologist Name	Michael Cane		Date	6-12-12
	Start Time	9:00	End Time	10:00

Comments for all Concerns Noted Above/Species Observed/ General Comments:

- Excavator loaded onto barge to conduct pad removal.
- Continued rock removal seems to have limited impacts on turbidity.
- No concerns noted.

Construction Activities Performed:

- Final Frame ~~removal~~ transport to Howard Yard
- Continued removal of rock and pad.

	Department of Water Resources **Biological Monitoring Field Report** **Project: Temporary Barriers Project**		
Biologist Name	Mike Cane	**Date**	6-13-12
	Start Time 9:00	**End Time**	10:30

Comments for all Concerns Noted Above/Species Observed/ General Comments:
- SWHA seen flying over construction
area. Appeared undisturbed by activities.
- No Concerns.

Construction Activities Performed:
- Removal of Rock and Pad from barge
and shore

	Department of Water Resources **Biological Monitoring Field Report** **Project: Temporary Barriers Project**			
Biologist Name	~~[illegible]~~ Mike Cane		**Date**	6-14-12
	Start Time	9:00	**End Time**	10:30

Comments for all Concerns Noted Above/Species Observed/ General Comments:

HOR - SWHA's and RTHW's seen soaring around construction area. Appeared to be undisturbed by project activities.

GLC - Place flash board structure
- Hole in barrier was dug and left open for several hours before the structure was placed. Flash boards were not placed.

Construction Activities Performed:

HOR - Continued Removal of Rock and Pad
GLC - Placement of Flashboard structure.

	Department of Water Resources Biological Monitoring Field Report Project: Temporary Barriers Project			
Biologist Name	Michael Cam		Date	6-15-12
	Start Time	9:00	End Time	10:30

Comments for all Concerns Noted Above/Species Observed/ General Comments:
HOR - No Concerns
Terns seen fishing near project.
GLC - No Concerns

Construction Activities Performed:
HOR - Removal of Rock and pad
from barge and shore
GLC - Place flash boards.

	Department of Water Resources Biological Monitoring Field Report Project: Temporary Barriers Project			
Biologist Name	Michael Cam		Date	6-18-12
	Start Time	9:00	End Time	10:30

Comments for all Concerns Noted Above/Species Observed/ General Comments:
HOR- SWHA seen flying over
construction area. Appeared
undisturbed by construction
activities.
-No Concerns

Construction Activities Performed:
HOR - Removal of Rock and Pad
from barge and shore.

Department of Water Resources
Biological Monitoring Field Report

Project: Temporary Barriers Project

Biologist Name	Michael Cane	**Date**	6-19-12
	Start Time 9:00	**End Time**	10:30

Comments for all Concerns Noted Above/Species Observed/ General Comments:

HOR- RTHA's seen flying on far shore of Old River.

- No concerns noted.

Construction Activities Performed:

HOR - Barge removal, Rock and Pad removal from shore.

	Department of Water Resources Biological Monitoring Field Report Project: Temporary Barriers Project			
Biologist Name	Mike Cane		Date	6-29-12
	Start Time	2:30	End Time	

Comments for all Concerns Noted Above/Species Observed/ General Comments:

- RTHW Juvenile still in nest eating. Fully developed, Appears to have not fledged. The second juvenile was not in the nest, but a young of year RTHW was seen soaring above and around the nest along with two adults.
- No SWHA's were seen for the first hour of surveying, but at 3:30 a pair of light morph SWHA were spotted soaring over head. They both landed on a Middle River island. ~~but~~
- Original nest site was empty.
- Killdeer nest on rdwy btw gate and →

Construction Activities Performed:

- None

Construction area. This area is not used for access, staging or work.

- One SWHA flew East along MR while the other stayed perched in willow on MR Island (preening feathers in tree) (3:45)

Department of Water Resources
Biological Monitoring Field Report

Temporary Barriers Project

Biologist Name			Date	7-3-12
Amy Young	Start Time	0915	End Time	1145

Yes	No		Yes	No	
X		Safety Signage per Plans	X		Swainson's Hawk monitoring complete
X		All Construction Activities within Work Boundaries		X	Dead or Injured Animals on or Adjacent to Work Area
X		Inspection for Equipment Leaks	X		Other Wildlife search completed
N/A	N/A	Hazardous Materials Properly Stored	X		Trash Properly Handled
X		Fugitive Dust Measures Functioning	X		HazMat containment kit present

Comments for all Concerns Noted Above/Species Observed/ General Comments:

Traffic was diverted away from killdeer nest.
2 Adult killdeer seen in area but were not present at nest.
RTHA - not seen near nest site
SWHA - not seen near island west of barrier.
WPT - not seen near barrier.
Some hawks observed > 1/4 mile away - not able to identify.
Most safety signage present - however - it appears that one warning buoy may be missing. There were 2 buoys on west side of barrier and 3 on east side.

Construction Activities Performed:

Work began just after 9am. Gravel arrived at site and was placed on barrier. Water truck arrived and sprayed regularly. Safety meeting was held.

	Department of Water Resources Biological Monitoring Field Report Project: Temporary Barriers Project		
Biologist Name	Michael Cane	Date	10-16-12
	Start Time 6:30	End Time	7:30

Comments for all Concerns Noted Above/Species Observed/ General Comments:
-No Concerns

Construction Activities Performed:
-Remove concrete mats at GLC
and ORT.

	Department of Water Resources **Biological Monitoring Field Report** **Project: Temporary Barriers Project**			
Biologist Name	Jeff Tkach		**Date**	October 17, 2012
	Start Time	1000 hrs	**End Time**	1500 hrs

Comments for all Concerns Noted Above/Species Observed/ General Comments:
- Arrived at the staging area off of Howard Road, no stains, garbage on site. Excavator and dump truck on site.
- Drove down Agricultural Road alongside South Tracy Blvd to the Front Line temporary barrier. No debris, garbage or sensitive species observed. Concrete pads had been removed from boat ramps and the temporary barrier itself was being removed from the channel with an excavator and dump trucks
- Drove to Old River location and no observed debris, garbage, or sensitive species. There was no traffic and concrete pads had been removed from boat ramps.

Construction Activities Performed:
- Dust mitigation was in place from staging area off of Howard road to Front Line. No work was being done at Middle River at this time.

	Department of Water Resources Biological Monitoring Field Report Project: Temporary Barriers Project			
Biologist Name	Jeff Tkach		Date	October 18, 2012
	Start Time	0900 hrs	End Time	1300 hrs

Comments for all Concerns Noted Above/Species Observed/ General Comments:
- Arrived at staging area off of Howard Road, no stains, garbage, leaks, or sensitive species observed. One excavator and three dump trucks on site, dump trucks running rock to staging area from Grant Line site. Dust mitigation was in place.
- Drove to Grant Line temporary barriers location no stains, leaks, garbage, debris or sensitive species were observed. Most of the temporary barrier had been removed from the channel by the excavator on site.
- Old River and Middle river had no material removal activities at this time

Construction Activities Performed:

	Department of Water Resources **Biological Monitoring Field Report** **Project: Temporary Barriers Project**			
Biologist Name	**Ruth Darling**		**Date**	**10/22/2012**
	Start Time	**1050**	**End Time**	**1200**

Comments for all Concerns Noted Above/Species Observed/ General Comments:
Arrived onsite at Old River, Tracy at approximately 1045 a.m. The Old River channel runs adjacent to and is
directly south of the levee road, agriculture fields occur north of the levee road.
Vegetation within the channel is primarily water hyacinth, vegetation occurs on the banks of the Old River
channel.
Weather: cloud cover and scattered showers; ~52 F
Wind speed: 6-10 mph
Species seen: Great white egret foraging within Old River channel.

Construction Activities Performed:
One backhoe removing rock within the water channel, and below the waterline ; and one backhoe picking
up rock and loading into a dump truck. The dump truck takes the rocks to the stockpile yard, approximately
0.25 miles from barrier site.

Department of Water Resources
Biological Monitoring Field Report

Project: Temporary Barriers Project

Biologist Name	Mike Cam		**Date**	10-24-12
	Start Time	9:20	**End Time**	

Comments for all Concerns Noted Above/Species Observed/ General Comments:

ORT
- Fish seen feeding around barrier site

GLC - No Concerns
- Fish seen swimming near construction

Construction Activities Performed:

ORT - Articulated Mat removal

GLC - Rock Removal

	Department of Water Resources **Biological Monitoring Field Report** **Project: Temporary Barriers Project (Grant Line Canal)**			
Biologist Name	**Kristin Ford**		**Date**	**10.29.12**
	Start Time	**10:45 am**	**End Time**	**11:45 am**

Comments for all Concerns Noted Above/Species Observed/ General Comments:
Arrived onsite at 10:45 am. Rock removal occurring in channel, one forklift moving rock from channel to
stationary island and one forklift moving rock from stationary island to dump truck. Two dump trucks
moving rock from construction site to 3-4 miles offsite. One water truck seen during site visit. Metal dock on
adjacent side of channel not moved. Water hyacinth in area, mostly around the bridge (west of project site).
Please see S:\FPO\FPO\Flood Corridor_EnvSupport\Bay- Delta_EnvSupport\TBP Ag-Barriers\Pictures\
Grant Line Canal 10.29 for pictures.
Temp: Approx. 55°
Weather: Sunny
Species Seen: Great White Egret, Snowy Egret

Construction Activities Performed:

	Department of Water Resources **Biological Monitoring Field Report** **Project: Temporary Barriers Project (Old River)**			
Biologist Name	**Kristin Ford**		**Date**	**10.29.12**
	Start Time	**12 noon**	**End Time**	**12:59 pm**

Comments for all Concerns Noted Above/Species Observed/ General Comments:
Arrived onsite at 12 noon. Rock removal occurring in channel, one forklift (larger) moving rock
(with dredging device) from channel to stationary island, and one (smaller) forklift moving rock from
stationary island to dump truck. One dump truck moving rock from construction site to rock pile approx.
0.25 mile away. Rocks are level with the levee on adjacent side of canal. Water hyacinth prevalent in canal
area.
Please see S:\FPO\FPO\Flood Corridor_EnvSupport\Bay- Delta_EnvSupport\TBP Ag-Barriers\Pictures\
Old River 10.29 for pictures.
Temp: Approx. 62°
Weather: Sunny
Species Seen: Great White Egret, Snowy Egret

Construction Activities Performed:

	Department of Water Resources **Biological Monitoring Field Report** **Project: Temporary Barriers Project (Middle River)**			
Biologist Name	**Kristin Ford**		**Date**	**10.29.12**
	Start Time	**1:05 pm**	**End Time**	**1:59 pm**

Comments for all Concerns Noted Above/Species Observed/ General Comments:
Arrived onsite at 1:05 pm. Rock removal occurring in channel, one forklift (larger) moving rock (with
dredging device) from channel to stationary island, and one forklift (smaller) moving rock from stationary
island to dump truck. One dump truck moving rock from construction site to rock pile approx. 0.25 mile
away. Rocks are level with the levee on adjacent side of canal. Water hyacinth prevalent in canal area.
Please see S:\FPO\FPO\Flood Corridor_EnvSupport\Bay- Delta_EnvSupport\TBP Ag-Barriers\Pictures\
Middle River 10.29 or pictures.
Temp: Approx. 64°
Weather: Sunny
Species Seen: Great White Egret, Snowy Egret

Construction Activities Performed:

	Department of Water Resources **Biological Monitoring Field Report** **Project: Temporary Barriers Project**			
Biologist Name	**Ruth Darling**		**Date**	**10/30/2012**
	Start Time	**1036**	**End Time**	**1200**

Comments for all Concerns Noted Above/Species Observed/ General Comments:
Arrived onsite at Grant Line Canal at approximately 1036 a.m. Vegetation within the channel is primarily
water hyacinth, riparian vegetation occurs on the banks of the Grant Line Canal channel.
Weather: sunny, clear skies; ~59 F
Wind speed: 2 mph

Construction Activities Performed:
1 backhoe removing rock beneath the waterline and 1 backhoe loading rock into a dump truck. The dump
truck carries the rock offsite to stockpile location. Rock removal is approximately ninety percent (90%)
complete.

Department of Water Resources
Biological Monitoring Field Report

Project: Temporary Barriers Project

Biologist Name	**Ruth Darling**		**Date**	**10/30/2012**
	Start Time	**1215**	**End Time**	**1330**

Comments for all Concerns Noted Above/Species Observed/ General Comments:
Arrived onsite at Old River, Tracy at approximately 1215. Vegetation within the channel is primarily
water hyacinth, riparian vegetation occurs on the banks of the Old River channel.
Weather: sunny, clear skies; ~59 F
Wind speed: 2 mph
Species observed: Great Blue Heron seen in the ag. fields, northeast of levee road.

Construction Activities Performed:
1 backhoe removing rock beneath the waterline and 1 backhoe loading rock into a dump truck. The dump
truck carries the rock offsite to stockpile location. Rock removal is approximately seventy-five percent (75%)
complete.

	Department of Water Resources Biological Monitoring Field Report Project: Temporary Barriers Project		
Biologist Name	Michael Cane	Date	10-31-12
	Start Time 9:00	End Time	

Comments for all Concerns Noted Above/Species Observed/ General Comments:
ORT- Rock Removal and trucking to storage.
- No concerns
GLC- No Concerns
- Off Road Hauler driver described that
a seal was in the vicinity of construction
but moved through undisturbed. (May
have been a sea lion)
MR- Construction finished (No work occuring

Construction Activities Performed:
ORT- Rock Removal and trucking to storage area.
GLC- Rock Removal and trucking to Howard Yard.
MR- Construction finished

	Department of Water Resources Biological Monitoring Field Report Project: Temporary Barriers Project			
Biologist Name	Mike Carner		Date	11-1-12
	Start Time	8:30	End Time	11:00

Comments for all Concerns Noted Above/Species Observed/ General Comments:

ORT - Rock Removal w/ two excavators. Small Hydraulic fuel leak. Dinpurs used, excavator replaced.

GLC - Rock Removal and Trucking
- No concerns

Construction Activities Performed:

ORT - Rock Removal / Trucking
GLC - Rock Removal / Trucking

	Department of Water Resources Biological Monitoring Field Report Project: Temporary Barriers Project		
Biologist Name	APRIL McEWEN	Date	11/2/12
	Start Time 10 AM	End Time	1PM

Comments for all Concerns Noted Above/Species Observed/ General Comments:
GLC – no species noted; tidy site; small plume along shore; partially cloudy; no dust
ORT – same as GLC ~ doesn't look like much work is left

Construction Activities Performed:
GLC – two trucks hauling rock, backhoe digging out rock along shore
ORT – removing rock along shoreline... one truck hauling rock

	Department of Water Resources Biological Monitoring Field Report Project: Temporary Barriers Project			
Biologist Name	Mike Cane		Date	11-5-12
	Start Time	7:45	End Time	

Comments for all Concerns Noted Above/Species Observed/ General Comments:
ORT - No Concerns
GLC - Construction is looking like it may finish in one more day
No Concerns.

Construction Activities Performed:
ORT - Rock Removal / Tracking
GLC - Rock Removal / Tracking

	Department of Water Resources **Biological Monitoring Field Report** **Project: Temporary Barriers Project (Old River)**			
Biologist Name	**Kristin Ford**		**Date**	**11.7.12**
	Start Time	**10:50 am**	**End Time**	**11:57 am**

Comments for all Concerns Noted Above/Species Observed/ General Comments:
Arrived onsite at 10:50 am. Rock removal occurring in channel, with two forklift s moving rock
from channel to road. One dump truck moving rock from construction site to rock pile approx. 0.25 mile
away. In addition, rock pile offsite has forklift moving rock. Stationary island is gone. Additional forklift
onsite, running, and not being used. Rocks are level with the levee on adjacent side of canal.
Water hyacinth EXTREMELY prevalent in canal area. One water truck seen during visit.
Please see S:\FPO\FPO\Flood Corridor_EnvSupport\Bay- Delta_EnvSupport\TBP Ag-Barriers\Pictures\
Old River 11.7 for pictures.
Temp: Approx. 71°
Weather: Sunny
Species Seen: Great White Egret, Snowy Egret

Construction Activities Performed:

	Department of Water Resources **Biological Monitoring Field Report** **Project: Temporary Barriers Project**			
Biologist Name	**Ruth Darling**		**Date**	**11/08/2012**
	Start Time	**1115**	**End Time**	**1200**

Comments for all Concerns Noted Above/Species Observed/ General Comments:
Arrived onsite at Old River, Tracy at approximately 1115. Vegetation within the channel is primarily
water hyacinth, riparian vegetation occurs on the banks of the Old River channel.
Weather: sparse cloud cover

Construction Activities Performed:
Construction complete. Clean-up occurring in the rock stockpile location.

Appendix 4: Worker Environmental Awareness Program Outline and Handouts

Worker Environmental Awareness Program

Training will be done by a qualified biologist for all workers at the job site.

Species List for WEAP Training – Handout attachment 1

Winter and Spring Run Chinook Salmon

Central Valley Steelhead

North American Green Sturgeon

Delta Smelt

Longfin Smelt

Swainson's Hawk

Western Pond Turtle

Best Management Practices

1. No pets, camping, firearms, or any other use of the right of way area will be allowed. The Contractor's employees will not be allowed at the work site during nonworking hours.
2. Any sightings, trappings, injuries, or fatalities to animals that occur as a result of project-related activities shall be reported immediately to the Engineer.
3. Food-related trash, such as wrappers, cans, bottles, scraps, shall be placed in closed containers and removed daily from work sites. Trash or garbage shall be removed to a county approved disposal site at least weekly by the Contractor. The right of way shall be policed daily by the Contractor's personnel.
4. Review of the potential penalties for taking a listed wildlife species will be described.
5. Protocol to follow if sensitive species are encountered, including appropriate contact points, such as the Engineer or designated representative, inspectors, and environmental personnel.
6. Fact sheets or cards will be available to the Contractor's employees.
7. Traffic shall be restricted to existing roads and flagged right of way or temporary construction easement.

Follow-up meetings to present additional topics pertaining to the above subjects as they occur or are brought to the attention of the Engineer or the Contractor during construction.

WEAP Handout

Georgiana Slough
Non-Physical Barrier

Worker Environmental
Awareness Training

Delta Smelt

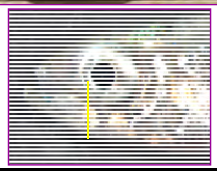
Hypomesus transpacificus

Threatened – State and Federal

Migrate from SF Bay to Delta

Spawn from Jan. to Jul. mostly in the Delta.

Eat microscopic crustaceans



Longfin Smelt

Spirinchus thaleichthys

Species of Concern

Migrate from SF Bay through Delta

Spawn in late winter to Spring in the Delta

Eat microscopic crustaceans

Rainbow Trout (Steelhead)

Oncorhynchus gairdneri

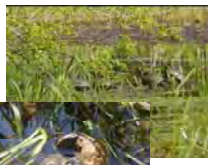
Endangered – Federal

Migrate from fresh to salt water and back

Spawn in fresh water from Dec. to Apr.

Western Pond Turtle

State-Species of Concern



Nests Mar. to Aug. along waterways

Basks on logs and beaches

Chinook Salmon

Oncorhynchus tshawytscha

Federal
Spring = Threatened
Winter = Endangered

Migrate from fresh to salt water

Spawn in fresh water

Delta is a migratory path

Juveniles migrate through the Delta year round

Migration route affects survival

Green Sturgeon

Acipenser medirostris

Threatened - Federal

Long-lived, slow growing fish

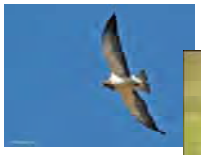
Adults are mostly marine

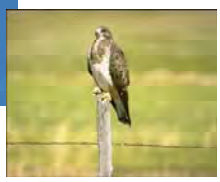
Spawn in fresh water

Young migrate to salt water

Swainson's Hawk

State-Threatened





Nest from Mar to May

Protected from construction impacts within a ¼ mile of nests

Appendix 5: Water Quality Monitoring Data

Site: Temporary Rock Barrier - Grantline Canal

Date	Barrier Sample Location	Time (PST)	Turbidity (NTU @ 300ft)		Settleable Solids (mL/L)		Observations	Observer
			Threshold	Measured	Threshold	Measured		
4/2/12	Above							
	Below							
Mon	Above							
	Below							
4/3/12	Above							
	Below							
Tues	Above							
	Below							
4/4/12	Above							
	Below							
Wed	Above							
	Below							
4/5/12	Above							
	Below							
Thur	Above							
	Below							
4/6/12	Above	1000		13.3	0.1	< 0.1		
	Below	0947	150	23.9	0.1	< 0.1	Dumping rock in water	Jason La Deaux
Fri	Above	1200		28.0	0.1	< 0.1		
	Below	1204	150	38.8	0.1	< 0.1	Dumping rock in water	Jason La Deaux
4/7/12	Above							
	Below							
Sat	Above							
	Below							
4/8/12	Above							
	Below							
Sun	Above							
	Below							

Site: Temporary Rock Barrier - Grantline Canal

Date	Barrier Sample Location	Time (PST)	Turbidity (NTU @ 300ft)		Settleable Solids (mL/L)		Observations	Observer
			Threshold	Measured	Threshold	Measured		
4/9/12	Above	0830		19.0	0.1	< 0.1		
	Below	0840	150	23.0	0.1	< 0.1	Placing rock in water	Wayne Jensen
	Above	1200		19.4	0.1	< 0.1		
Mon	Below	1210	150	21.2	0.1	< 0.1	Placing rock in water	Wayne Jensen
4/10/12	Above	0910		22.9	0.1	< 0.1		
	Below	0930	150	18.7	0.1	< 0.1	Placing rock in water	Tom Coleman
	Above	1300		20.0	0.1	< 0.1		
Tues	Below	1315	150	21.2	0.1	< 0.1	Placing rock in water	Tom Coleman
4/11/12	Above	0915		19.5	0.1	< 0.1		
	Below	0900	150	22.3	0.1	< 0.1	Placing rock in water	Tom Coleman
	Above	1300		20.1	0.1	< 0.1		
Wed	Below	1315	150	18.9	0.1	< 0.1	Placing rock in water	Tom Coleman
4/12/12	Above	0845		22.1	0.1	< 0.1		
	Below	0850	150	20.7	0.1	< 0.1	Placing rock in water	Jason La Deaux
	Above	1200		24.3	0.1	< 0.1		
Thur	Below	1205	150	22.2	0.1	< 0.1	Placing rock in water	Jason La Deaux
4/13/12	Above							
	Below						No water work	Tom Coleman
	Above							
Fri	Below							
4/14/12	Above							
	Below							
	Above							
Sat	Below							
4/15/12	Above							
	Below							
	Above							
Sun	Below							

Site: Temporary Rock Barrier - Grantline Canal

Date	Barrier Sample Location	Time (PST)	Turbidity (NTU @ 300ft) Threshold	Turbidity (NTU @ 300ft) Measured	Settleable Solids (mL/L) Threshold	Settleable Solids (mL/L) Measured	Observations	Observer
4/16/12	Above	1055	150	13.6	0.1	< 0.1	Dumping of rock in watter	Larry Crane
	Below	1050		13.1	0.1	< 0.1		
Mon	Above	1207	150	17.2	0.1	< 0.1	Dumping of rock in watter	Larry Crane
	Below	1213		14.4	0.1	< 0.1		
4/17/12	Above	1030	150	13.1	0.1	< 0.1	Putting rocks in water	Tom Coleman
	Below	1035		12.5	0.1	< 0.1		
Tues	Above	1230	150	14.1	0.1	< 0.1	Putting rocks in water	Tom Coleman
	Below	1235		14.9	0.1	< 0.1		
4/18/12	Above	0830	150	12.8	0.1	< 0.1	Putting rocks in water	Tom Coleman
	Below	0835		13.3	0.1	< 0.1		
Wed	Above	1330	150	14.9	0.1	< 0.1	Putting rocks in water	Tom Coleman
	Below	1335		15.8	0.1	< 0.1		
4/19/12	Above	1125	150	18.9	0.1	< 0.1	Excavator in water	Jason La Deaux
	Below	1135		19.9	0.1	< 0.1		
Thur	Above	1200	150	18.1	0.1	< 0.1	Excavator in water	Jason La Deaux
	Below	1205		22.1	0.1	< 0.1		
4/20/12	Above	0830	150	24.2	0.1	< 0.1	Excavator in water	Jason La Deaux
	Below	0854		15.1	0.1	< 0.1		
Fri	Above	1201	150	19.8	0.1	< 0.1	Excavator in water	Jason La Deaux
	Below	1209		22.5	0.1	< 0.1		
4/21/12	Above							
	Below							
Sat	Above							
	Below							
4/22/12	Above							
	Below							
Sun	Above							
	Below							

Site: Temporary Rock Barrier - Grantline Canal

Date	Barrier Sample Location	Time (PST)	Turbidity (NTU @ 300ft)		Settleable Solids (mL/L)		Observations	Observer
			Threshold	Measured	Threshold	Measured		
4/23/12	Above	0935		15.5	0.1	< 0.1		
	Below	0945	150	16.1	0.1	< 0.1	Placing matts in water with crane	Larry Crane
	Above	1205		18.0	0.1	< 0.1		
Mon	Below	1210	150	18.3	0.1	< 0.1	Placing matts in water with crane	Larry Crane
4/24/12	Above	1030						
	Below						No work at this time	Jason La Deaux
	Above							
Tues	Below							
4/25/12	Above	0800						
	Below						No work at this time	Wayne Jensen
	Above							
Wed	Below							
4/26/12	Above							
	Below							
	Above							
Thur	Below							
4/27/12	Above							
	Below							
	Above							
Fri	Below							
4/28/12	Above							
	Below							
	Above							
Sat	Below							
4/29/12	Above							
	Below							
	Above							
Sun	Below							

Site: Grantline Canal

Date	Barrier Sample Location	Time (PST)	Turbidity (NTU @ 300ft)		Settleable Solids (mL/L)		Observations	Observer
			Threshold	Measured	Threshold	Measured		
10/15/12	Above							
	Below							
Mon	Above							
	Below							
10/16/12	Above							
	Below							
Tues	Above							
	Below							
10/17/12	Above							
	Below							
Wed	Above							
	Below							
10/18/12	Above	1130		8.4	0.1	< 0.1		
	Below	1135	150	10.2	0.1	< 0.1	Removing rock from water	Joaquin Garza
Thur	Above	1255		7.7	0.1	< 0.1		
	Below	1238	150	5.5	0.1	<0.1	Removing rock from water	Joaquin Garza
10/19/12	Above	1109		12.6	0.1	< 0.1		
	Below	1056	150	5.2	0.1	< 0.1	Removing rock from water	Joaquin Garza
Fri	Above	1234		9.7	0.1	< 0.1		
	Below	1222	150	4.8	0.1	<0.1	Removing rock from water	Joaquin Garza
10/20/12	Above	1050		13.0	0.1	< 0.1		
	Below	1100	150	8.9	0.1	< 0.1	Removing rock from water	Joaquin Garza
Sat	Above							
	Below						No work in water; no equipment in water	Joaquin Garza
10/21/12	Above							
	Below							
Sun	Above							
	Below							

Site: Grantline Canal

Date	Barrier Sample Location	Time (PST)	Turbidity (NTU @ 300ft)		Settleable Solids (mL/L)		Observations	Observer
			Threshold	Measured	Threshold	Measured		
10/22/12	Above							
	Below							
Mon	Above							
	Below							
10/23/12	Above							
	Below							
Tues	Above							
	Below							
10/24/12	Above	0845						
	Below	0850					No water work at this time.	Wayne Jensen
Wed	Above	1200		10.4	0.1	< 0.1		
	Below	1210	150	40.0	0.1	< 0.1	Removing Rock from water	Wayne Jensen
10/25/12	Above	1045		12.4	0.1	< 0.1		
	Below	1055	150	25.3	0.1	< 0.1	Removing Rock from water	Joaquin Garza
Thur	Above	1245		7.5	0.1	< 0.1		
	Below	1255	150	13.1	0.1	< 0.1	Removing Rock from water	Joaquin Garza
10/26/12	Above	1125		10.2	0.1	< 0.1		
	Below	1135	150	14.3	0.1	< 0.1	Removing Rock from water	Joaquin Garza
Fri	Above	1335		6.4	0.1	< 0.1		
	Below	1325	150	14.3	0.1	< 0.1	Removing Rock from water	Joaquin Garza
10/27/12	Above							
	Below							
Sat	Above							
	Below							
10/28/12	Above							
	Below							
Sun	Above							
	Below							

Site: Grantline Canal

Date	Barrier Sample Location	Time (PST)	Turbidity (NTU @ 300ft)		Settleable Solids (mL/L)		Observations	Observer
			Threshold	Measured	Threshold	Measured		
10/29/12	Above	1032	150	6.3	0.1	< 0.1	Removing rock from water	Joaquin Garza
	Below	1042		8.7	0.1	< 0.1		
Mon	Above	1240	150	6.3	0.1	< 0.1	Removing rock from water	Joaquin Garza
	Below	1230		16.7	0.1	< 0.1		
10/30/12	Above	0820	150	16.1	0.1	< 0.1	Removing rock from water	Wayne Jensen
	Below	0810		5.9	0.1	< 0.1		
Tues	Above	1230	150	15.5	0.1	< 0.1	Removing rock from water	Wayne Jensen
	Below	1240		14.9	0.1	< 0.1		
10/31/12	Above	1100	150	17.8	0.1	< 0.1	Removing rock from water	Joaquin Garza
	Below	1110		4.7	0.1	< 0.1		
Wed	Above	1248	150	6.8	0.1	< 0.1	Removing rock from water	Joaquin Garza
	Below	1254		20.7	0.1	< 0.1		
11/1/12	Above	1004	150	6.8	0.1	< 0.1	Removing rock from water	Jason La Deaux
	Below	1017		18.1	0.1	< 0.1		
Thur	Above	1300	150	16.3	0.1	< 0.1	Removing rock from water	Jason La Deaux
	Below	1310		7.4	0.1	< 0.1		
11/2/12	Above	0904	150	14.2	0.1	< 0.1	Removing rock from water	Jason La Deaux
	Below	0859		11.9	0.1	< 0.1		
Fri	Above	1300	150	17.4	0.1	< 0.1	Removing rock from water	Jason La Deaux
	Below	1317		6.2	0.1	< 0.1		
11/3/12	Above							
	Below							
Sat	Above							
	Below							
11/4/12	Above							
	Below							
Sun	Above							
	Below							

Site: Grantline Canal

Date	Barrier Sample Location	Time (PST)	Turbidity (NTU @ 300ft)		Settleable Solids (mL/L)		Observations	Observer
			Threshold	Measured	Threshold	Measured		
11/5/12	Above	0830		7.5	0.1	< 0.1		
	Below	0840	150	9.9	0.1	< 0.1	Removing rock from water	Wayne Jensen
Mon	Above	1230		19.4	0.1	< 0.1		
	Below	1235	150	8.1	0.1	< 0.1	Removing rock from water	Wayne Jensen
11/6/12	Above							
	Below							
Tues	Above							
	Below							
11/7/12	Above							
	Below							
Wed	Above							
	Below							
11/8/12	Above							
	Below							
Thur	Above							
	Below							
11/9/12	Above							
	Below							
Fri	Above							
	Below							
11/10/12	Above							
	Below							
Sat	Above							
	Below							
11/11/12	Above							
	Below							
Sun	Above							
	Below							

Monitoring Results for Turbidity and Settleable Solids
Spring 2012

State of California Department of Water Resources

Site: Temporary Rock Barrier - Middle River

Date	Barrier Sample Location	Time (PST)	Turbidity (NTU @ 300ft)		Settleable Solids (mL/L)		Observations	Observer
			Threshold	Measured	Threshold	Measured		
	Above	1100		8.5	0.1	< 0.1		
3/12/12	Below	1110	150	8.3	0.1	< 0.1	Placing rock in water	Wayne Jensen
	Above	1310		10.9	0.1	< 0.1		
Mon	Below	1320	150	9.3	0.1	< 0.1	Placing rock in water	Wayne Jensen
	Above	0940		12.5	0.1	< 0.1		
3/13/12	Below	0942	150	8.6	0.1	< 0.1	Placing rock in water	Jason La Deaux
	Above	1540		12.1	0.1	< 0.1		
Tues	Below	1545	150	12.2	0.1	< 0.1	Placing rock in water	Jason La Deaux
	Above	0930						
3/14/12	Below	0930					No water work	Tom Coleman
	Above							
Wed	Below							
	Above	1040		10.0	0.1	< 0.1		
3/15/12	Below	1042	150	14.5	0.1	< 0.1	Placing rock in water	Tom Coleman
	Above	1300		11.5	0.1	< 0.1		
Thur	Below	1302	150	17.0	0.1	< 0.1	Placing rock in water	Tom Coleman
	Above	1130		10.0	0.1	< 0.1		
3/16/12	Below	1131	150	14.5	0.1	< 0.1	Placing rock in water	Tom Coleman
	Above	1350		12.1	0.1	< 0.1		
Fri	Below	1352	150	18.6	0.1	< 0.1	Placing rock in water	Tom Coleman
	Above	1100		32.1	0.1	< 0.1		
3/17/12	Below	1110	150	22.7	0.1	< 0.1	Finishing all water work	Jason La Deaux
	Above							
Sat	Below							
	Above							
	Below							
	Above							
Sun	Below							

Site: Middle River

Date	Barrier Sample Location	Time (PST)	Turbidity (NTU @ 300ft)		Settleable Solids (mL/L)		Observations	Observer
			Threshold	Measured	Threshold	Measured		
10/22/11	Above							
	Below							
Mon	Above							
	Below							
10/23/11	Above	1110		4.1	0.1	< 0.1		
	Below	1100	150	8.0	0.1	< 0.1	Removing rock from water	Joaquin Garza
Tues	Above	1315		3.6	0.1	< 0.1		
	Below	1325	150	9.3	0.1	< 0.1	Removing rock from water	Joaquin Garza
10/24/11	Above	0825		31.1	0.1	< 0.1		
	Below	0835	150	14.6	0.1	< 0.1	Removing rock from water	Wayne Jensen
Wed	Above	1230		19.1	0.1	< 0.1		
	Below	1235	150	20.1	0.1	< 0.1	Removing rock from water	Wayne Jensen
10/25/11	Above	1020		11.2	0.1	< 0.1		
	Below	1025	150	13.5	0.1	< 0.1	Removing rock from water	Joaquin Garza
Thur	Above	1325		3.6	0.1	< 0.1		
	Below	1335	150	3.8	0.1	< 0.1	Removing rock from water	Joaquin Garza
10/26/11	Above	1105		2.2	0.1	< 0.1		
	Below	1055	150	8.7	0.1	< 0.1	Removing rock from water	Joaquin Garza
Fri	Above	1350		3.1	0.1	< 0.1		
	Below	1400	150	4.9	0.1	< 0.1	Removing rock from water	Joaquin Garza
10/27/11	Above							
	Below							
Sat	Above							
	Below							
10/28/11	Above							
	Below							
Sun	Above							
	Below							

Site: Middle River

Date	Barrier Sample Location	Time (PST)	Turbidity (NTU @ 300ft)		Settleable Solids (mL/L)		Observations	Observer
			Threshold	Measured	Threshold	Measured		
10/29/11	Above	0950		3.3	0.1	< 0.1		
	Below	1000	150	14.6	0.1	< 0.1	Removing rock from water	Joaqin Garza
	Above	1255		3.2	0.1	< 0.1		
Mon	Below	1259	150	6.3	0.1	< 0.1	Removing rock from water	Joaqin Garza
10/30/11	Above							
	Below							
	Above							
Tues	Below							
10/31/11	Above							
	Below							
	Above							
Wed	Below							
11/1/11	Above							
	Below							
	Above							
Thur	Below							
11/2/11	Above							
	Below							
	Above							
Fri	Below							
11/3/11	Above							
	Below							
	Above							
Sat	Below							
11/4/11	Above							
	Below							
	Above							
Sun	Below							

Site: Temporary Rock Barrier - Old River at DMC

Date	Barrier Sample Location	Time (PST)	Turbidity (NTU @ 300ft)		Settleable Solids (mL/L)		Observations	Observer
			Threshold	Measured	Threshold	Measured		
3/12/12	Above							
	Below							
Mon	Above							
	Below							
3/13/12	Above							
	Below							
Tues	Above							
	Below							
3/14/12	Above							
	Below							
Wed	Above							
	Below							
3/15/12	Above							
	Below							
Thur	Above							
	Below							
3/16/12	Above							
	Below							
Fri	Above							
	Below							
3/17/12	Above							
	Below							
Sat	Above							
	Below							
3/18/12	Above	0900						
	Below	0900	150				No water work yet	Jason La Deaux
Sun	Above	1230		9.8	0.1	< 0.1		
	Below	1230	150	10.7	0.1	< 0.1	Placing rocks in water	Jason La Deaux

Site: Temporary Rock Barrier - Old River at DMC

Date	Barrier Sample Location	Time (PST)	Turbidity (NTU @ 300ft) Threshold	Turbidity (NTU @ 300ft) Measured	Settleable Solids (mL/L) Threshold	Settleable Solids (mL/L) Measured	Observations	Observer
3/19/12	Above		150		0.1		Staff unable to visit site due vehicle breakdown	Tom Coleman
	Below				0.1			
Mon	Above	1230	150	12.5	0.1	< 0.1	Placing rocks in water	Tom Coleman
	Below	1230		15.5	0.1	< 0.1		
3/20/12	Above	1030	150	10.2	0.1	< 0.1	Removing rock (Ebb)	Rich Pendleton
	Below	1035		10.4	0.1	< 0.1		
Tues	Above		150		0.1		No water work	Rich Pendleton
	Below				0.1			
3/21/12	Above		150		0.1		No work at this site	Wayne Jensen
	Below				0.1			
Wed	Above		150		0.1		No work at this site	Wayne Jensen
	Below				0.1			
3/22/12	Above	1005	150	6.5	0.1	< 0.1	Dumping rock in water	Kenny Karcher
	Below	1010		5.5	0.1	< 0.1		
Thur	Above	1205	150	8.1	0.1	< 0.1	Dumping rock in water	Kenny Karcher
	Below	1210		9.7	0.1	< 0.1		
3/23/12	Above	0915	150	6.9	0.1	< 0.1	Dumping rock in water	Jason La Deaux
	Below	0909		7.5	0.1	< 0.1		
Fri	Above	1217	150	7.6	0.1	< 0.1	Dumping rock in water	Jason La Deaux
	Below	1206		14.8	0.1	< 0.1		
3/24/12	Above	1015	150	12.2	0.1	< 0.1	Pushing rock in water	Tom Coleman
	Below	1020		11.8	0.1	< 0.1		
Sat	Above	1230	150	12.5	0.1	< 0.1	Pushing rock in water	Tom Coleman
	Below	1235		11.9	0.1	< 0.1		
3/25/12	Above		150		0.1		Tractor broke down, no water work	Tom Coleman
	Below				0.1			
Sun	Above		150		0.1			
	Below				0.1			

Site: Temporary Rock Barrier - Old River at DMC

Date	Barrier Sample Location	Time (PST)	Turbidity (NTU @ 300ft) Threshold	Turbidity (NTU @ 300ft) Measured	Settleable Solids (mL/L) Threshold	Settleable Solids (mL/L) Measured	Observations	Observer
3/26/12	Above	0935	150	12.4	0.1	< 0.1	Dragline working in water	Wayne Jensen
	Below	0945		13.0	0.1	< 0.1		
Mon	Above	1200	150	15.3	0.1	< 0.1	Dragline working in water	Wayne Jensen
	Below	1205		24.6	0.1	< 0.1		
3/27/12	Above	0910	150	27.2	0.1	< 0.1	Dragline working in water	Wayne Jensen
	Below	0920		13.4	0.1	< 0.1		
Tues	Above	1205	150	17.0	0.1	< 0.1	Dragline working in water	Wayne Jensen
	Below	1200		26.8	0.1	< 0.1		
3/28/12	Above	0835	150	17.9	0.1	< 0.1	Dragline working in water	Wayne Jensen
	Below	0845		9.2	0.1	< 0.1		
Wed	Above	1205	150	18.6	0.1	< 0.1	Dragline working in water	Wayne Jensen
	Below	1200		9.4	0.1	< 0.1		
3/29/12	Above	1005	150	10.1	0.1	< 0.1	Dragline working in water	Kenny Karcher
	Below	1013		10.1	0.1	< 0.1		
Thur	Above	1200	150	13.3	0.1	< 0.1	Dragline working in water	Kenny Karcher
	Below	1205		9.9	0.1	< 0.1		
3/30/12	Above	0900	150		0.1		No water work at this time	Jason La Deaux
	Below	0905			0.1			
Fri	Above	1200	150		0.1		No water work at this time	Jason La Deaux
	Below	1205			0.1			
3/31/12	Above	0750	150	4.0	0.1	< 0.1	Dragline working in water	Jason La Deaux
	Below	0805		14.0	0.1	< 0.1		
Sat	Above	1204	150	15.9	0.1	< 0.1	Dumping rock in water	Jason La Deaux
	Below	1212		28.1	0.1	< 0.1		
4/1/12	Above	0800	150		0.1		No work	Jason La Deaux
	Below	0800			0.1			
Sun	Above	1200	150		0.1		No work	Jason La Deaux
	Below	1205			0.1			

Site: Temporary Rock Barrier - Old River at DMC

Date	Barrier Sample Location	Time (PST)	Turbidity (NTU @ 300ft)		Settleable Solids (mL/L)		Observations	Observer
			Threshold	Measured	Threshold	Measured		
	Above	1130		15.7	0.1	< 0.1		
4/2/12	Below	1135	150	18.1	0.1	< 0.1	Placing rock in water	Tom Coleman
	Above	1330		18.2	0.1	< 0.1		
Mon	Below	1335	150	24.5	0.1	< 0.1	Placing rock in water	Tom Coleman
	Above	1029		13.2	0.1	< 0.1		
4/3/12	Below	1036	150	13.6	0.1	< 0.1	Excavator in water	Jason La Deaux
	Above	1200		19.8	0.1	< 0.1		
Tues	Below	1204	150	12.8	0.1	< 0.1	Excavator in water	Jason La Deaux
	Above	0930			0.1		Working on bank placing mats only; no water	
4/4/12	Below	0930	150		0.1		work	Wayne Jensen
	Above	1200			0.1		Working on bank placing mats only; no water	
Wed	Below	1200	150		0.1		work	Wayne Jensen
	Above	0920		12.8	0.1	< 0.1		
4/5/12	Below	0925	150	19.0	0.1	< 0.1	Placing rock in water	Tom Coleman
	Above	1245		13.5	0.1	< 0.1		
Thur	Below	1250	150	19.7	0.1	< 0.1	Closing barrier with rock	Tom Coleman
	Above				0.1			
4/6/12	Below		150		0.1		Water work completed.	
	Above				0.1			
Fri	Below		150		0.1			
	Above				0.1			
4/7/12	Below		150		0.1			
	Above				0.1			
Sat	Below		150		0.1			
	Above				0.1			
4/8/12	Below		150		0.1			
	Above				0.1			
Sun	Below		150		0.1			

Site: Old River at DMC

Date	Barrier Sample Location	Time (PST)	Turbidity (NTU @ 300ft)		Settleable Solids (mL/L)		Observations	Observer
			Threshold	Measured	Threshold	Measured		
10/15/12	Above							
	Below							
Mon	Above							
	Below							
10/16/12	Above							
	Below							
Tues	Above							
	Below							
10/17/12	Above							
	Below							
Wed	Above							
	Below							
10/18/12	Above							
	Below							
Thur	Above							
	Below							
10/19/12	Above							
	Below							
Fri	Above							
	Below							
10/20/12	Above	1125		5.4	0.1	< 0.1		
	Below	1135	150	4.0	0.1	< 0.1	Removing rock from water	Joaquin Garza
Sat	Above	1250		4.5	0.1	< 0.1		
	Below	1235	150	6.5	0.1	< 0.1	Removing rock from water	Joaquin Garza
10/21/12	Above							
	Below							
Sun	Above							
	Below							

Site: Old River at DMC

Date	Barrier Sample Location	Time (PST)	Turbidity (NTU @ 300ft)		Settleable Solids (mL/L)		Observations	Observer
			Threshold	Measured	Threshold	Measured		
10/22/12	Above	0915	150	12.6	0.1	< 0.1	Removing rock from water	Larry Crane
	Below	0910		22.2	0.1	< 0.1		
Mon	Above	1245	150	13.8	0.1	< 0.1	Removing rock from water	Larry Crane
	Below	1250		8.2	0.1	< 0.1		
10/23/12	Above	1136	150	6.8	0.1	< 0.1	No water work at this time	Joaquin Garza
	Below	1148		5.4	0.1	< 0.1		
Tues	Above	1247	150	11.9	0.1	< 0.1	Removing rock from water	Joaquin Garza
	Below	1233		11.4	0.1	< 0.1		
10/24/12	Above	0933					No water work at this time	Wayne Jensen
	Below	0933						
Wed	Above	1200					No water work at this time	Wayne Jensen
	Below	1205						
10/25/12	Above	1125	150	16.5	0.1	< 0.1	Removing valve and pipe works from water	Joaquin Garza
	Below	1130		6.6	0.1	< 0.1		
Thur	Above	1225	150	5.3	0.1	< 0.1	Removing valve and pipe works from water	Joaquin Garza
	Below	1215		5.8	0.1	< 0.1		
10/26/12	Above	1145	150	29.6	0.1	< 0.1	Removing rock from water	Joaquin Garza
	Below	1155		30.4	0.1	< 0.1		
Fri	Above	1235	150	4.3	0.1	< 0.1	Removing rock from water	Joaquin Garza
	Below	1250		16.5	0.1	< 0.1		
10/27/12	Above							
	Below							
Sat	Above							
	Below							
10/28/12	Above							
	Below							
Sun	Above							
	Below							

Site: Old River at DMC

Date	Barrier Sample Location	Time (PST)	Turbidity (NTU @ 300ft) Threshold	Turbidity (NTU @ 300ft) Measured	Settleable Solids (mL/L) Threshold	Settleable Solids (mL/L) Measured	Observations	Observer
10/29/12	Above	1100	150	8.4	0.1	< 0.1	Removing rock from water	Joaquin Garza
	Below	1110		21.2	0.1	< 0.1		
Mon	Above	1205	150	8.5	0.1	< 0.1	Removing rock from water	Joaquin Garza
	Below	1215		25.2	0.1	< 0.1		
10/30/12	Above	0845	150	28.1	0.1	< 0.1	Removing rock from water	Wayne Jensen
	Below	0855		18.5	0.1	< 0.1		
Tues	Above	1210	150	16.0	0.1	< 0.1	Removing rock from water	Wayne Jensen
	Below	1200		5.9	0.1	< 0.1		
10/31/12	Above	1125	150	11.5	0.1	< 0.1	Removing rock from water	Joaquin Garza
	Below	1135		4.2	0.1	< 0.1		
Wed	Above	1228	150	8.2	0.1	< 0.1	Removing rock from water	Joaquin Garza
	Below	1217		19.1	0.1	< 0.1		
11/1/12	Above	0900	150	-	0.1	< 0.1	No water work at this time	Jason La Deaux
	Below	0905		-	0.1	< 0.1		
Thur	Above	1200	150	15.4	0.1	< 0.1	Removing rock from water	Jason La Deaux
	Below	1205		5.8	0.1	< 0.1		
11/2/12	Above	0811	150	14.1	0.1	< 0.1	Removing rock from water	Jason La Deaux
	Below	0819		8.7	0.1	< 0.1		
Fri	Above	1218	150	12.8	0.1	< 0.1	Removing rock from water	Jason La Deaux
	Below	1200		9.9	0.1	< 0.1		
11/3/12	Above							
	Below							
Sat	Above							
	Below							
11/4/12	Above							
	Below							
Sun	Above							
	Below							

Site: Old River at DMC

Date	Barrier Sample Location	Time (PST)	Turbidity (NTU @ 300ft) Threshold	Turbidity (NTU @ 300ft) Measured	Settleable Solids (mL/L) Threshold	Settleable Solids (mL/L) Measured	Observations	Observer
11/5/12	Above	0900	150	10.4	0.1	< 0.1	Removing rock from water	Wayne Jensen
	Below	0910		10.1	0.1	< 0.1		
Mon	Above	1205	150	33.1	0.1	< 0.1	Removing rock from water	Wayne Jensen
	Below	1200		57.8	0.1	< 0.1		
11/6/12	Above	1040	150	11.0	0.1	< 0.1	Removing rock from water	Joaquin Garza
	Below	1050		4.9	0.1	< 0.1		
Tues	Above	1215	150	10.3	0.1	< 0.1	Removing rock from water	Joaquin Garza
	Below	1205		3.8	0.1	< 0.1		
11/7/12	Above	1000	150	10.0	0.1	< 0.1	Removing rock from water	Larry Crane
	Below	1010		29.8	0.1	< 0.1		
Wed	Above						No water work at this time	Larry Crane
	Below							
11/8/12	Above							
	Below							
Thur	Above							
	Below							
11/9/12	Above							
	Below							
Fri	Above							
	Below							
11/10/12	Above							
	Below							
Sat	Above							
	Below							
11/11/12	Above							
	Below							
Sun	Above							
	Below							

Site: Temporary Rock Barrier - Old River at Head

Date	Barrier Sample Location	Time (PST)	Turbidity (NTU @ 300ft)		Settleable Solids (mL/L)		Observations	Observer
			Threshold	Measured	Threshold	Measured		
3/12/12	Above							
	Below							
Mon	Above							
	Below							
3/13/12	Above							
	Below							
Tues	Above							
	Below							
3/14/12	Above							
	Below							
Wed	Above							
	Below							
3/15/12	Above							
	Below							
Thur	Above							
	Below							
3/16/12	Above				0.1			
	Below		150		0.1		No Water Work	Tom Coleman
Fri	Above	1300		13.0	0.1	< 0.1		
	Below	1302	150	13.9	0.1	< 0.1	Barge in the water	Tom Coleman
3/17/12	Above	0930		18.6	0.1	< 0.1		
	Below	0942	150	32.8	0.1	< 0.1	Dragline in water	Jason La Deaux
Sat	Above	1330		14.0	0.1	< 0.1		
	Below	1335	150	21.6	0.1	< 0.1	Dragline in water	Jason La Deaux
3/18/12	Above	0930		22.5	0.1	< 0.1		
	Below	0940	150	31.7	0.1	< 0.1	Dragline in water	Jason La Deaux
Sun	Above	1330		12.9	0.1	< 0.1		
	Below	1335	150	18.3	0.1	< 0.1	Dragline in water	

Site: Temporary Rock Barrier - Old River at Head

Date	Barrier Sample Location	Time (PST)	Turbidity (NTU @ 300ft)		Settleable Solids (mL/L)		Observations	Observer
			Threshold	Measured	Threshold	Measured		
3/19/12	Above	1120	150	19.4	0.1	< 0.1	Dragline removing mud	Wayne Jensen
	Below	1130		12.1	0.1	< 0.1		
Mon	Above	1430	150	16.4	0.1	< 0.1	Dragline removing mud	Wayne Jensen
	Below	1440		13.0	0.1	< 0.1		
3/20/12	Above	0900	150	9.5	0.1	< 0.1	Dragline in water	Jason La Deaux
	Below	0915		12.5	0.1	< 0.1		
Tues	Above	1215	150	15.2	0.1	< 0.1	Dragline in water	Jason La Deaux
	Below	1220		12.0	0.1	< 0.1		
3/21/12	Above	0850	150		0.1		Staging equipment on bank	Wayne Jensen
	Below	0855			0.1			
Wed	Above	1200	150	16.7	0.1	< 0.1	Dragline placing rock in water	Wayne Jensen
	Below	1210		21.9	0.1	< 0.1		
3/22/12	Above	1045	150	17.9	0.1	< 0.1	Dragline placing rock in water	Rich Pendleton
	Below	1055		17.1	0.1	< 0.1		
Thur	Above	1515	150	25.7	0.1	< 0.1	Dragline placing rock in water	Rich Pendleton
	Below	1615		28.3	0.1	< 0.1		
3/23/12	Above	0920	150	18.0	0.1	< 0.1	Dragline placing rock in water	Tom Coleman
	Below	0925		18.5	0.1	< 0.1		
Fri	Above	1330	150	23.4	0.1	< 0.1	Dragline placing rock in water	Tom Coleman
	Below	1335		30.1	0.1	< 0.1		
3/24/12	Above	0900	150	17.6	0.1	< 0.1	Dragline placing rock in water	Tom Coleman
	Below	0905		18.5	0.1	< 0.1		
Sat	Above		150		0.1			
	Below				0.1			
3/25/12	Above		150		0.1			
	Below				0.1			
Sun	Above		150		0.1			
	Below				0.1			

Monitoring Results for Turbidity and Settleable Solids
Spring 2012

State of California Department of Water Resources

Site: Temporary Rock Barrier - Old River at Head

Date	Barrier Sample Location	Time (PST)	Turbidity (NTU @ 300ft) Threshold	Turbidity (NTU @ 300ft) Measured	Settleable Solids (mL/L) Threshold	Settleable Solids (mL/L) Measured	Observations	Observer
3/26/12	Above	0845		16.3	0.1	< 0.1		
	Below	0835	150	16.5	0.1	< 0.1	Dragline working in water	Wayne Jensen
	Above	1235		27.6	0.1	< 0.1		
Mon	Below	1245	150	25.3	0.1	< 0.1	Dragline working in water	Wayne Jensen
3/27/12	Above	0755		24.8	0.1	< 0.1		
	Below	0745	150	24.5	0.1	< 0.1	Dragline working in water	Wayne Jensen
	Above	1230		20.6	0.1	< 0.1		
Tues	Below	1240	150	22.1	0.1	< 0.1	Dragline working in water	Wayne Jensen
3/28/12	Above	0740			0.1	< 0.1		
	Below	0745	150		0.1	< 0.1	No water work	Wayne Jensen
	Above	1235		13.8	0.1	< 0.1		
Wed	Below	1240	150	18.3	0.1	< 0.1	Placing frames in water	Wayne Jensen
3/29/12	Above	0908		10.4	0.1	< 0.1	Placing gravel and rock in water w/ dump truck	
	Below	0918	150	20.2	0.1	< 0.1		Kenny Karcher
	Above	1242		13.0	0.1	< 0.1	Placing gravel and rock in water w/ dump truck	
Thur	Below	1250	150	26.7	0.1	< 0.1		Kenny Karcher
3/30/12	Above	0940			0.1	< 0.1		
	Below	0945	150		0.1	< 0.1	No water work	Jason La Deaux
	Above	1205		17.6	0.1	< 0.1		
Fri	Below	1200	150	28.5	0.1	< 0.1	Dumping rock into water	Jason La Deaux
3/31/12	Above				0.1	< 0.1		
	Below		150		0.1	< 0.1	No work today	Jason La Deaux
	Above				0.1	< 0.1		
Sat	Below		150		0.1	< 0.1	No work today	Jason La Deaux
4/1/12	Above	0845		20.4	0.1	< 0.1		
	Below	0855	150	34.3	0.1	< 0.1	Dumping rock into water	Jason La Deaux
	Above	1200		19.7	0.1	< 0.1		
Sun	Below	1206	150	34.2	0.1	< 0.1	Dumping rock into water	Jason La Deaux

Site: Temporary Rock Barrier - Old River at Head

Date	Barrier Sample Location	Time (PST)	Turbidity (NTU @ 300ft)		Settleable Solids (mL/L)		Observations	Observer
			Threshold	Measured	Threshold	Measured		
	Above	1050			0.1			
4/2/12	Below	1050	150		0.1		No water work. Ran out of rock	Tom Coleman
	Above				0.1			
Mon	Below		150		0.1			
	Above	0930			0.1	< 0.1		
4/3/12	Below	0930	150		0.1	< 0.1	No work at this time	Jason La Deaux
	Above	1247		29.1	0.1	< 0.1		
Tues	Below	1254	150	39.8	0.1	< 0.1	Excavator in wter	Jason La Deaux
	Above	0840		25.8	0.1	< 0.1		
4/4/12	Below	0830	150	27.3	0.1	< 0.1	Excavator placing rock	Wayne Jensen
	Above	1230			0.1			
Wed	Below	1230	150		0.1		Working on top of dam, no water work	Wayne Jensen
	Above	0830			0.1			
4/5/12	Below	0830	150		0.1		No heavy equipment, no water work	Tom Coleman
	Above				0.1			
Thur	Below		150		0.1		Water work completed	
	Above				0.1			
4/6/12	Below		150		0.1			
	Above				0.1			
Fri	Below		150		0.1			
	Above				0.1			
4/7/12	Below		150		0.1			
	Above				0.1			
Sat	Below		150		0.1			
	Above				0.1			
4/8/12	Below		150		0.1			
	Above				0.1			
Sun	Below		150		0.1			

Site: Temporary Rock Barrier - Old River at Head (Removal)

Date	Barrier Sample Location	Time (PST)	Turbidity (NTU @ 300ft)		Settleable Solids (mL/L)		Observations	Observer
			Threshold	Measured	Threshold	Measured		
6/4/12	Above	0810	150	18.9	0.1	< 0.1	Removing rock from water	Wayne Jensen
	Below	0800		17.9	0.1	< 0.1		
Mon	Above	1210	150	23.4	0.1	< 0.1	Removing rock from water	Wayne Jensen
	Below	1200		37.5	0.1	< 0.1		
6/5/12	Above	0944	150	17.1	0.1	< 0.1	Removing rock from water	Jason La Deaux
	Below	0953		16.6	0.1	< 0.1		
Tues	Above	1211	150	19.8	0.1	< 0.1	Removing rock from water	Jason La Deaux
	Below	1200		21.4	0.1	< 0.1		
6/6/12	Above	1010	150	16.7	0.1	< 0.1	Removing rock from water	Wayne Jensen
	Below	1000		20.7	0.1	< 0.1		
Wed	Above	1210	150	15.8	0.1	< 0.1	Removing rock from water	Wayne Jensen
	Below	1200		23.4	0.1	< 0.1		
6/7/12	Above	1045	150	13.7	0.1	< 0.1	Removing rock from water	Larry Crane
	Below	1045		24.1	0.1	< 0.1		
Thur	Above	1200	150	12.7	0.1	< 0.1	Removing rock from water	Larry Crane
	Below	1205		26.7	0.1	< 0.1		
6/8/12	Above	1030	150	13.0	0.1	< 0.1	Removing rock from water	Larry Crane
	Below	1030		28.4	0.1	< 0.1		
Fri	Above	1200	150	14.1	0.1	< 0.1	Removing rock from water	Larry Crane
	Below	1200		36.4	0.1	< 0.1		
6/9/12	Above							
	Below							
Sat	Above							
	Below							
6/10/12	Above							
	Below							
Sun	Above							
	Below							

Site: Temporary Rock Barrier - Old River at Head (Removal)

Date	Barrier Sample Location	Time (PST)	Turbidity (NTU @ 300ft)		Settleable Solids (mL/L)		Observations	Observer
			Threshold	Measured	Threshold	Measured		
6/11/12	Above	1015	150	12.0	0.1	< 0.1	Removing rock from water	Wayne Jensen
	Below	1020		23.7	0.1	< 0.1		
Mon	Above	1300	150	-	0.1	< 0.1	No water work	Wayne Jensen
	Below	1305		-	0.1	< 0.1		
6/12/12	Above	1030	150	-	0.1	< 0.1	All work is on shore.	Jason La Deaux
	Below	1030		-	0.1	< 0.1		
Tues	Above	1200	150	17.4	0.1	< 0.1	Backhoe in water. Removing Platform.	Jason La Deaux
	Below	1207		12.1	0.1	< 0.1		
6/13/12	Above	0800	150	13.7	0.1	< 0.1	Excavator in water.	Jason La Deaux
	Below	0807		12.7	0.1	< 0.1		
Wed	Above	1200	150	14.4	0.1	< 0.1	Excavator in water.	Jason La Deaux
	Below	1210		13.7	0.1	< 0.1		
6/14/12	Above	0806	150	12.4	0.1	< 0.1	Excavator in water.	Jason La Deaux
	Below	0817		18.6	0.1	< 0.1		
Thur	Above	1207	150	22.2	0.1	< 0.1	Excavator in water.	Jason La Deaux
	Below	1200		21.1	0.1	< 0.1		
6/15/12	Above	0832	150	11.6	0.1	< 0.1	Excavator in water.	Jason La Deaux
	Below	0828		11.9	0.1	< 0.1		
Fri	Above	1210	150	21.5	0.1	< 0.1	Excavator in water.	Jason La Deaux
	Below	1220		22.1	0.1	< 0.1		
6/16/12	Above							
	Below							
Sat	Above							
	Below							
6/17/12	Above							
	Below							
Sun	Above							
	Below							

Site: Temporary Rock Barrier - Old River at Head (Removal)

Date	Barrier Sample Location	Time (PST)	Turbidity (NTU @ 300ft)		Settleable Solids (mL/L)		Observations	Observer
			Threshold	Measured	Threshold	Measured		
6/18/12	Above	0833	150	15.6	0.1	< 0.1	Excavator in water.	Jason La Deaux
	Below	0845		16.1	0.1	< 0.1		
Mon	Above	1231	150	25.2	0.1	< 0.1	Excavator in water.	Jason La Deaux
	Below	1239		29.5	0.1	< 0.1		
6/19/12	Above	1045	150	23.3	0.1	< 0.1	Removing last pieces of equipment from water	Jason La Deaux
	Below	1053		12.7	0.1	< 0.1		
Tues	Above	1200	150	-	-	-	All water work complete.	Jason La Deaux
	Below	1200		-	-	-		
6/20/12	Above							
	Below							
Wed	Above							
	Below							
6/21/12	Above							
	Below							
Thur	Above							
	Below							
6/22/12	Above							
	Below							
Fri	Above							
	Below							
6/23/12	Above							
	Below							
Sat	Above							
	Below							
6/24/12	Above							
	Below							
Sun	Above							
	Below							

Appendix 6: Dissolved Oxygen Data

Monthly Statistics for the Grant Line Canal continuous water quality monitoring stations

	Water Temperature (°C)				Dissolved Oxygen (mg/L)				pH			
Month	Doughty Cut	GLC abv Barrier	GLC @ Tracy Blvd	GLC nr Old River	Doughty Cut	GLC abv Barrier	GLC @ Tracy Blvd	GLC nr Old River	Doughty Cut	GLC abv Barrier	GLC @ Tracy Blvd	GLC nr Old River
	MAXIMUMS				MAXIMUMS				MAXIMUMS			
January	11.9	11.8	11.9	11.8	12.75	12.67	12.28	11.92	8.15	8.32	8.09	8.13
February	14.3	14.4	14.1	13.7	11.11	11.03	10.68	10.18	8.15	8.09	7.94	7.94
March	17.1	17.0	16.8	16.6	16.33	14.94	15.07	12.49	8.92	8.84	8.65	8.45
April	23.2	22.9	22.7	22.3	14.69	14.08	13.94	10.38	8.85	8.96	8.86	8.06
May	22.7	22.7	22.1	22.5	13.30	10.08	9.10	9.02	8.62	8.16	7.77	7.92
June	26.8	26.9	25.9	25.7	16.36	15.98	14.30	10.03	9.44	9.68	9.36	8.50
July	28.3	28.3	26.5	26.8	16.32	18.99	10.10	10.16	9.60	9.61	9.07	8.77
August	28.7	29.6	28.0	27.7	12.73	15.09	8.66	8.33	9.10	9.39	8.92	7.98
September	25.2	25.8	24.7	25.4	13.98	14.21	11.39	8.59	9.07	9.15	8.53	7.92
October	24.9	24.6	24.3	24.0	11.84	12.36	10.22	8.94	8.49	8.75	8.13	7.85
November	17.6	17.7	17.6	18.1	11.14	11.18	11.01	10.03	8.15	8.17	7.99	8.06
December	14.3	14.1	14.2	14.2	11.27	10.90	10.97	11.03	7.98	7.91	7.91	7.95
	AVERAGES				AVERAGES				AVERAGES			
January	9.5	9.5	9.6	9.2	11.32	11.25	11.02	10.65	7.94	7.92	7.82	7.80
February	12.2	12.2	12.1	11.8	10.10	9.85	9.85	9.61	7.98	7.83	7.74	7.74
March	14.1	14.2	13.9	13.6	11.06	10.72	10.88	9.27	8.19	8.16	7.94	7.77
April	17.9	17.9	17.8	17.6	9.24	8.57	8.54	8.29	7.65	7.64	7.62	7.61
May	19.8	19.9	19.9	20.5	7.98	7.85	7.68	7.67	7.46	7.61	7.42	7.65
June	22.1	22.3	22.1	22.3	9.77	9.29	9.25	7.36	8.05	8.21	8.02	7.65
July	25.0	25.0	24.6	24.3	8.65	7.14	5.43	6.21	8.87	8.50	8.14	7.53
August	25.4	25.6	25.3	24.6	7.07	5.48	4.59	5.49	8.06	7.99	7.60	7.41
September	23.1	23.1	22.9	22.6	9.94	8.71	7.97	6.70	8.42	8.16	7.91	7.49
October	18.8	18.8	18.7	19.1	8.99	8.62	8.48	7.89	7.74	7.85	7.65	7.52
November	14.4	14.4	14.5	14.9	9.64	9.50	9.40	8.73	7.73	7.78	7.68	7.66
December	10.8	10.9	10.9	11.0	9.61	9.34	9.40	9.20	7.70	7.66	7.65	7.61
	MEDIANS				MEDIANS				MEDIANS			
January	9.3	9.3	9.4	9.1	11.36	11.36	11.06	10.64	7.95	7.95	7.83	7.83
February	12.0	12.0	12.0	11.6	10.12	10.12	9.90	9.62	7.98	7.98	7.78	7.76
March	14.2	14.2	14.1	13.5	10.82	10.82	10.54	9.38	8.19	8.19	8.14	7.75
April	16.8	16.8	16.7	16.4	9.48	9.48	8.72	8.52	7.81	7.81	7.68	7.63
May	19.8	19.8	19.9	20.8	7.74	7.74	7.56	7.71	7.48	7.48	7.42	7.66
June	21.8	21.8	21.8	22.3	9.51	9.51	9.16	7.40	8.35	8.35	8.45	7.67
July	25.1	25.1	24.8	24.4	8.65	8.65	5.15	6.43	8.96	8.96	8.41	7.53
August	25.4	25.4	25.3	24.4	7.03	7.03	4.26	5.33	8.31	8.31	7.85	7.39
September	23.0	23.0	22.9	22.5	9.95	9.95	7.97	6.72	8.45	8.45	7.97	7.50
October	18.5	18.5	18.4	19.1	9.04	9.04	8.56	8.02	7.80	7.80	7.69	7.55
November	14.0	14.0	14.2	14.5	9.64	9.64	9.40	8.78	7.72	7.72	7.70	7.67
December	10.1	10.1	10.0	10.5	9.56	9.56	9.35	9.21	7.72	7.72	7.68	7.61
	MINIMUMS				MINIMUMS				MINIMUMS			
January	7.3	7.6	7.6	7.6	9.74	9.51	7.93	9.00	7.69	7.61	7.61	7.46
February	10.7	11.1	11.0	10.1	7.82	8.56	7.65	8.89	7.86	7.67	7.44	7.47
March	11.1	11.3	11.2	11.3	8.91	7.99	8.11	7.08	7.82	7.79	7.54	7.50
April	14.4	14.5	14.3	14.3	4.08	3.93	2.64	4.25	7.06	7.06	7.09	7.19
May	17.7	17.9	18.0	18.3	5.33	5.86	5.52	6.23	7.18	7.33	7.15	7.37
June	18.8	19.6	19.7	19.3	6.73	5.21	4.65	5.40	7.35	7.59	7.30	7.30
July	21.5	21.6	21.6	22.0	1.89	1.47	1.23	2.33	7.85	7.47	7.23	7.15
August	22.9	22.8	23.0	22.2	1.63	0.75	1.43	2.30	6.88	7.43	6.54	7.12
September	21.3	21.4	21.5	21.1	5.40	1.14	4.24	4.06	7.94	7.64	7.46	7.28
October	14.6	14.7	14.6	15.2	5.41	6.29	5.10	5.97	7.26	7.50	7.24	7.24
November	12.2	12.2	12.3	12.5	6.23	7.95	7.94	7.69	7.47	7.58	7.27	7.26
December	8.0	8.2	8.2	8.3	7.85	7.45	7.67	7.04	7.48	7.45	7.46	7.33
	STANDARD DEVIATIONS				STANDARD DEVIATIONS				STANDARD DEVIATIONS			
January	1.1	1.1	1.1	1.0	0.55	0.56	0.56	0.52	0.08	0.15	0.12	0.15
February	0.7	0.7	0.7	0.7	0.38	0.40	0.36	0.24	0.06	0.09	0.10	0.09
March	1.3	1.3	1.4	1.2	1.21	1.23	1.28	0.87	0.22	0.23	0.31	0.19
April	2.3	2.3	2.3	2.5	2.53	2.36	2.36	1.26	0.49	0.51	0.49	0.14
May	1.0	0.9	0.9	1.0	0.84	0.71	0.63	0.44	0.21	0.16	0.13	0.11
June	1.7	1.6	1.5	1.4	1.53	1.86	1.58	0.69	0.51	0.54	0.54	0.19
July	1.3	1.2	1.0	0.9	1.96	2.51	1.88	1.41	0.24	0.41	0.42	0.26
August	1.2	1.3	1.1	1.1	1.73	2.23	1.50	1.62	0.42	0.42	0.46	0.18
September	0.8	0.8	0.7	0.8	1.11	1.82	1.03	1.15	0.18	0.30	0.22	0.12
October	2.5	2.5	2.5	2.2	0.70	0.79	0.64	0.56	0.27	0.24	0.18	0.14
November	1.7	1.7	1.7	1.6	0.58	0.53	0.53	0.39	0.13	0.10	0.09	0.11
December	2.1	2.0	2.1	2.0	0.83	0.79	0.80	0.91	0.12	0.11	0.12	0.15
2012 - Max.	28.7	29.6	28.0	27.7	16.36	18.99	15.07	12.49	9.60	9.68	9.36	8.77
2012 - Avg.	17.8	17.8	17.8	17.7	9.44	8.85	8.47	8.09	7.86	7.87	7.72	7.61
2012 - Med.	17.9	17.9	18.4	18.6	9.60	9.60	8.86	8.16	7.99	7.99	7.77	7.65
2012 - Min.	7.3	7.6	7.6	7.6	1.63	0.75	1.23	2.30	6.88	7.06	6.54	7.12
2012 - S.D.	5.5	5.5	5.5	5.4	1.75	2.13	2.24	1.73	0.48	0.45	0.41	0.19

Monthly Statistics for the Grant Line Canal continuous water quality monitoring stations – continued

Month	Specific Conductance (µS/cm)				Turbidity (NTU)			
	Doughty Cut	GLC abv Barrier	GLC @ Tracy Blvd	GLC nr Old River	Doughty Cut	GLC abv Barrier	GLC @ Tracy Blvd	GLC nr Old River
	MAXIMUMS				MAXIMUMS			
January	874	862	887	862	36.9	33.0	19.2	36.5
February	1102	1037	1028	1002	36.0	41.8	24.1	39.0
March	1110	1086	1077	1061	37.2	52.2	27.6	32.4
April	1062	1012	1010	1012	48.9	44.4	35.0	37.6
May	697	613	615	626	43.8	56.7	31.9	38.2
June	814	724	727	655	67.3	55.6	37.2	36.7
July	845	789	771	756	82.8	53.7	38.8	29.6
August	886	792	788	760	52.1	65.3	34.9	38.5
September	805	806	812	808	61.2	24.7	40.2	31.3
October	791	773	774	772	38.4	43.4	44.7	42.1
November	832	842	858	815	66.1	46.9	35.4	39.2
December	1015	941	943	931	141.4	185.2	183.8	100.3
	AVERAGES				AVERAGES			
January	769	772	772	726	8.1	4.6	4.5	4.8
February	837	847	846	743	8.3	4.8	5.0	5.5
March	949	956	983	790	12.3	9.6	10.2	6.7
April	687	675	677	604	18.4	13.0	12.7	8.4
May	408	407	407	435	11.5	7.6	7.5	7.5
June	539	531	535	433	19.4	14.7	15.4	8.1
July	645	645	643	447	21.8	13.6	16.3	8.9
August	702	707	709	537	16.6	16.6	11.8	8.1
September	730	732	736	667	11.3	6.8	10.1	5.0
October	565	558	563	537	6.5	4.7	6.7	3.7
November	746	748	753	599	7.5	4.3	4.8	5.0
December	748	743	743	658	18.9	16.9	16.0	15.6
	MEDIANS				MEDIANS			
January	780	780	775	744	7.9	7.9	4.3	4.3
February	812	812	825	758	8.1	8.1	4.9	5.4
March	952	952	984	865	11.9	11.9	10.1	6.2
April	613	613	588	562	17.8	17.7	12.5	8.2
May	407	407	405	422	11.7	11.7	7.6	7.2
June	540	540	520	418	20.1	20.1	16.9	7.6
July	672	672	681	425	21.0	21.0	16.2	8.4
August	702	702	705	598	16.1	16.1	11.6	7.5
September	729	729	735	710	10.2	10.2	9.7	4.4
October	576	576	576	501	6.2	6.2	6.0	2.9
November	752	752	754	645	6.4	6.4	4.3	3.8
December	781	781	781	687	9.2	9.2	6.5	9.2
	MINIMUMS				MINIMUMS			
January	637	648	646	515	4.3	1.6	1.8	2.2
February	679	681	678	500	4.8	1.8	1.8	2.0
March	797	796	825	445	6.7	3.9	4.3	2.5
April	515	510	512	435	10.6	5.8	5.9	2.4
May	231	236	239	306	4.3	2.0	2.6	3.9
June	415	412	425	286	7.5	2.2	2.9	3.8
July	417	420	418	238	12.4	4.1	5.9	2.7
August	606	625	646	261	6.8	3.2	3.4	2.7
September	656	673	688	358	3.6	2.1	3.4	2.0
October	278	275	288	282	2.1	0.0	1.9	1.4
November	537	542	543	373	3.1	1.8	2.0	1.5
December	389	389	389	299	4.5	1.6	1.3	1.9
	STANDARD DEVIATIONS				STANDARD DEVIATIONS			
January	56	54	55	92	2.4	2.0	1.6	2.1
February	89	85	86	126	2.7	2.9	1.2	1.8
March	62	63	46	197	3.0	3.4	3.4	2.4
April	160	169	170	146	3.8	3.1	2.9	3.0
May	102	94	95	78	3.3	3.9	2.7	2.4
June	86	77	78	113	6.2	6.5	6.6	2.5
July	87	94	92	158	5.5	4.6	3.7	3.6
August	39	29	29	162	4.2	8.3	3.0	3.2
September	31	26	25	104	4.7	2.2	3.2	2.3
October	150	156	151	137	2.3	3.0	3.8	3.2
November	43	50	51	152	4.1	2.3	2.4	3.5
December	156	156	155	178	22.9	25.6	24.1	17.1
2012 - Max.	1110	1086	1077	1061	141.4	185.2	183.8	100.3
2012 - Avg.	693	693	689	597	14.0	9.7	10.0	7.2
2012 - Med.	713	713	715	589	12.0	12.0	8.3	6.2
2012 - Min.	231	236	239	238	2.1	0.0	1.3	1.4
2012 - S.D.	169	172	170	184	9.5	9.9	8.9	5.7

Monthly Statistics for the Victoria Canal water quality monitoring station

Month	Water Temperature (°C)	Dissolved Oxygen (mg/L)	pH	Specific Conductance (µS/cm)	Turbidity (NTU)
			MAXIMUMS		
January	10.1	10.98	7.79	602	23.6
February	12.9	10.28	7.69	600	24.1
March	15.4	10.65	7.77	592	22.2
April	21.8	10.71	8.02	653	29.0
May	22.8	9.31	7.86	542	14.8
June	25.4	9.04	8.13	384	26.9
July	26.0	11.23	9.23	399	31.1
August	25.7	8.83	7.97	366	31.0
September	24.2	9.36	7.92	459	31.0
October	22.9	8.97	7.97	432	7.4
November	18.2	9.49	7.74	416	36.7
December	14.1	10.67	7.83	508	36.0
			AVERAGES		
January	8.7	10.33	7.54	518	3.7
February	11.3	9.73	7.49	526	4.3
March	12.9	9.60	7.58	506	5.2
April	17.3	9.17	7.69	528	3.3
May	20.7	8.07	7.51	417	5.6
June	22.6	7.82	7.65	324	5.8
July	24.2	7.98	7.69	256	7.7
August	24.0	7.91	7.58	257	6.5
September	22.2	8.24	7.59	371	2.8
October	19.6	8.32	7.65	383	2.1
November	15.4	8.79	7.50	337	2.2
December	11.2	9.05	7.47	361	10.1
			MEDIANS		
January	8.6	10.32	7.56	525	3.2
February	11.4	9.75	7.52	524	4.0
March	12.9	9.53	7.63	502	5.0
April	16.3	9.30	7.68	529	3.1
May	21.0	8.05	7.52	430	5.2
June	22.6	7.80	7.74	321	5.5
July	24.2	7.76	7.68	247	7.0
August	24.1	7.90	7.58	250	6.1
September	22.1	8.23	7.60	370	2.2
October	19.6	8.35	7.63	384	1.8
November	14.7	8.82	7.49	334	1.6
December	11.1	8.76	7.48	361	9.8
			MINIMUMS		
January	7.7	9.72	7.28	427	1.1
February	9.8	9.09	7.30	484	1.2
March	11.1	8.93	7.37	462	1.8
April	13.8	7.01	7.46	461	1.4
May	18.4	6.73	7.22	318	3.1
June	19.9	6.69	7.15	291	2.6
July	22.6	6.37	7.13	203	1.2
August	22.1	7.02	7.29	216	1.8
September	20.8	7.21	7.33	289	0.5
October	17.3	7.06	7.41	337	1.0
November	13.4	7.86	7.25	302	0.7
December	8.0	7.74	7.17	266	1.6
			STANDARD DEVIATIONS		
January	0.6	0.22	0.12	38	2.0
February	0.7	0.20	0.10	23	1.8
March	0.9	0.35	0.10	21	1.9
April	2.5	0.81	0.11	33	1.5
May	1.1	0.41	0.12	62	1.4
June	1.2	0.40	0.19	17	1.6
July	0.7	0.89	0.46	31	3.4
August	0.7	0.35	0.13	24	2.7
September	0.7	0.41	0.10	49	2.4
October	1.5	0.28	0.13	21	1.0
November	1.5	0.32	0.11	23	2.3
December	2.0	0.92	0.17	55	5.4
2012 - Max.	26.0	11.23	9.23	653	36.7
2012 - Avg.	17.5	8.75	7.57	398	5.3
2012 - Med.	18.9	8.52	7.60	383	4.6
2012 - Min.	7.7	6.37	7.13	203	0.5
2012 - S.D.	5.4	0.95	0.21	103	3.4

Monthly Statistics for the Middle River continuous water quality monitoring stations

	Water Temperature (°C)				Dissolved Oxygen (mg/L)				pH			
Month	Undine	Howard	Tracy Blvd	Union Point	Undine	Howard	Tracy Blvd	Union Point	Undine	Howard	Tracy Blvd	Union Point
	MAXIMUMS				MAXIMUMS				MAXIMUMS			
January	12.7	11.7	11.0	10.4	16.07	14.31	11.59	11.15	8.76	8.14	7.88	7.79
February	15.6	14.4	13.7	12.9	13.86	12.75	10.88	10.55	8.58	8.34	7.99	7.80
March	18.2	17.3	17.1	16.2	19.32	16.50	11.47	10.65	9.09	8.94	8.12	7.89
April	17.8	25.3	25.0	21.9	13.62	16.57	11.57	10.66	8.71	8.66	8.48	8.14
May	24.9	24.8	24.4	22.8	15.86	10.96	10.28	9.25	9.31	8.48	8.31	7.98
June	28.2	27.8	26.5	25.0	15.62	11.21	9.29	9.19	9.46	8.79	8.00	8.04
July	28.9	28.3	27.5	26.4	17.47	13.99	10.18	11.93	9.59	9.13	8.60	9.21
August	30.6	27.7	27.0	25.9	17.10	7.43	7.86	9.40	9.39	7.45	7.61	8.36
September	26.2	24.0	24.7	24.4	16.87	6.77	8.07	9.65	9.21	7.58	7.50	8.14
October	25.4	23.4	23.5	22.9	14.99	8.95	8.68	9.01	8.92	7.81	7.67	7.83
November	18.7	16.9	18.3	18.3	15.60	10.20	10.24	9.63	8.84	8.33	7.73	7.71
December	14.8	13.8	14.3	14.1	12.29	10.75	10.53	10.68	8.14	7.67	7.65	7.52
	AVERAGES				AVERAGES				AVERAGES			
January	9.4	8.4	8.5	8.7	11.72	11.44	10.54	10.28	8.01	7.47	7.63	7.57
February	12.0	11.7	11.3	11.3	10.41	10.41	9.86	9.54	7.93	7.88	7.68	7.48
March	14.1	13.8	13.3	13.0	10.48	9.53	9.01	9.34	8.02	7.69	7.64	7.69
April	15.8	18.6	17.8	17.3	9.77	9.22	8.89	9.00	8.02	7.87	7.65	7.81
May	19.7	21.0	20.7	20.9	10.17	6.81	7.77	7.88	7.91	7.44	7.60	7.55
June	22.2	23.1	22.4	22.5	10.49	5.20	6.72	7.74	8.38	7.26	7.47	7.58
July	25.0	24.9	24.2	24.2	9.89	4.00	6.04	7.94	8.96	7.08	7.41	7.79
August	25.5	24.9	24.0	23.9	8.36	2.36	5.28	7.92	8.32	6.86	7.21	7.65
September	22.9	22.2	22.1	22.1	10.05	2.83	5.57	8.03	8.39	6.94	7.07	7.65
October	18.5	18.6	19.0	19.6	9.56	5.31	5.15	8.10	7.91	7.12	7.12	7.50
November	14.3	13.4	14.8	15.4	11.15	7.08	8.42	8.61	8.07	7.22	7.35	7.53
December	10.6	10.6	10.7	11.2	9.21	7.02	8.76	8.94	7.68	7.18	7.31	7.27
	MEDIANS				MEDIANS				MEDIANS			
January	9.1	8.4	8.4	8.6	11.40	11.43	10.54	10.23	8.03	7.56	7.63	7.57
February	12.0	11.6	11.3	11.4	10.29	10.59	9.83	9.53	7.93	7.96	7.67	7.45
March	14.2	13.8	13.2	12.9	10.19	9.08	8.92	9.27	8.02	7.67	7.67	7.70
April	15.5	17.5	17.0	16.2	9.62	9.17	8.90	9.09	8.04	7.88	7.64	7.81
May	19.7	21.2	20.7	21.0	10.09	6.75	7.74	7.84	8.26	7.74	7.60	7.56
June	22.0	23.0	22.3	22.5	10.45	5.12	6.71	7.75	8.85	7.34	7.48	7.56
July	24.9	24.8	24.2	24.1	9.86	3.73	5.99	7.76	9.10	7.10	7.40	7.77
August	25.5	24.9	24.0	23.9	8.23	2.14	5.49	7.90	8.65	6.85	7.23	7.76
September	22.9	22.1	22.0	22.0	9.66	2.65	5.61	8.06	8.53	6.92	7.09	7.69
October	18.2	18.6	19.0	19.6	9.30	5.55	5.28	8.15	7.97	7.13	7.16	7.51
November	13.7	12.8	14.3	14.7	10.92	7.10	8.65	8.71	8.14	7.44	7.35	7.54
December	9.6	10.8	10.3	11.1	9.52	6.79	8.85	8.74	7.72	7.22	7.31	7.29
	MINIMUMS				MINIMUMS				MINIMUMS			
January	6.3	5.3	6.2	7.3	8.19	9.43	9.13	9.40	7.51	7.09	7.45	7.36
February	9.2	9.1	9.5	9.8	7.45	6.10	8.05	8.59	7.60	7.24	7.53	7.28
March	10.3	9.7	10.1	10.8	5.16	5.93	7.21	8.42	7.63	7.36	7.29	7.52
April	14.6	14.3	13.6	13.7	7.08	3.73	6.11	7.07	7.77	7.48	7.31	7.63
May	16.5	17.4	17.9	18.8	4.95	0.46	5.46	6.63	7.34	6.69	7.27	7.19
June	17.6	18.8	19.1	20.0	4.26	0.38	2.52	6.51	7.30	6.64	7.12	7.36
July	20.0	22.1	21.9	22.4	0.53	0.24	3.67	3.12	7.80	6.71	7.00	7.36
August	21.6	21.5	21.4	22.0	0.85	0.23	0.84	5.38	7.21	6.68	6.90	7.22
September	20.1	18.9	20.3	20.9	0.39	0.39	1.77	5.68	7.39	6.73	6.78	7.26
October	13.9	15.2	15.8	17.0	1.16	1.33	1.47	5.52	7.33	6.82	6.81	7.10
November	11.3	11.2	12.6	13.2	7.43	4.77	5.32	6.98	7.62	6.80	7.19	7.25
December	7.0	7.2	7.3	8.1	4.45	4.45	6.36	7.43	7.30	6.82	7.05	7.07
	STANDARD DEVIATIONS				STANDARD DEVIATIONS				STANDARD DEVIATIONS			
January	1.3	1.4	0.9	0.6	1.63	0.96	0.39	0.29	0.27	0.25	0.07	0.08
February	1.0	1.1	0.9	0.7	1.37	1.28	0.40	0.32	0.21	0.20	0.09	0.13
March	1.5	1.6	1.4	1.0	1.73	1.82	0.75	0.37	0.27	0.32	0.15	0.06
April	0.9	3.0	2.7	2.4	1.12	2.75	1.01	0.70	0.18	0.25	0.18	0.08
May	2.0	1.5	1.3	0.9	2.91	1.60	0.71	0.43	0.64	0.37	0.15	0.19
June	2.1	1.9	1.4	1.1	2.25	1.97	0.79	0.45	0.48	0.32	0.12	0.13
July	1.8	1.3	1.0	0.7	2.79	1.89	0.95	1.03	0.27	0.29	0.18	0.39
August	1.8	1.2	1.0	0.6	2.90	1.33	1.24	0.45	0.45	0.09	0.13	0.24
September	1.3	0.8	0.8	0.7	2.82	1.24	1.10	0.43	0.34	0.15	0.13	0.12
October	2.5	2.1	1.8	1.5	1.91	1.71	1.56	0.38	0.39	0.22	0.16	0.12
November	1.9	1.8	1.7	1.5	1.47	1.01	0.99	0.40	0.28	0.33	0.10	0.08
December	2.2	2.0	2.2	2.0	1.74	1.40	0.91	0.88	0.19	0.14	0.13	0.12
2012 - Max.	30.6	28.3	27.5	26.4	19.32	16.57	11.59	11.93	9.59	9.13	8.60	9.21
2012 - Avg.	17.5	17.7	17.4	17.5	10.13	6.75	7.66	8.61	8.05	7.23	7.37	7.56
2012 - Med.	16.9	18.6	18.2	19.0	10.08	6.68	7.86	8.41	8.21	7.37	7.46	7.60
2012 - Min.	6.3	5.3	6.2	7.3	0.39	0.23	0.84	3.12	7.21	6.64	6.78	7.07
2012 - S.D.	6.0	5.8	5.5	5.4	2.34	3.29	2.03	0.96	0.51	0.43	0.25	0.23

Monthly Statistics for the Middle River continuous water quality monitoring stations – continued

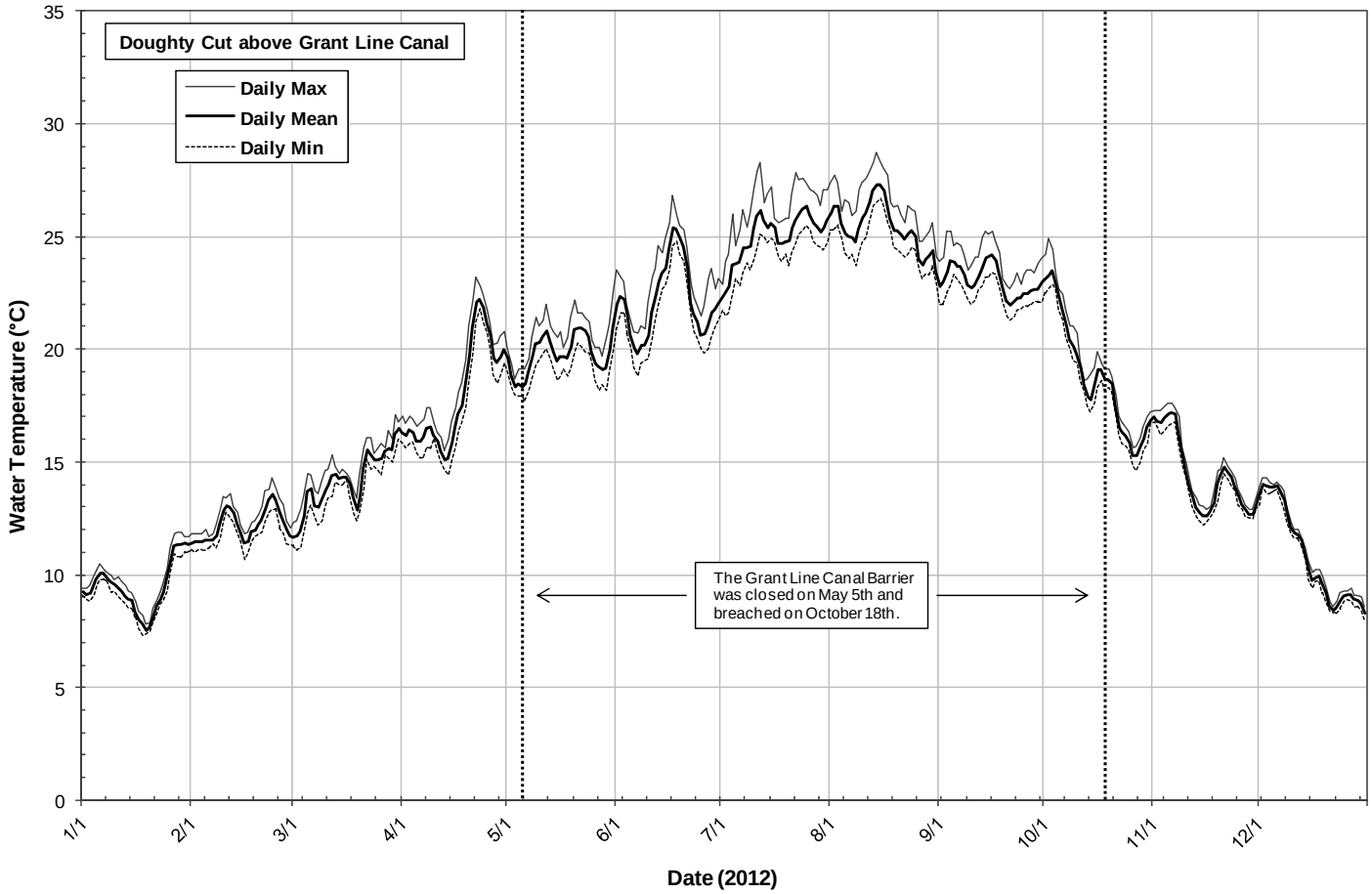
	Specific Conductance (µS/cm)				Turbidity (NTU)			
Month	Undine	Howard	Tracy Blvd	Union Point	Undine	Howard	Tracy Blvd	Union Point
	MAXIMUMS				MAXIMUMS			
January	842	1266	919	689	29.7	15.8	61.8	37.6
February	1036	1194	931	655	38.3	35.6	33.3	45.2
March	1291	1524	1173	743	44.9	21.7	34.3	25.4
April	1128	1580	1217	734	23.4	38.4	35.5	41.1
May	453	1723	600	505	37.1	26.7	77.5	32.1
June	639	1071	410	363	66.0	37.0	46.1	21.5
July	733	1089	404	358	71.7	36.4	60.6	42.9
August	747	909	346	297	66.1	23.7	39.7	32.4
September	773	1133	489	434	35.8	38.7	33.6	29.8
October	767	982	751	501	28.3	37.7	49.5	35.6
November	807	1013	627	466	36.8	26.2	44.0	15.8
December	1230	1381	1094	807	533.8	67.2	223.0	111.5
	AVERAGES				AVERAGES			
January	756	794	588	519	3.7	3.7	6.4	4.8
February	834	883	629	524	3.4	3.0	6.8	5.8
March	940	928	653	485	7.6	5.5	7.6	5.5
April	976	1080	655	511	6.7	4.0	4.9	4.6
May	389	597	431	398	5.8	4.3	7.3	6.3
June	502	505	345	312	20.6	4.9	9.4	5.4
July	618	463	286	240	26.2	6.5	12.2	7.5
August	674	450	281	242	17.4	4.2	7.4	4.6
September	703	623	384	366	10.7	5.0	5.2	3.0
October	541	618	511	378	3.8	5.1	5.8	2.5
November	732	669	427	337	2.7	2.4	3.4	2.0
December	766	901	575	354	32.7	7.9	18.2	11.2
	MEDIANS				MEDIANS			
January	758	820	555	524	3.4	3.6	4.8	3.7
February	818	876	594	514	2.9	2.5	6.2	5.0
March	943	974	562	479	6.8	5.3	7.2	4.7
April	955	1074	609	502	5.5	2.3	4.3	3.8
May	384	582	448	407	5.1	3.8	6.2	5.7
June	489	486	340	309	21.1	4.2	8.3	5.1
July	642	448	269	229	24.9	5.3	10.2	7.0
August	677	411	280	234	15.5	3.6	7.2	4.2
September	703	601	372	371	9.8	3.5	4.8	2.6
October	565	607	461	376	2.9	3.4	4.7	2.0
November	727	718	417	332	2.3	2.0	2.4	1.8
December	767	950	544	344	6.5	3.1	10.8	10.4
	MINIMUMS				MINIMUMS			
January	647	518	432	422	1.6	1.2	1.8	1.1
February	646	674	471	475	1.2	1.4	1.9	1.2
March	767	546	441	445	1.1	1.2	2.8	2.0
April	920	757	474	454	2.6	0.6	1.7	1.6
May	343	411	338	309	2.6	0.6	2.6	2.3
June	356	387	299	280	2.8	0.5	4.1	2.6
July	399	304	218	194	5.3	1.2	3.1	1.8
August	572	303	224	203	3.2	0.9	2.1	1.3
September	644	437	296	289	2.1	0.9	1.9	0.9
October	290	357	388	333	1.2	0.7	1.6	0.7
November	509	385	312	300	1.2	0.7	1.2	0.7
December	339	515	301	260	2.1	1.3	3.6	2.3
	STANDARD DEVIATIONS				STANDARD DEVIATIONS			
January	53	133	107	45	1.8	1.6	5.6	3.3
February	89	72	111	34	2.3	1.9	3.1	3.4
March	66	217	181	32	4.2	2.6	2.8	2.5
April	48	178	137	39	3.3	4.6	2.6	2.7
May	26	105	58	62	3.3	2.1	4.3	2.1
June	76	81	24	17	9.7	3.1	4.1	1.5
July	74	118	44	36	9.0	4.0	6.7	3.5
August	32	116	20	24	8.7	2.4	2.6	2.2
September	30	129	48	50	4.8	4.3	2.0	1.7
October	152	114	99	24	2.6	4.0	4.0	2.5
November	47	131	69	27	1.8	1.8	3.9	1.1
December	201	171	180	66	59.2	11.1	21.4	8.9
2012 - Max.	1291	1723	1217	807	533.8	67.2	223.0	111.5
2012 - Avg.	699	705	480	388	13.0	4.7	7.9	5.4
2012 - Med.	706	667	456	375	5.7	3.4	6.2	4.5
2012 - Min.	290	303	218	194	1.1	0.5	1.2	0.7
2012 - S.D.	165	238	170	105	22.6	4.4	8.4	4.2

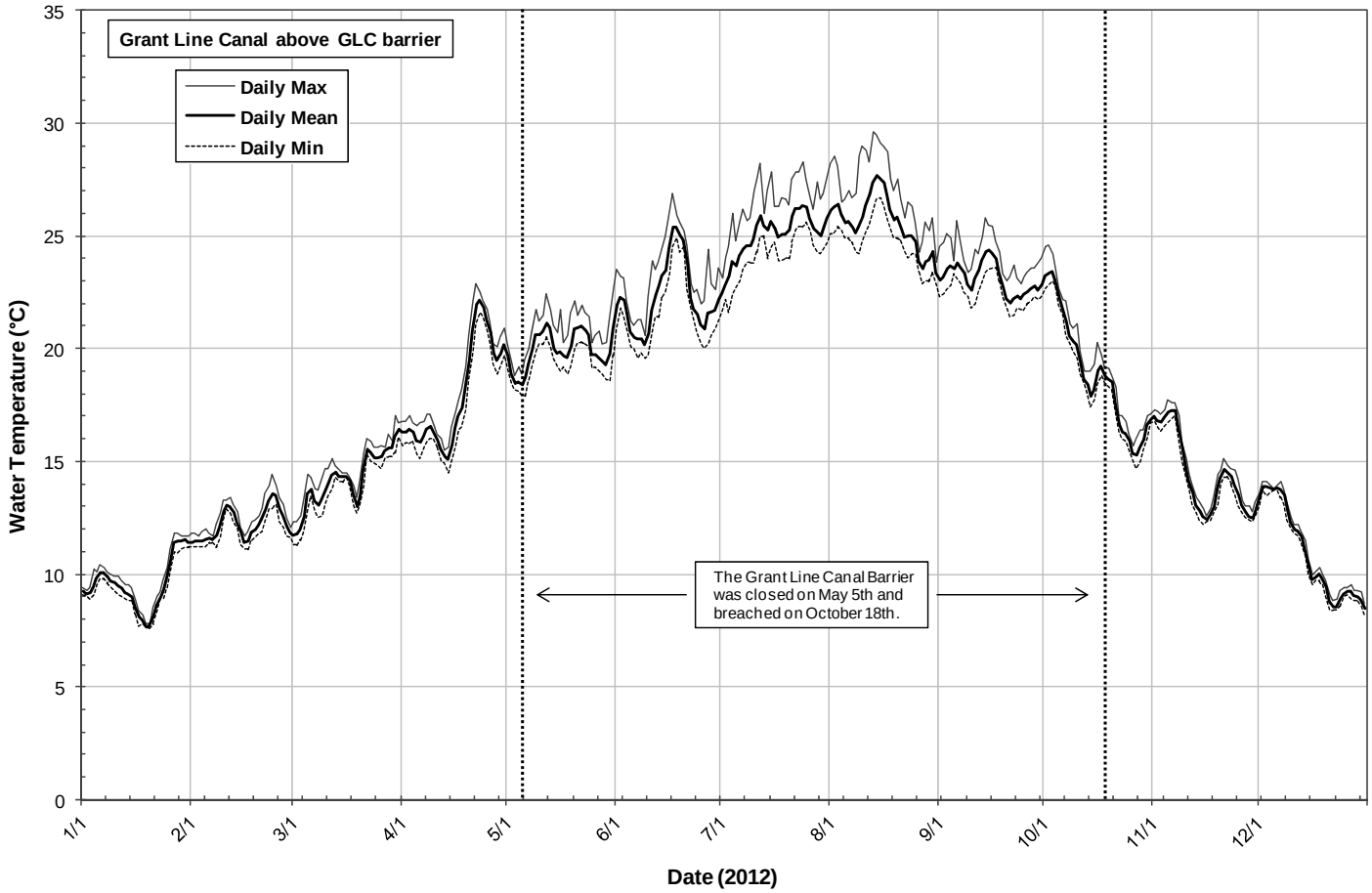
Monthly Statistics for the Old River continuous water quality monitoring stations

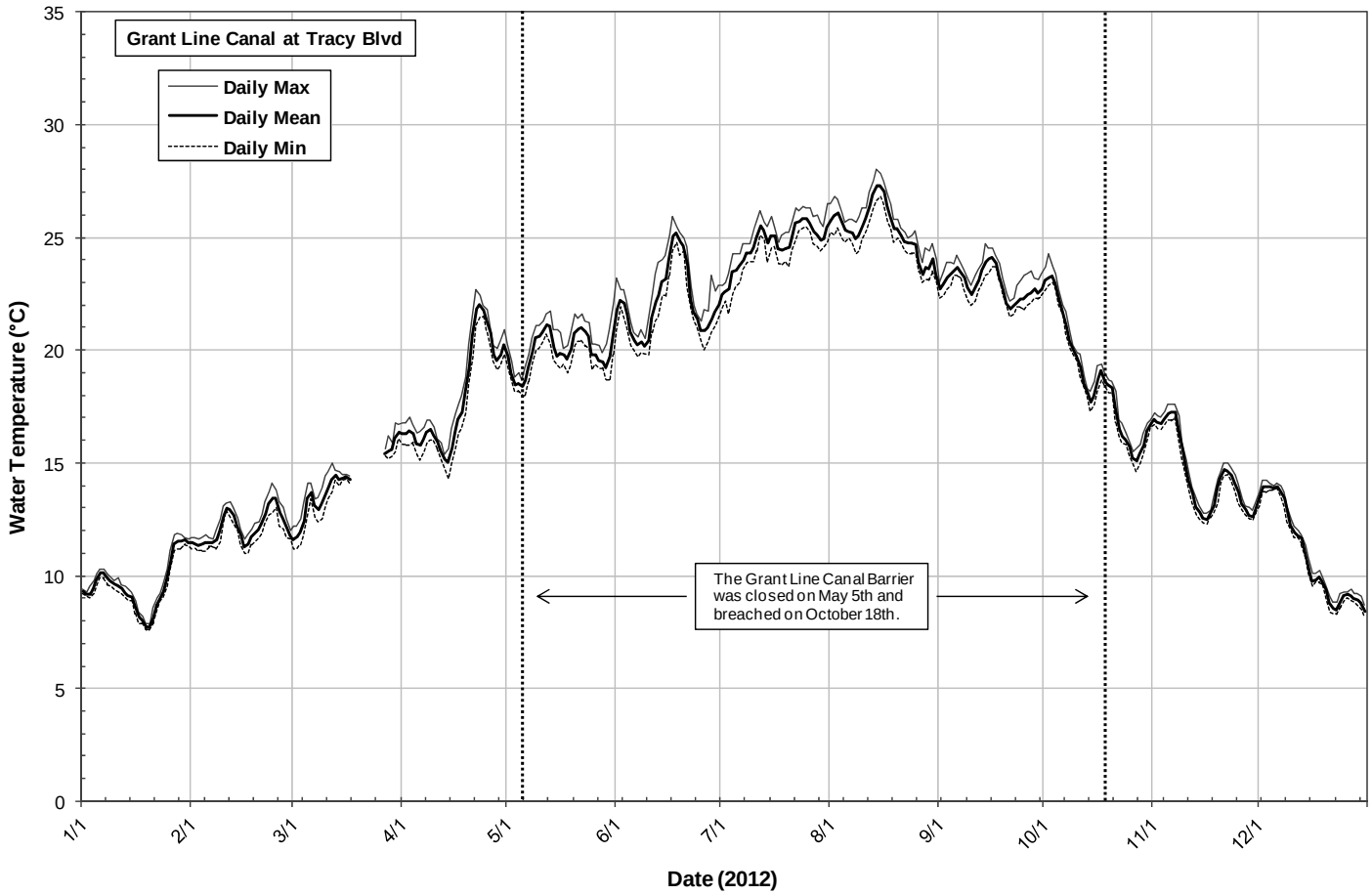
	Water Temperature (°C)				Dissolved Oxygen (mg/L)				pH			
Month	Head	TWA	u/s ORT	d/s ORT	Head	TWA	u/s ORT	d/s ORT	Head	TWA	u/s ORT	d/s ORT
	MAXIMUMS				MAXIMUMS				MAXIMUMS			
January	11.9	11.5	11.4	11.5	12.16	13.75	12.89	12.71	8.18	8.13	8.46	8.52
February	14.0	14.2	14.1	13.9	11.36	10.74	11.10	11.49	8.30	8.05	8.20	8.25
March	17.5	16.8	16.7	16.5	14.72	15.95	15.11	15.41	8.82	8.89	8.87	9.13
April	20.5	24.8	21.9	22.0	13.73	23.84	9.66	9.78	8.78	9.38	8.06	8.26
May	22.1	24.3	22.7	22.6	11.61	11.62	9.33	8.87	8.58	8.69	8.17	8.02
June	26.3	27.9	24.7	24.9	14.74	16.78	11.01	11.20	9.75	9.11	9.07	9.14
July	28.6	28.7	26.8	26.0	19.49	20.53	16.73	11.04	9.89	9.68	9.54	9.16
August	29.3	27.9	26.9	26.9	16.80	10.54	16.74	10.26	9.62	8.87	9.11	8.58
September	26.2	25.4	23.6	23.4	15.45	11.33	8.04	8.48	9.03	8.40	7.67	7.94
October	24.4	24.4	22.4	22.6	14.51	9.65	8.22	8.61	8.75	8.26	7.56	7.80
November	18.0	18.3	18.1	18.1	11.12	10.38	9.15	9.49	8.04	7.86	7.65	7.72
December	14.3	14.3	14.1	14.0	10.78	10.33	10.47	10.81	7.90	7.82	7.74	7.89
	AVERAGES				AVERAGES				AVERAGES			
January	9.5	9.1	9.0	9.1	10.94	11.14	10.47	10.45	7.95	7.75	7.85	7.96
February	12.2	12.1	11.7	11.7	10.30	9.30	9.47	9.71	8.13	7.79	7.85	7.72
March	14.3	14.0	13.5	13.4	11.09	11.25	8.93	9.66	8.03	8.21	7.83	7.95
April	16.9	18.4	17.6	17.7	10.53	10.18	7.41	7.89	8.10	8.09	7.60	7.61
May	19.1	20.9	20.1	20.3	9.00	6.49	7.08	7.56	7.76	7.61	7.61	7.66
June	21.9	22.6	21.7	21.8	11.71	8.15	7.06	7.41	8.59	7.82	7.67	7.66
July	25.1	24.8	23.3	23.5	12.13	7.34	5.76	6.47	9.05	8.50	7.86	7.91
August	25.7	25.2	23.5	23.7	10.42	5.11	4.42	4.86	8.45	7.79	7.48	7.56
September	23.0	22.8	21.6	21.6	11.25	6.94	3.83	4.50	8.49	7.78	7.31	7.43
October	18.4	19.3	18.9	19.0	9.43	6.45	4.60	5.49	7.83	7.48	7.18	7.37
November	14.3	14.3	14.9	14.8	9.78	7.95	7.16	7.86	7.69	7.56	7.36	7.39
December	10.8	10.7	11.1	11.0	9.54	7.53	7.43	8.03	7.66	7.47	7.33	7.40
	MEDIANS				MEDIANS				MEDIANS			
January	9.4	8.9	8.8	8.8	10.96	11.06	10.37	10.30	7.95	7.78	7.88	8.00
February	12.0	11.9	11.7	11.6	10.31	9.31	9.45	9.67	8.12	7.76	7.86	7.74
March	14.4	14.1	13.5	13.4	10.79	11.00	8.94	9.65	8.08	8.24	7.85	7.97
April	16.6	17.4	16.4	16.4	10.34	9.47	7.96	8.30	8.17	8.37	7.71	7.58
May	19.1	20.9	20.2	20.5	8.94	6.73	7.24	7.58	7.75	7.68	7.66	7.69
June	21.7	22.4	21.7	21.8	11.62	7.88	7.05	7.38	8.69	7.89	7.69	7.64
July	25.2	24.9	23.2	23.5	12.52	7.25	5.75	6.52	9.27	8.63	8.00	7.99
August	25.6	25.1	23.3	23.5	10.68	4.85	4.14	4.62	8.88	7.80	7.50	7.58
September	22.9	22.8	21.5	21.5	11.20	6.86	3.59	4.10	8.56	7.77	7.31	7.42
October	18.0	19.1	18.7	18.8	9.34	6.77	4.18	5.11	7.86	7.56	7.16	7.37
November	13.9	13.6	14.3	14.3	9.80	8.11	7.28	8.16	7.69	7.59	7.37	7.41
December	10.1	10.2	10.8	10.8	9.56	8.01	7.54	8.15	7.69	7.50	7.35	7.42
	MINIMUMS				MINIMUMS				MINIMUMS			
January	7.3	6.9	7.2	7.2	9.67	9.00	7.94	9.43	7.82	7.48	7.52	7.68
February	10.9	10.4	10.1	10.0	8.58	8.03	5.93	8.93	7.96	7.47	7.61	7.43
March	11.0	10.7	10.7	11.2	8.70	4.21	1.24	7.50	7.67	7.63	7.34	7.54
April	14.2	15.0	14.5	14.4	7.89	0.66	0.75	4.70	7.53	7.46	7.18	7.26
May	17.4	18.2	18.0	18.3	5.76	0.76	0.79	6.33	7.41	7.11	7.12	7.31
June	18.7	19.3	18.6	18.6	4.33	0.79	2.49	5.47	7.86	7.23	7.15	7.27
July	21.2	21.4	21.1	21.2	3.80	0.94	1.42	2.32	7.52	7.69	7.25	7.34
August	22.8	22.3	20.9	21.2	3.93	0.95	1.05	1.79	7.49	7.41	7.17	7.22
September	20.9	21.2	19.7	19.9	5.78	4.50	0.84	1.74	7.58	7.44	7.10	7.18
October	14.4	15.5	15.7	15.5	1.69	2.68	1.03	1.63	7.37	7.03	6.96	7.11
November	12.0	12.2	12.6	12.7	7.74	4.66	3.18	4.87	7.41	7.22	7.07	7.05
December	7.8	8.0	8.2	8.3	8.01	1.27	3.19	3.85	7.47	7.10	7.07	7.11
	STANDARD DEVIATIONS				STANDARD DEVIATIONS				STANDARD DEVIATIONS			
January	1.1	1.1	0.9	1.0	0.46	0.72	0.67	0.63	0.06	0.11	0.17	0.19
February	0.7	0.9	0.8	0.7	0.35	0.41	0.38	0.34	0.05	0.12	0.12	0.16
March	1.4	1.3	1.2	1.1	1.25	1.57	1.37	1.05	0.28	0.26	0.24	0.28
April	1.8	2.6	2.3	2.4	1.27	5.01	1.52	1.08	0.28	0.53	0.21	0.24
May	0.9	1.2	1.0	1.0	0.69	1.69	1.01	0.47	0.21	0.24	0.19	0.13
June	1.7	1.8	1.4	1.3	1.11	2.95	0.93	0.83	0.54	0.51	0.30	0.33
July	1.3	1.2	0.9	0.9	2.57	2.44	1.94	1.68	0.31	0.30	0.45	0.45
August	1.3	1.2	1.2	1.2	2.78	1.44	1.80	1.69	0.48	0.31	0.30	0.25
September	0.8	0.7	0.7	0.7	1.38	0.98	1.41	1.61	0.19	0.16	0.11	0.14
October	2.5	2.3	1.7	1.7	0.95	1.23	1.71	1.83	0.29	0.24	0.10	0.16
November	1.7	1.6	1.6	1.6	0.47	0.98	1.12	1.08	0.08	0.10	0.11	0.11
December	2.0	2.1	2.0	2.0	0.62	1.77	1.61	1.57	0.11	0.15	0.16	0.18
2012 - Max.	29.3	28.7	26.9	26.9	19.49	23.84	16.74	15.41	9.89	9.68	9.54	9.16
2012 - Avg.	17.6	18.0	17.2	17.6	10.51	8.14	6.96	7.40	8.00	7.74	7.51	7.58
2012 - Med.	17.4	18.9	18.4	18.7	10.32	7.86	7.20	7.67	8.09	7.78	7.61	7.62
2012 - Min.	7.3	6.9	7.2	7.2	1.69	0.66	0.75	1.63	7.37	7.03	6.96	7.05
2012 - S.D.	5.5	5.7	5.1	5.0	1.67	2.85	2.39	2.18	0.56	0.45	0.35	0.34

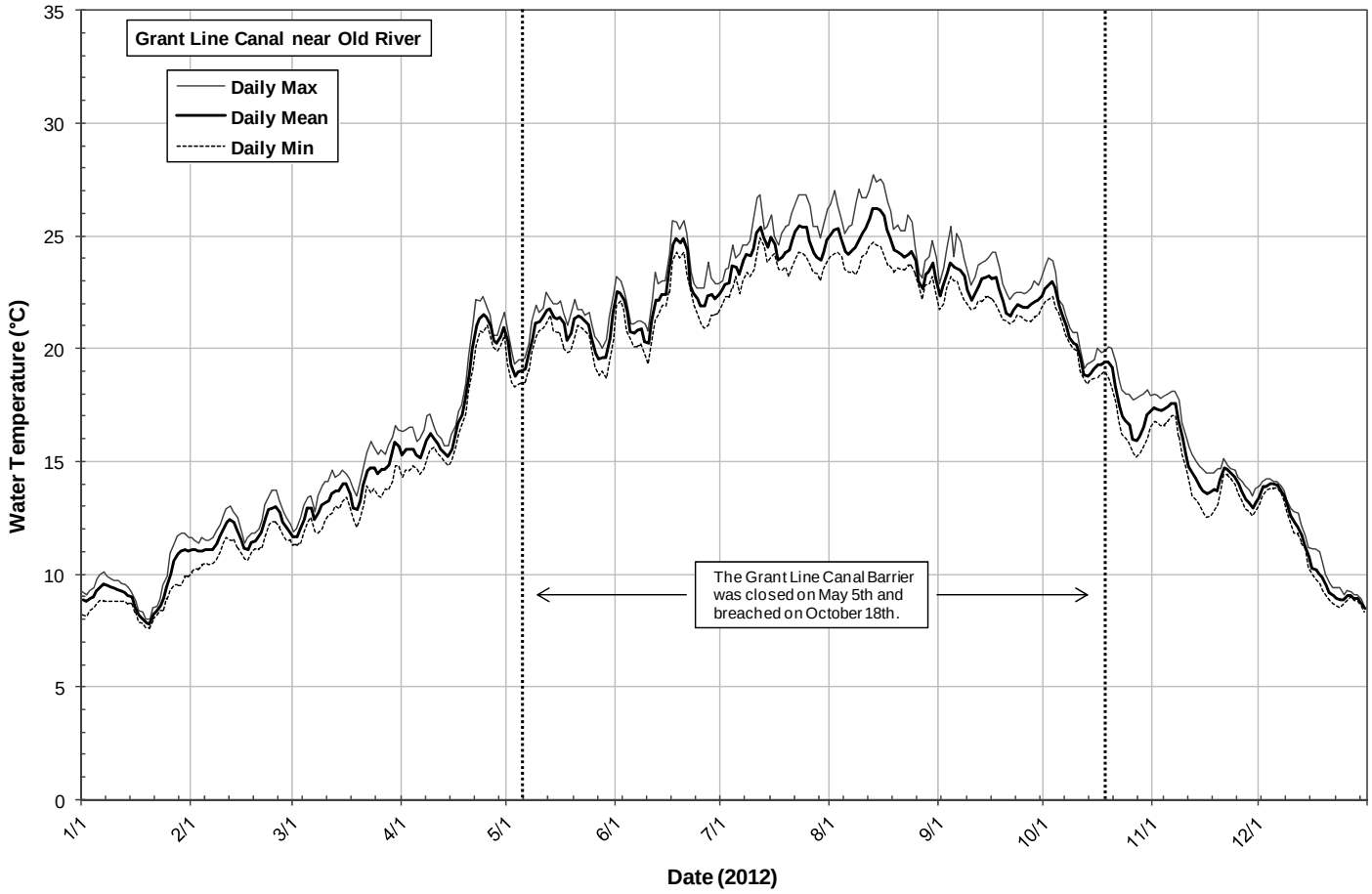
Monthly Statistics for the Old River continuous water quality monitoring stations – continued

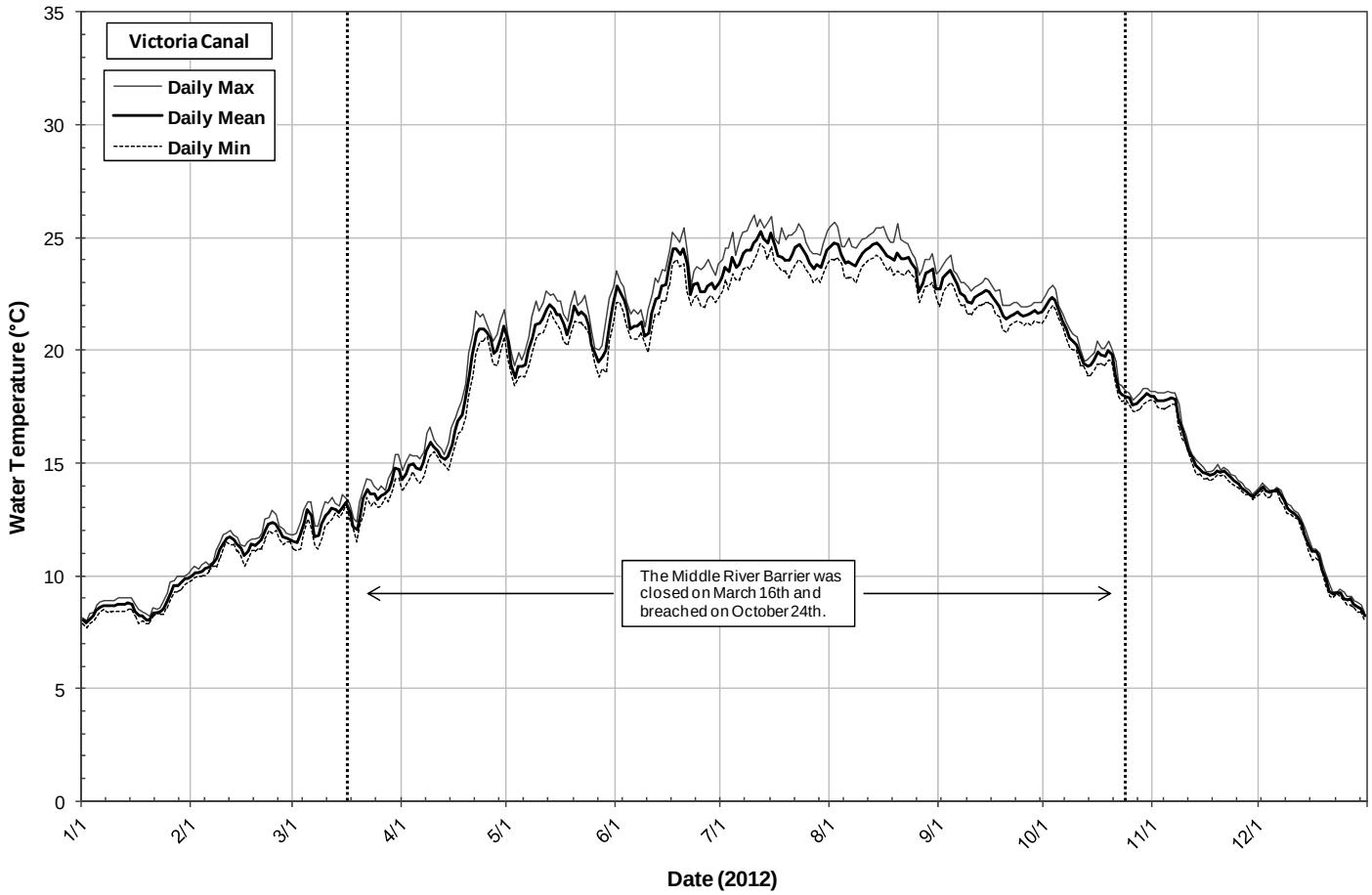
	Specific Conductance (µS/cm)				Turbidity (NTU)			
Month	Head	TWA	u/s ORT	d/s ORT	Head	TWA	u/s ORT	d/s ORT
	MAXIMUMS				MAXIMUMS			
January	843	1067	1151	1160	29.0	21.6	43.5	22.7
February	1047	1279	1297	1304	35.6	19.0	54.8	27.2
March	1056	1334	1581	1594	41.5	32.2	48.6	70.1
April	996	1440	1036	1045	44.1	61.9	40.3	34.7
May	520	1253	742	687	56.3	39.0	35.4	20.6
June	629	853	817	833	62.9	42.0	34.6	16.8
July	737	908	888	895	58.4	67.2	46.0	29.0
August	742	1002	948	923	54.9	45.5	46.0	39.8
September	770	979	998	995	44.3	30.2	47.3	40.8
October	777	899	980	985	20.9	26.6	49.1	44.4
November	815	1069	1105	1128	32.1	28.1	71.3	36.9
December	921	1159	1277	1280	311.5	117.5	80.3	71.9
	AVERAGES				AVERAGES			
January	753	902	811	796	5.4	10.4	6.3	6.0
February	845	988	825	814	6.4	8.6	6.7	6.3
March	939	1129	883	866	10.5	14.1	8.0	8.3
April	549	1302	639	631	14.0	18.9	7.7	7.2
May	330	638	455	448	14.0	11.6	7.7	4.8
June	493	676	434	424	15.2	14.2	5.3	5.8
July	615	715	629	594	19.7	21.0	11.1	10.5
August	665	774	736	686	14.2	15.7	10.6	9.0
September	699	813	879	848	8.2	11.0	7.1	5.6
October	525	692	744	715	5.2	9.3	5.7	5.5
November	751	854	710	681	4.8	9.1	6.7	6.9
December	725	899	827	799	24.6	16.7	8.5	9.9
	MEDIANS				MEDIANS			
January	757	916	803	766	5.1	9.1	5.1	5.5
February	853	954	812	801	6.0	7.2	5.7	6.1
March	951	1123	898	883	9.8	13.2	6.8	7.8
April	466	1300	573	572	13.0	17.9	6.9	6.9
May	342	551	463	453	13.1	10.6	5.9	4.7
June	486	681	407	385	14.5	13.1	4.7	5.9
July	635	746	644	610	18.8	20.7	10.3	10.0
August	669	766	806	754	13.6	15.4	9.9	8.2
September	696	812	912	899	8.1	10.1	6.5	5.0
October	540	703	795	759	4.8	9.2	4.3	4.1
November	752	851	691	602	4.3	9.1	4.7	5.4
December	764	919	890	862	8.6	11.3	5.6	6.7
	MINIMUMS				MINIMUMS			
January	626	737	522	560	2.5	4.8	2.3	2.3
February	553	791	492	492	2.9	3.8	2.6	2.1
March	763	936	463	455	3.7	6.3	3.2	1.8
April	384	996	462	453	5.4	5.2	3.1	3.0
May	187	331	313	309	6.5	5.1	2.3	1.8
June	390	478	293	292	5.5	3.4	1.8	2.1
July	382	454	254	254	7.9	11.1	3.4	3.9
August	539	669	302	292	4.4	8.2	2.8	2.9
September	608	722	500	451	1.9	3.9	1.6	2.1
October	258	392	383	331	1.8	3.1	1.0	1.5
November	617	597	384	372	1.4	3.6	1.7	1.3
December	335	540	330	308	2.1	1.7	1.8	1.9
	STANDARD DEVIATIONS				STANDARD DEVIATIONS			
January	53	60	163	160	1.6	3.9	4.2	2.5
February	97	129	182	187	2.2	3.3	4.1	2.0
March	63	98	267	279	4.1	3.3	4.6	4.1
April	172	67	127	125	5.1	5.7	3.3	1.9
May	72	247	84	79	4.8	3.7	4.2	1.1
June	71	93	118	122	4.7	6.8	2.5	1.7
July	73	95	171	178	5.2	3.9	4.1	3.3
August	39	42	170	184	4.3	3.3	4.3	3.4
September	33	35	101	120	2.9	3.3	3.5	2.3
October	148	116	174	180	2.2	2.2	5.4	4.8
November	38	78	239	246	2.4	1.7	6.8	5.6
December	166	151	241	253	43.3	15.8	8.0	9.3
2012 - Max.	1056	1440	1581	1594	311.5	117.5	80.3	71.9
2012 - Avg.	657	864	714	687	12.1	13.5	7.6	7.2
2012 - Med.	682	826	721	660	9.8	11.8	6.3	6.3
2012 - Min.	187	331	254	254	1.4	1.7	1.0	1.3
2012 - S.D.	187	222	230	234	14.7	7.1	5.1	4.5

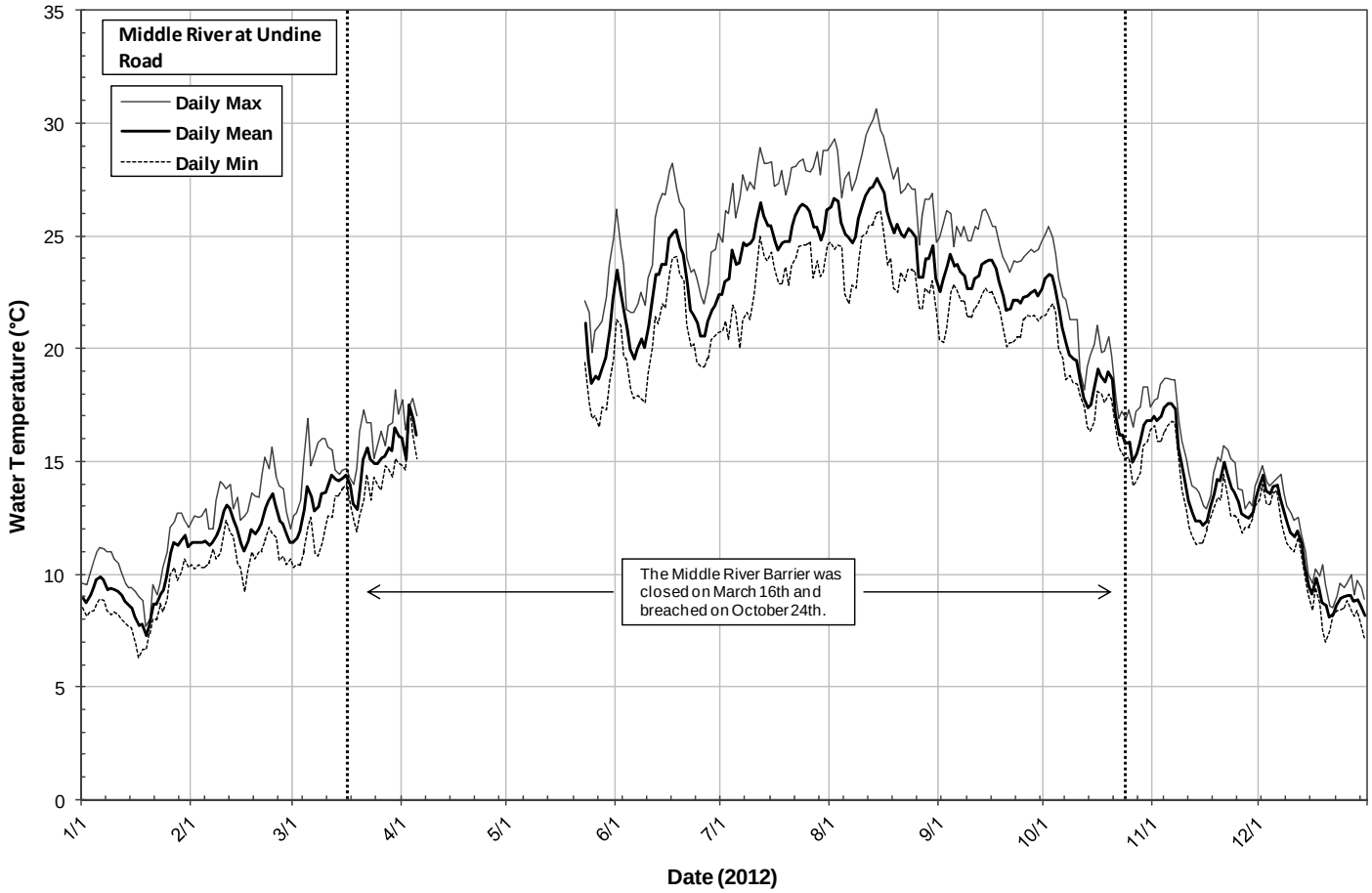

Doughty Cut above Grant Line Canal
Daily Max
Daily Mean
Daily Min
Water Temperature (°C)
35
30
25
20
15
10
5
0
The Grant Line Canal Barrier was closed on May 5th and breached on October 18th.
1/1
2/1
3/1
4/1
5/1
6/1
7/1
8/1
9/1
10/1
11/1
12/1
Date (2012)

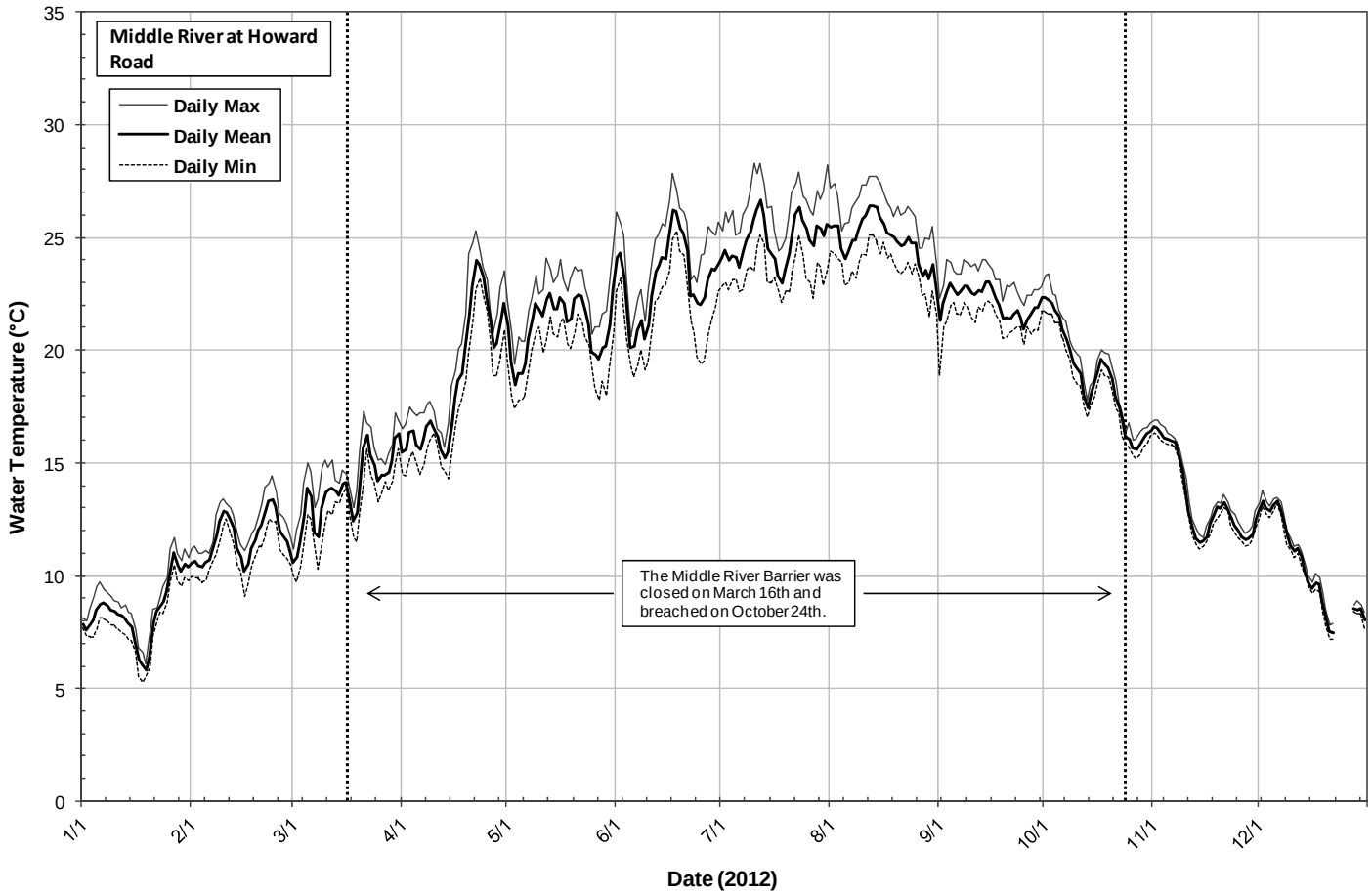

Grant Line Canal above GLC barrier
Daily Max
Daily Mean
Daily Min
Water Temperature (°C)
35
30
25
20
15
10
5
0
The Grant Line Canal Barrier was closed on May 5th and breached on October 18th.
1/1
2/1
3/1
4/1
5/1
6/1
7/1
8/1
9/1
10/1
11/1
12/1
Date (2012)

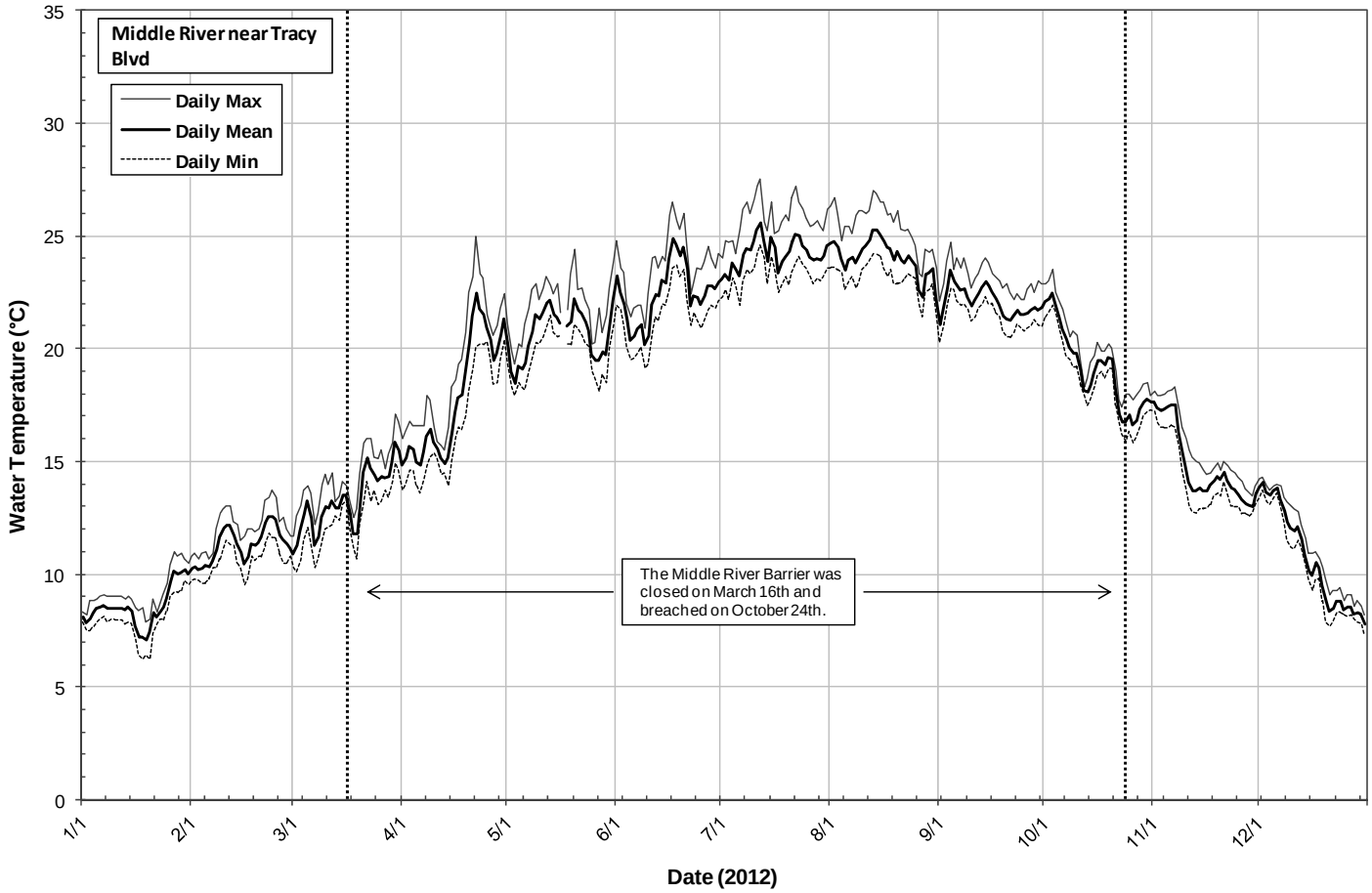

Grant Line Canal at Tracy Blvd
Daily Max
Daily Mean
Daily Min
Water Temperature (°C)
35
30
25
20
15
10
5
0
The Grant Line Canal Barrier was closed on May 5th and breached on October 18th.
1/1
2/1
3/1
4/1
5/1
6/1
7/1
8/1
9/1
10/1
11/1
12/1
Date (2012)

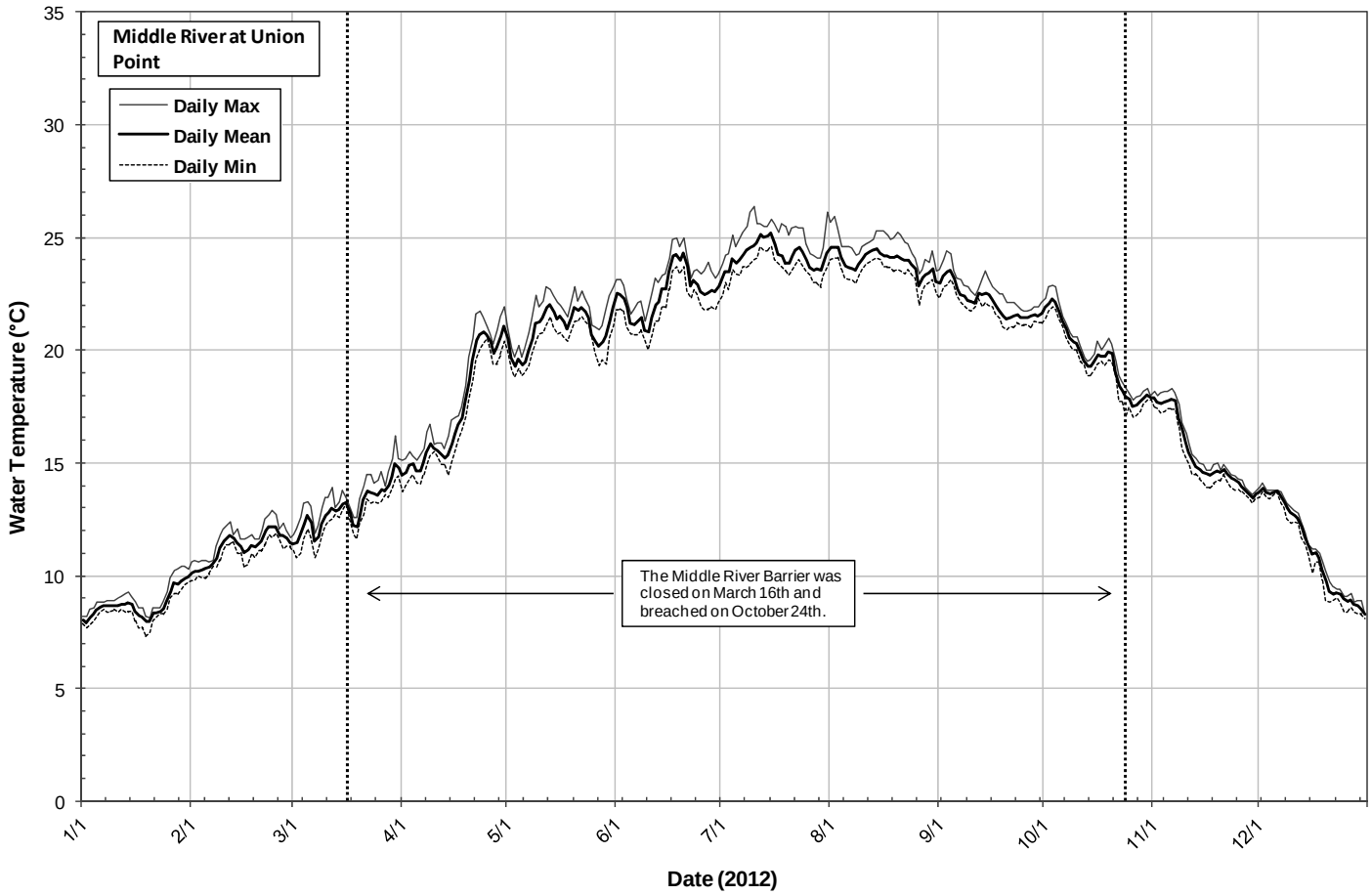

Grant Line Canal near Old River
Daily Max
Daily Mean
Daily Min
Water Temperature (°C)
35
30
25
20
15
10
5
0
The Grant Line Canal Barrier was closed on May 5th and breached on October 18th.
1/1
2/1
3/1
4/1
5/1
6/1
7/1
8/1
9/1
10/1
11/1
12/1
Date (2012)

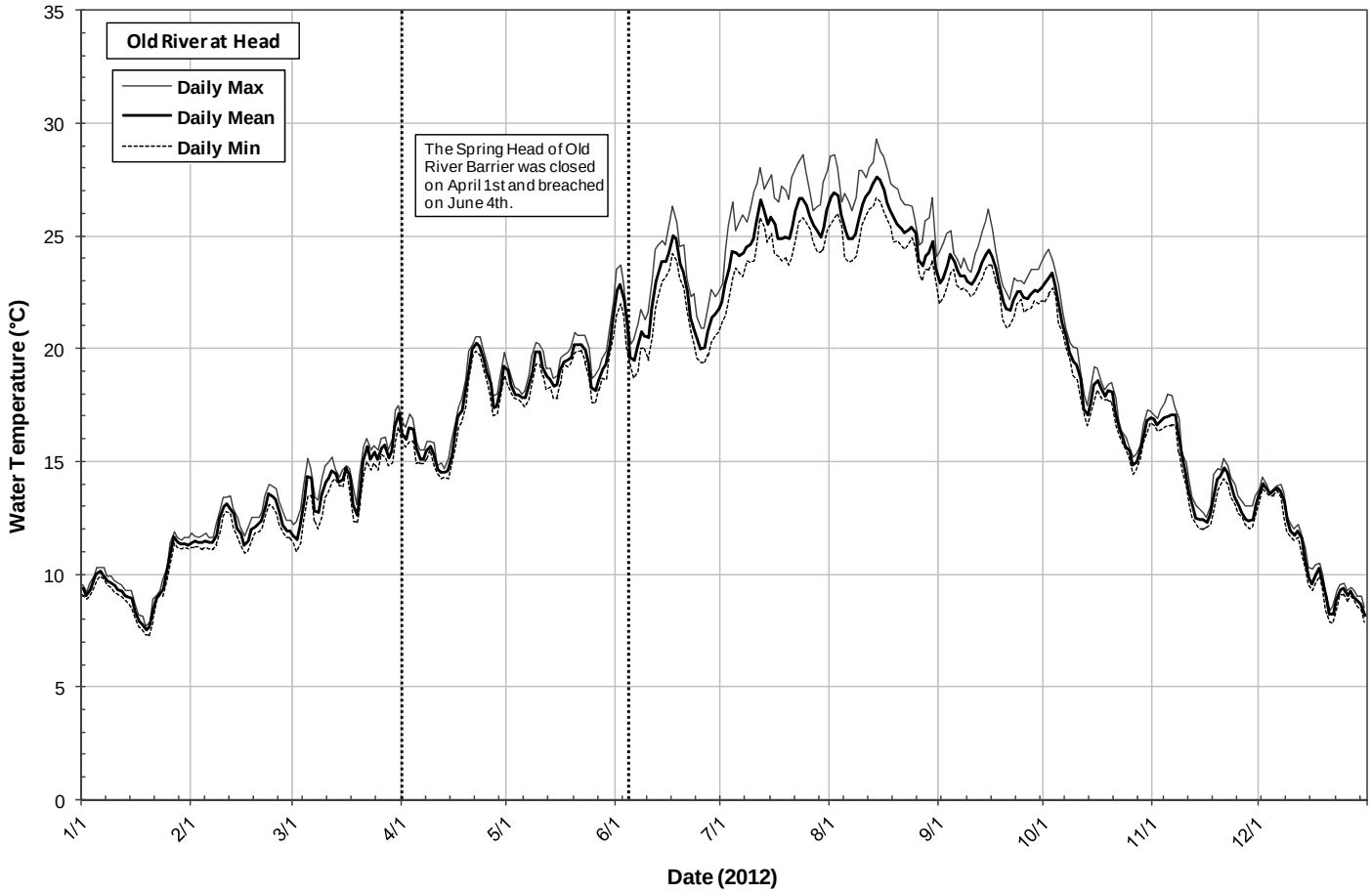

Victoria Canal
Daily Max
Daily Mean
Daily Min
Water Temperature (°C)
35
30
25
20
15
10
5
0
The Middle River Barrier was closed on March 16th and breached on October 24th.
1/1
2/1
3/1
4/1
5/1
6/1
7/1
8/1
9/1
10/1
11/1
12/1
Date (2012)

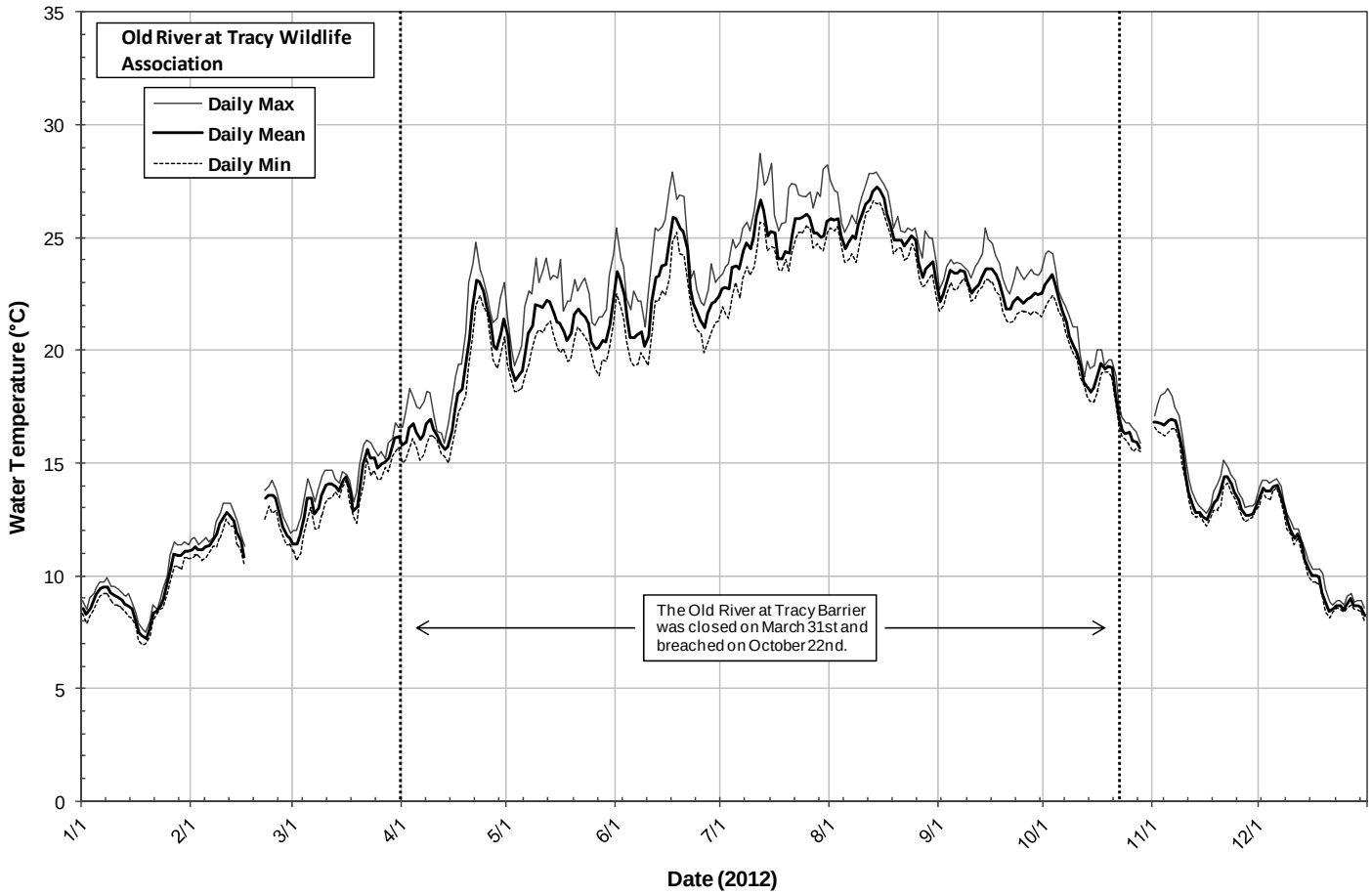

Middle River at Undine Road
Daily Max
Daily Mean
Daily Min
Water Temperature (°C)
35
30
25
20
15
10
5
0
The Middle River Barrier was closed on March 16th and breached on October 24th.
1/1
2/1
3/1
4/1
5/1
6/1
7/1
8/1
9/1
10/1
11/1
12/1
Date (2012)

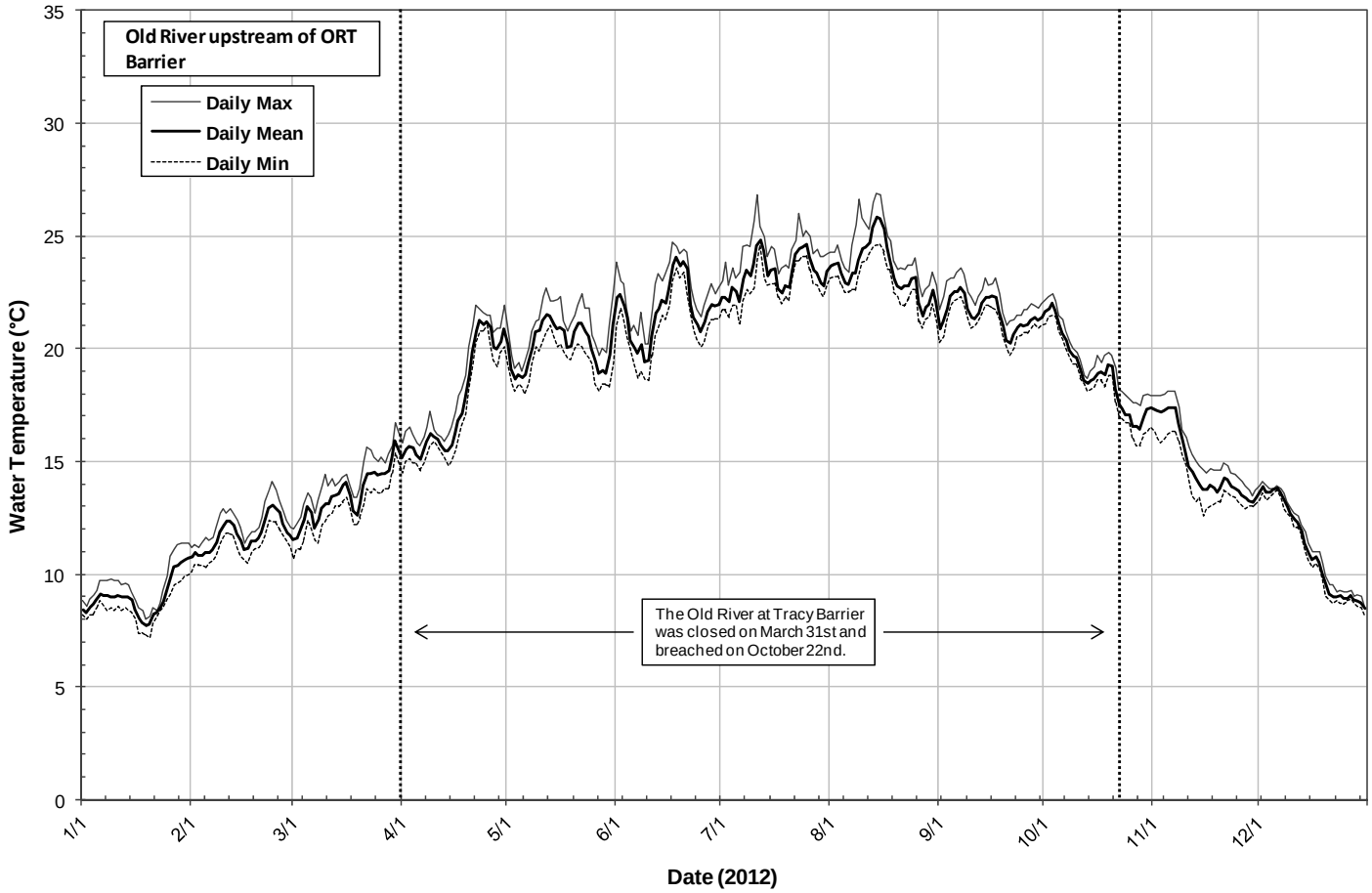

Middle River at Howard Road
Daily Max
Daily Mean
Daily Min
Water Temperature (°C)
35
30
25
20
15
10
5
0
The Middle River Barrier was closed on March 16th and breached on October 24th.
1/1
2/1
3/1
4/1
5/1
6/1
7/1
8/1
9/1
10/1
11/1
12/1
Date (2012)

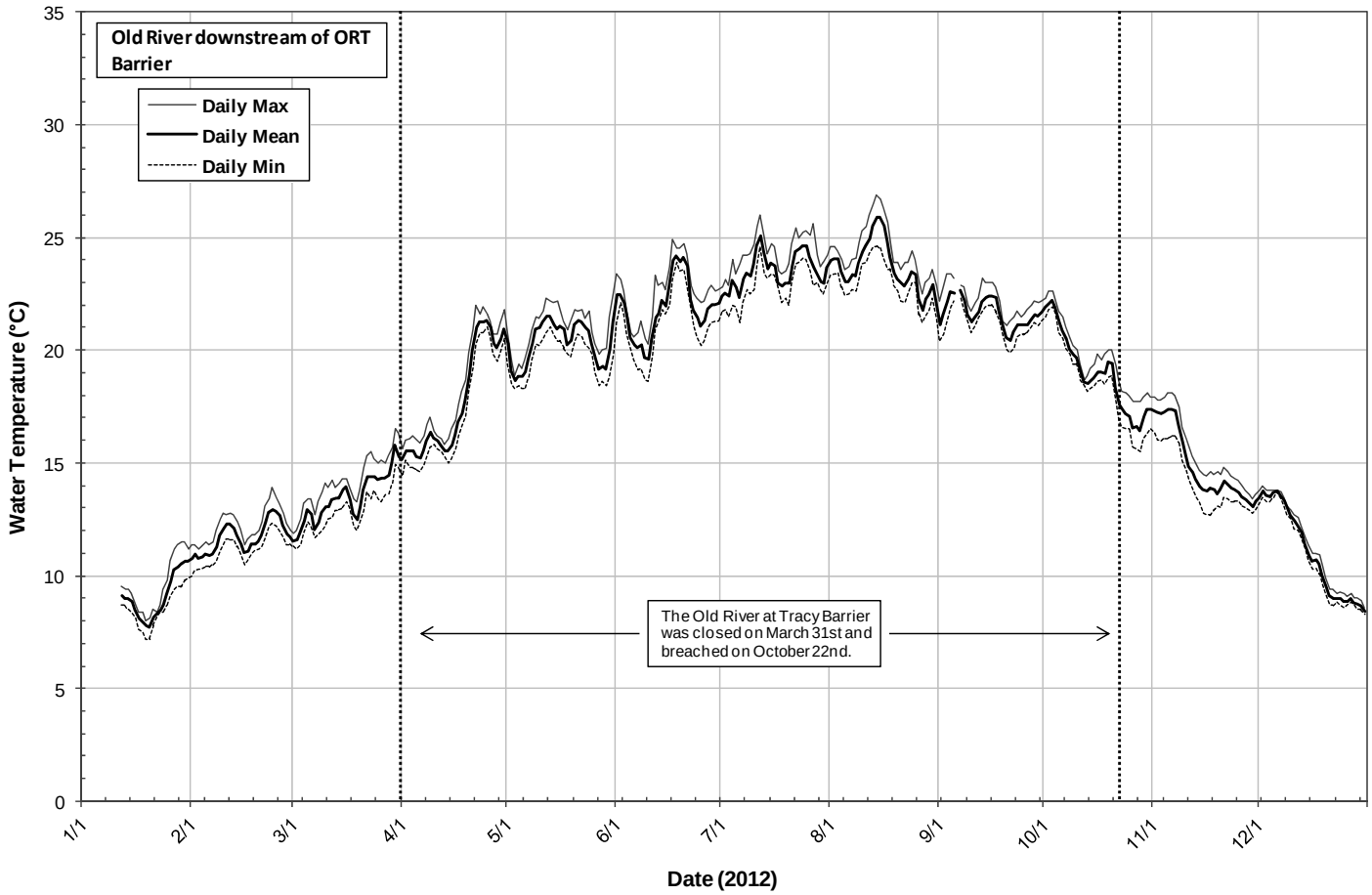

Middle River near Tracy Blvd
Daily Max
Daily Mean
Daily Min
Water Temperature (°C)
35
30
25
20
15
10
5
0
The Middle River Barrier was closed on March 16th and breached on October 24th.
1/1
2/1
3/1
4/1
5/1
6/1
7/1
8/1
9/1
10/1
11/1
12/1
Date (2012)

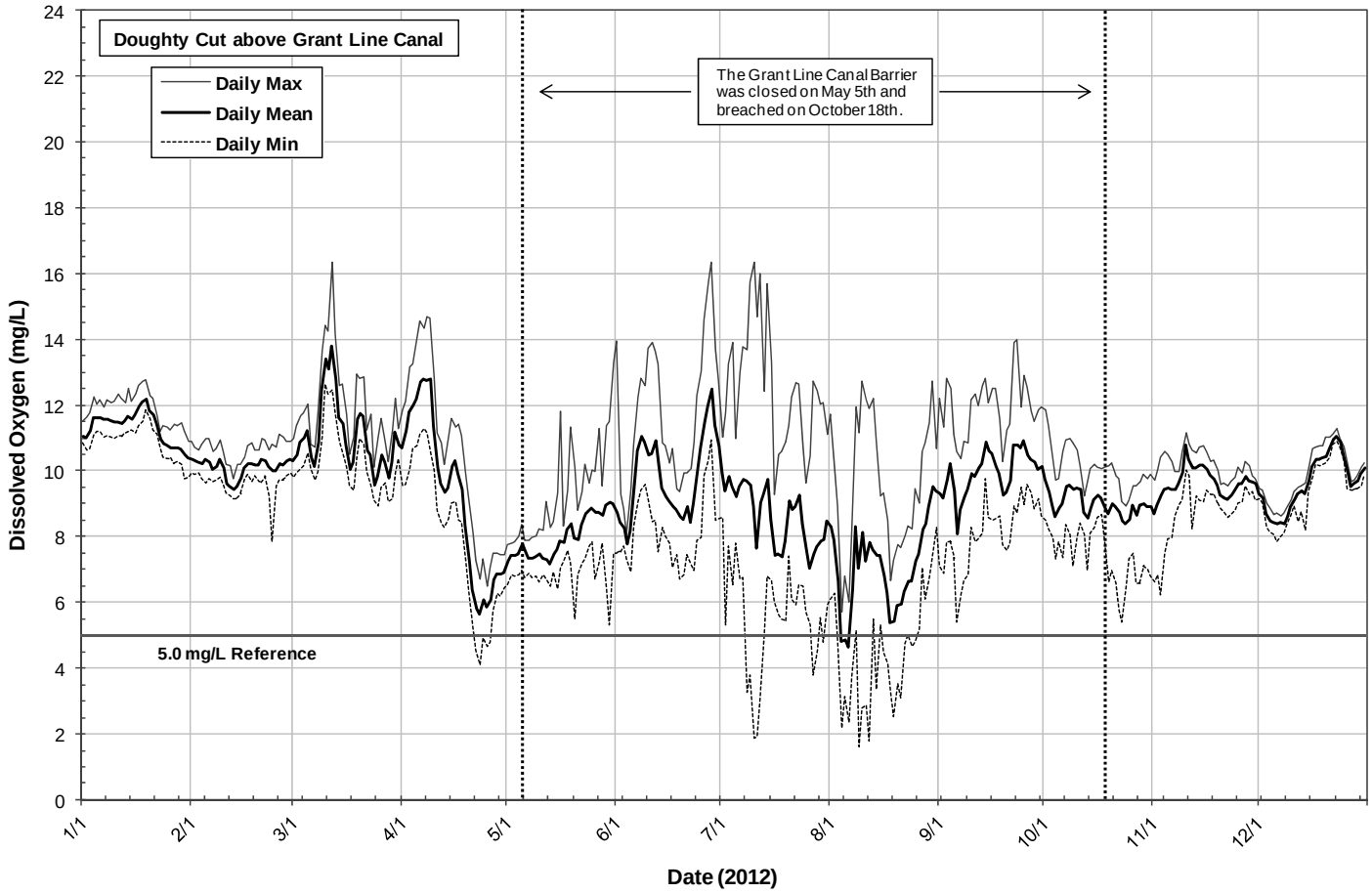

Middle River at Union Point
Daily Max
Daily Mean
Daily Min
The Middle River Barrier was closed on March 16th and breached on October 24th.
Water Temperature (°C)
Date (2012)
0
5
10
15
20
25
30
35
1/1
2/1
3/1
4/1
5/1
6/1
7/1
8/1
9/1
10/1
11/1
12/1

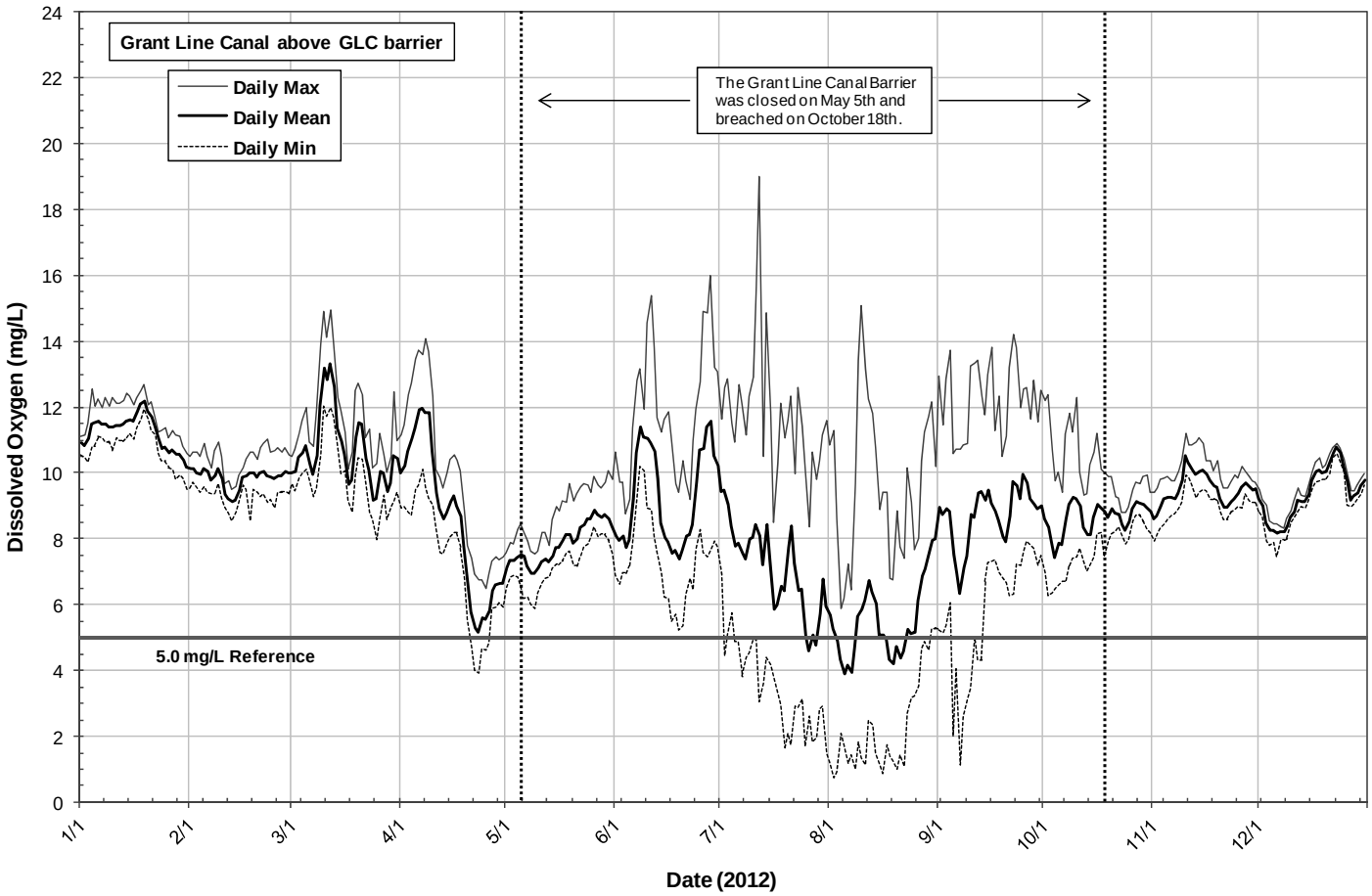

Old River at Head
Daily Max
Daily Mean
Daily Min
The Spring Head of Old River Barrier was closed on April 1st and breached on June 4th.
Water Temperature (°C)
Date (2012)
0
5
10
15
20
25
30
35
1/1
2/1
3/1
4/1
5/1
6/1
7/1
8/1
9/1
10/1
11/1
12/1

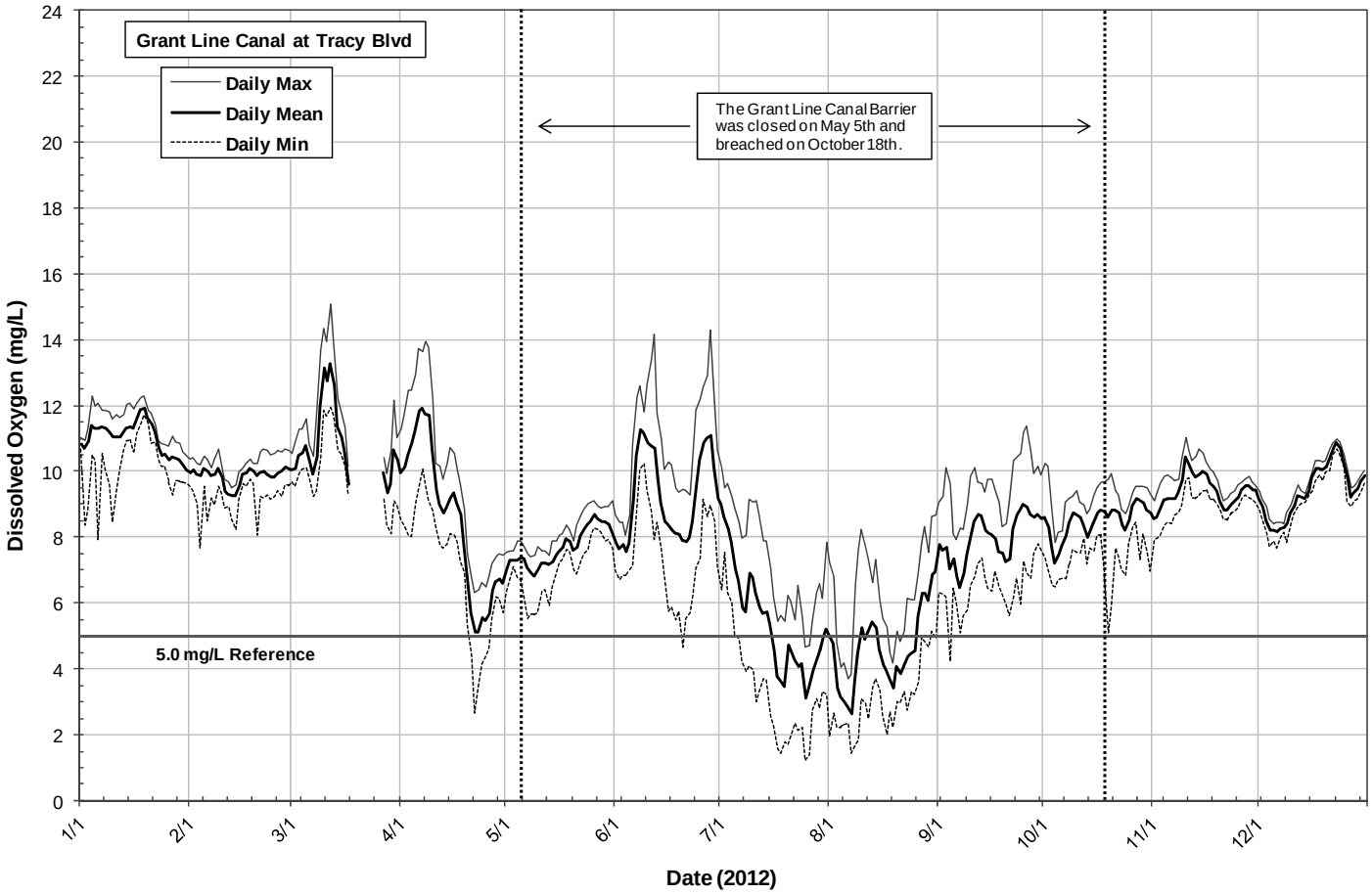

Old River at Tracy Wildlife Association
Daily Max
Daily Mean
Daily Min
Water Temperature (°C)
35
30
25
20
15
10
5
0
The Old River at Tracy Barrier was closed on March 31st and breached on October 22nd.
1/1
2/1
3/1
4/1
5/1
6/1
7/1
8/1
9/1
10/1
11/1
12/1
Date (2012)

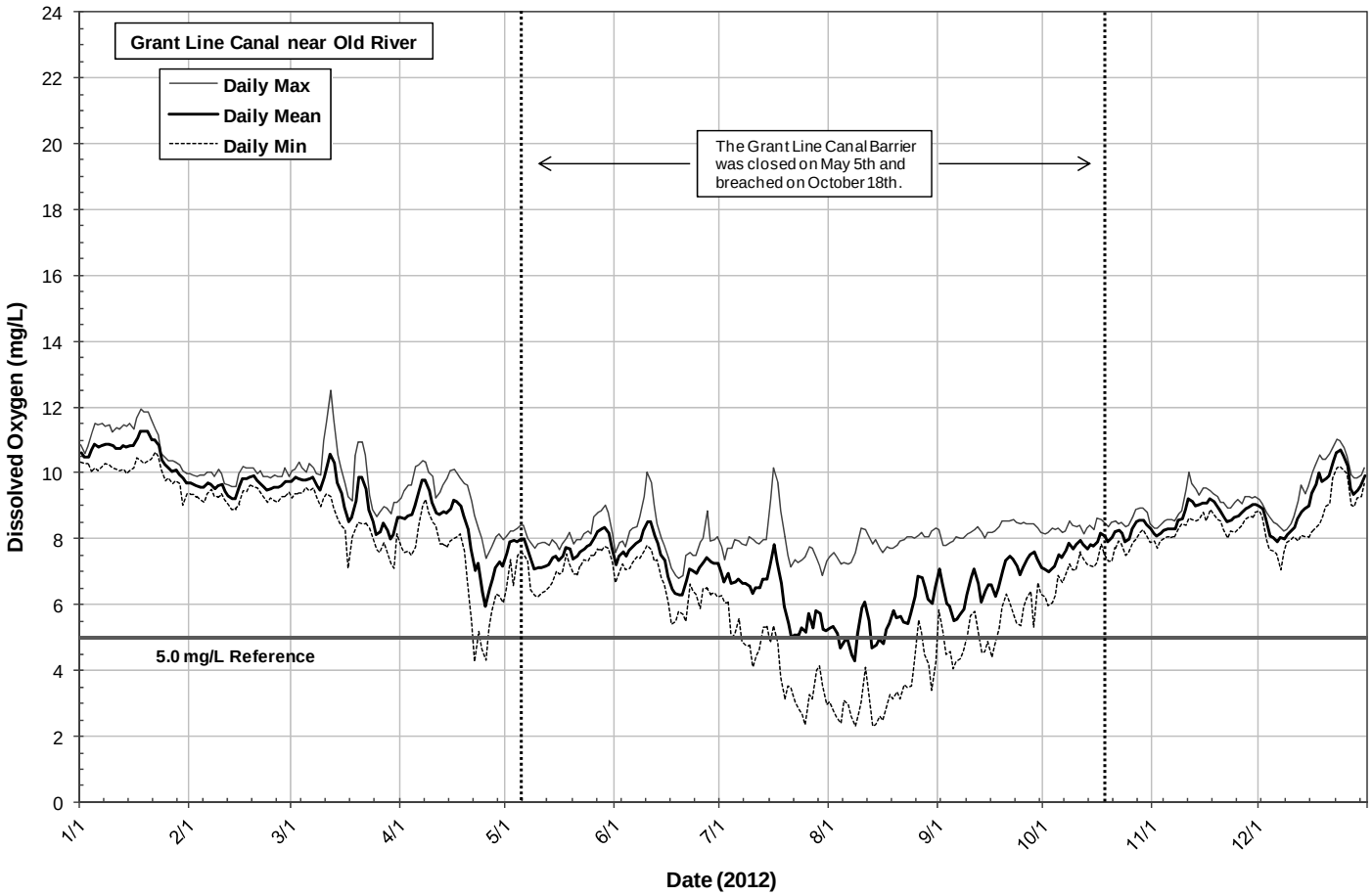

Old River upstream of ORT Barrier
Daily Max
Daily Mean
Daily Min
Water Temperature (°C)
35
30
25
20
15
10
5
0
The Old River at Tracy Barrier was closed on March 31st and breached on October 22nd.
1/1
2/1
3/1
4/1
5/1
6/1
7/1
8/1
9/1
10/1
11/1
12/1
Date (2012)

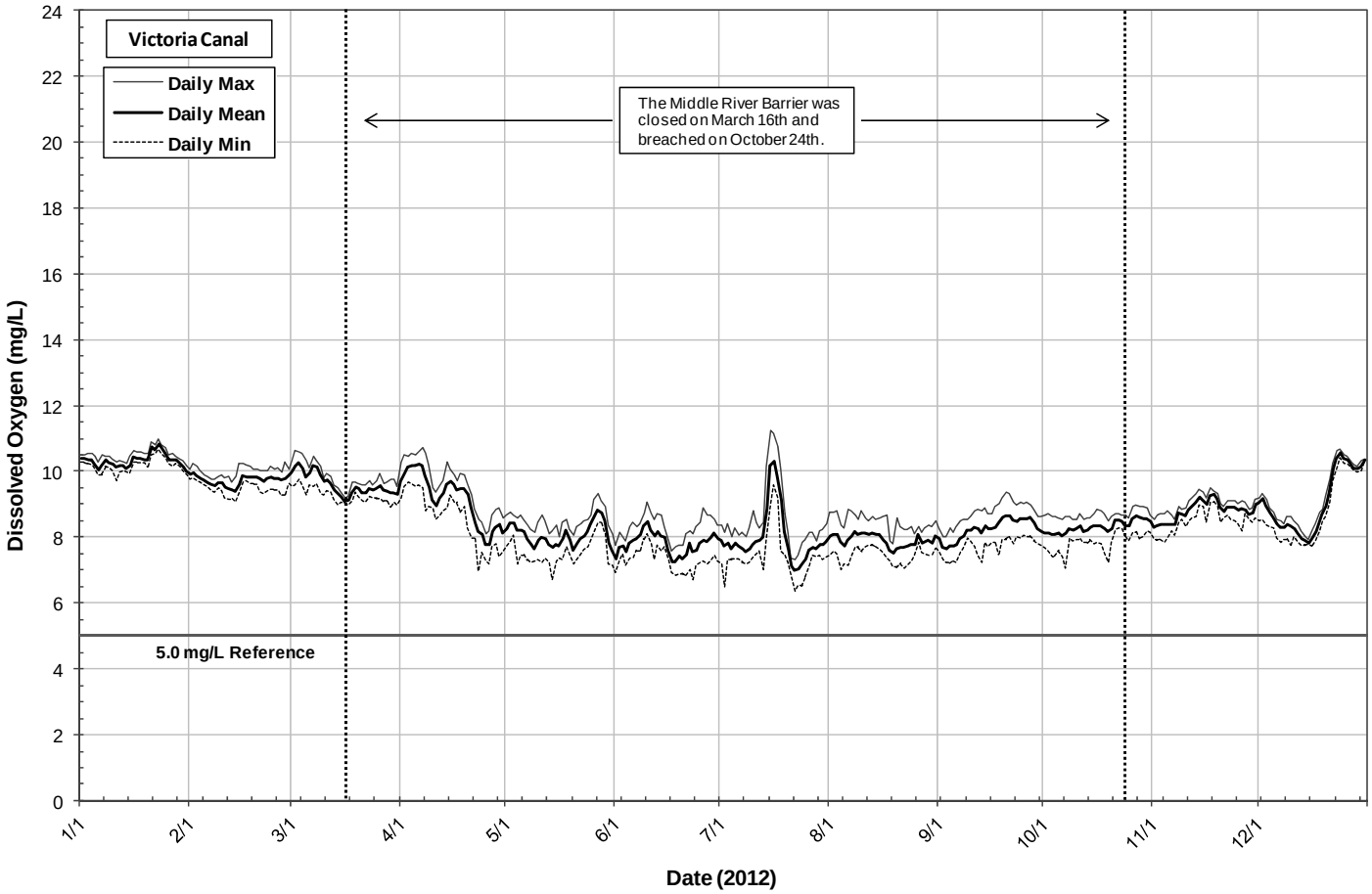

Old River downstream of ORT Barrier
Daily Max
Daily Mean
Daily Min
The Old River at Tracy Barrier was closed on March 31st and breached on October 22nd.
Water Temperature (°C)
Date (2012)
0
5
10
15
20
25
30
35
1/1
2/1
3/1
4/1
5/1
6/1
7/1
8/1
9/1
10/1
11/1
12/1

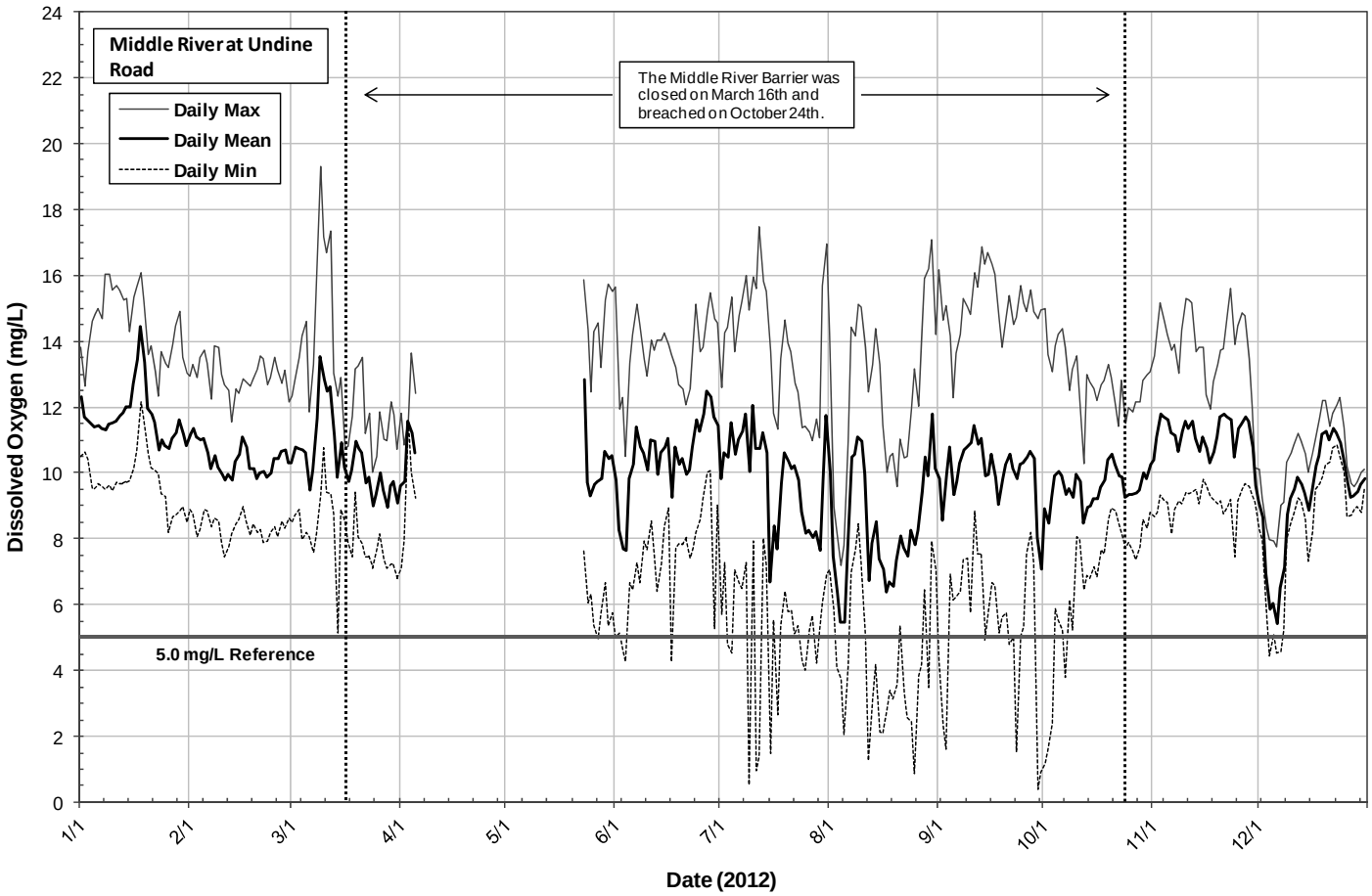

Doughty Cut above Grant Line Canal
Daily Max
Daily Mean
Daily Min
The Grant Line Canal Barrier was closed on May 5th and breached on October 18th.
5.0 mg/L Reference
Dissolved Oxygen (mg/L)
Date (2012)
0
2
4
6
8
10
12
14
16
18
20
22
24
1/1
2/1
3/1
4/1
5/1
6/1
7/1
8/1
9/1
10/1
11/1
12/1

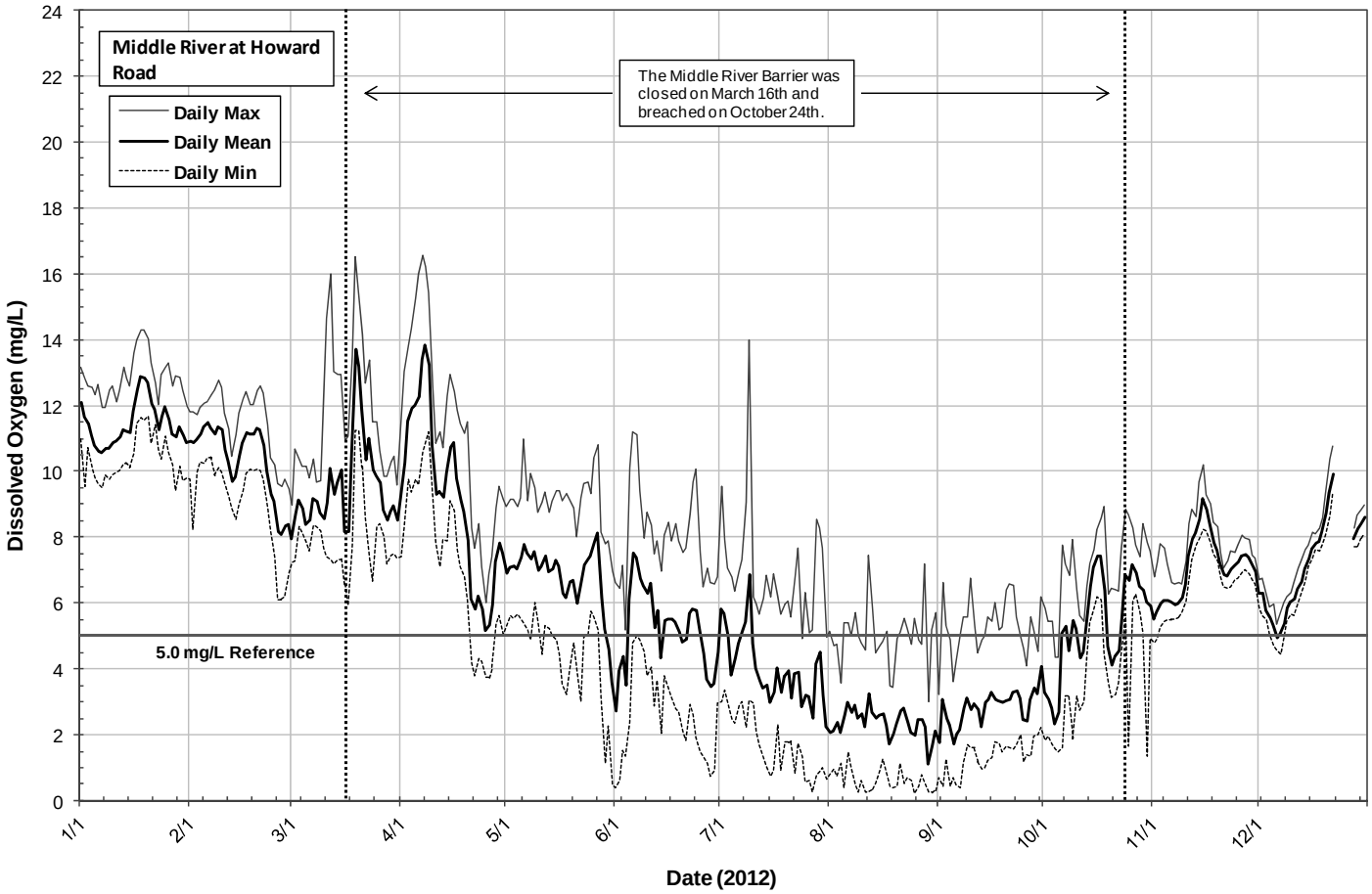

Grant Line Canal above GLC barrier
Daily Max
Daily Mean
Daily Min
The Grant Line Canal Barrier was closed on May 5th and breached on October 18th.
5.0 mg/L Reference
Dissolved Oxygen (mg/L)
Date (2012)
0
2
4
6
8
10
12
14
16
18
20
22
24
1/1
2/1
3/1
4/1
5/1
6/1
7/1
8/1
9/1
10/1
11/1
12/1

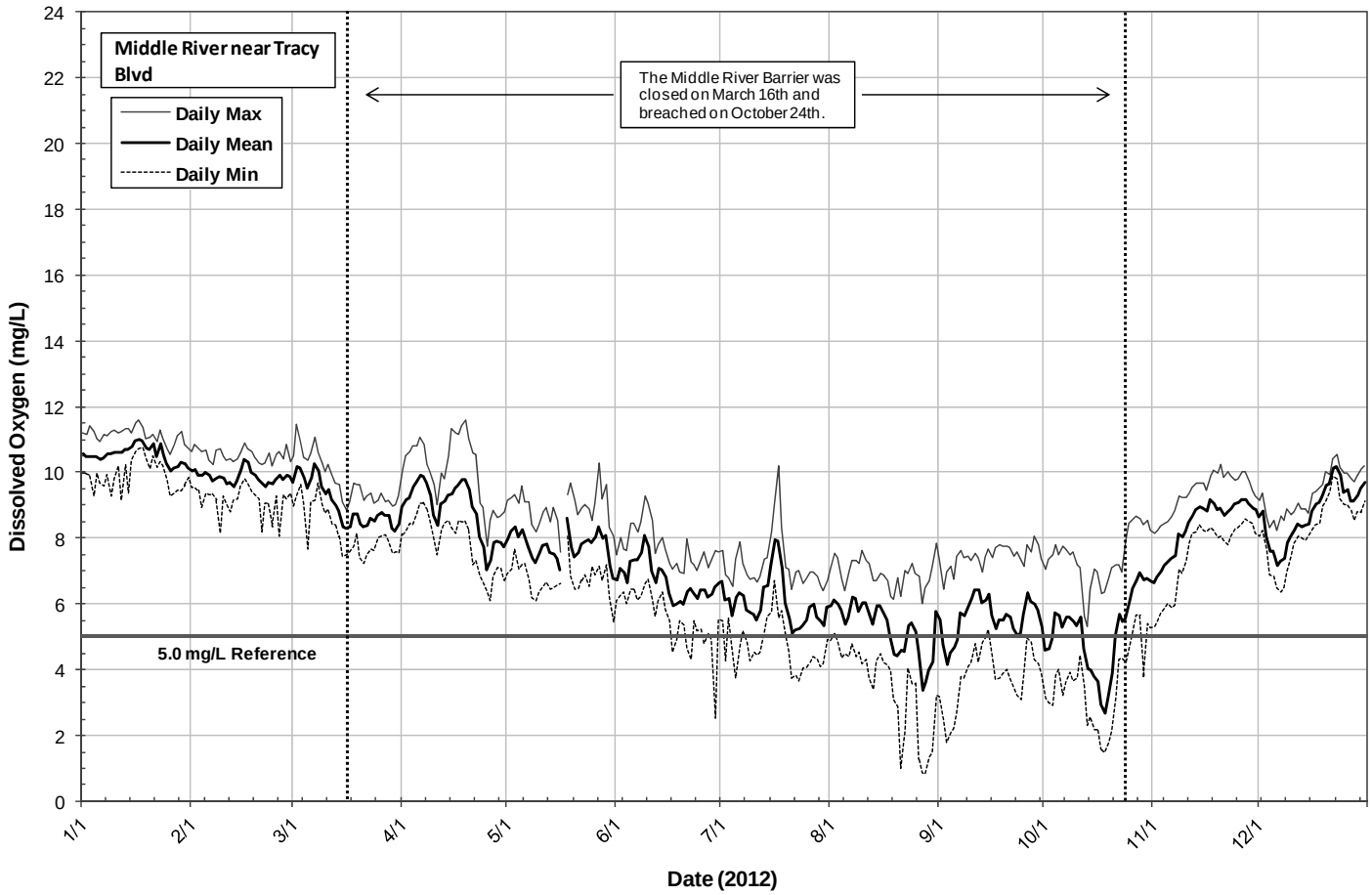

Grant Line Canal at Tracy Blvd
Daily Max
Daily Mean
Daily Min
The Grant Line Canal Barrier was closed on May 5th and breached on October 18th.
5.0 mg/L Reference
Dissolved Oxygen (mg/L)
Date (2012)
0
2
4
6
8
10
12
14
16
18
20
22
24
1/1
2/1
3/1
4/1
5/1
6/1
7/1
8/1
9/1
10/1
11/1
12/1

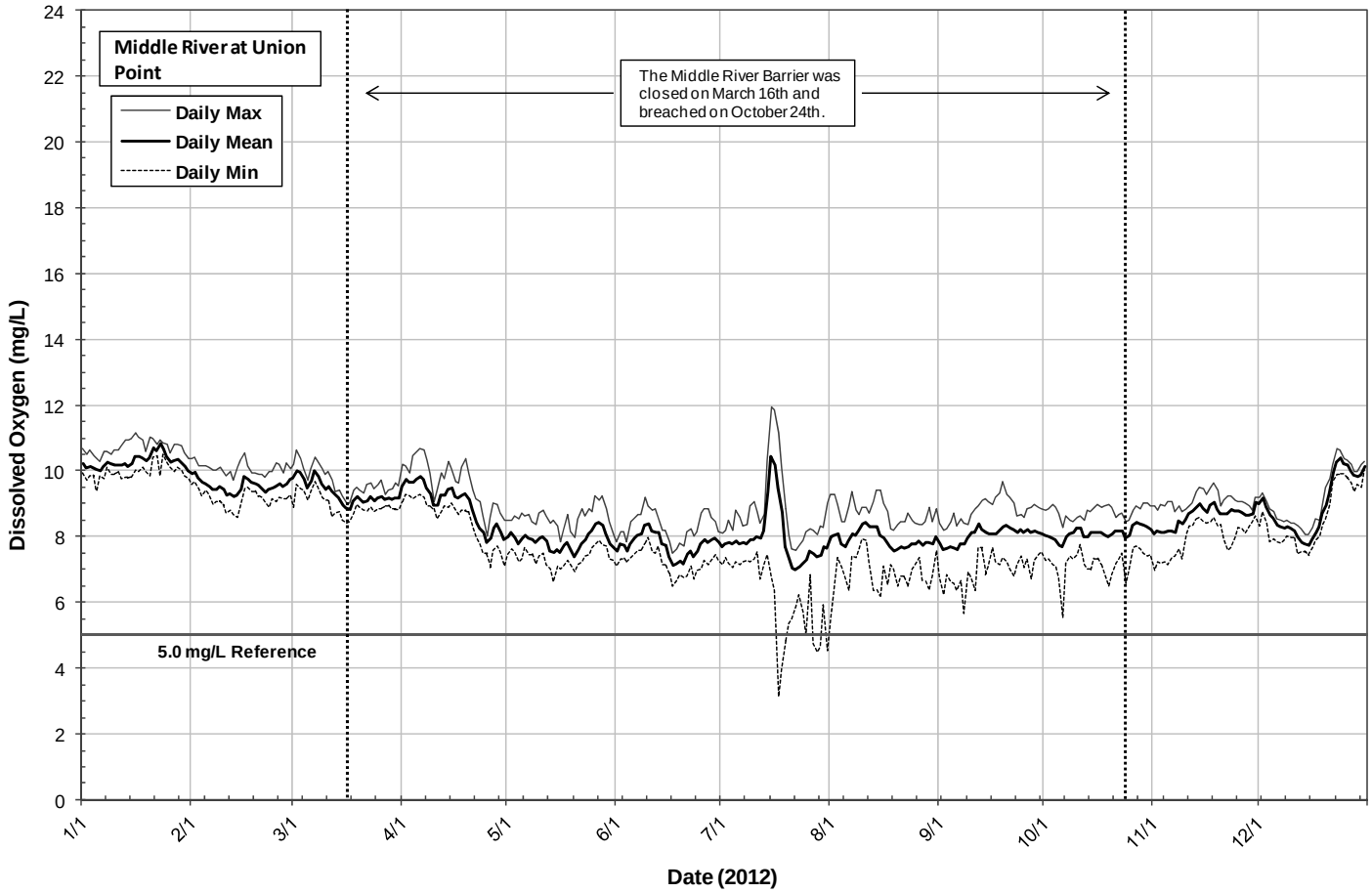

Grant Line Canal near Old River
Daily Max
Daily Mean
Daily Min
The Grant Line Canal Barrier was closed on May 5th and breached on October 18th.
5.0 mg/L Reference
Dissolved Oxygen (mg/L)
Date (2012)
0
2
4
6
8
10
12
14
16
18
20
22
24
1/1
2/1
3/1
4/1
5/1
6/1
7/1
8/1
9/1
10/1
11/1
12/1

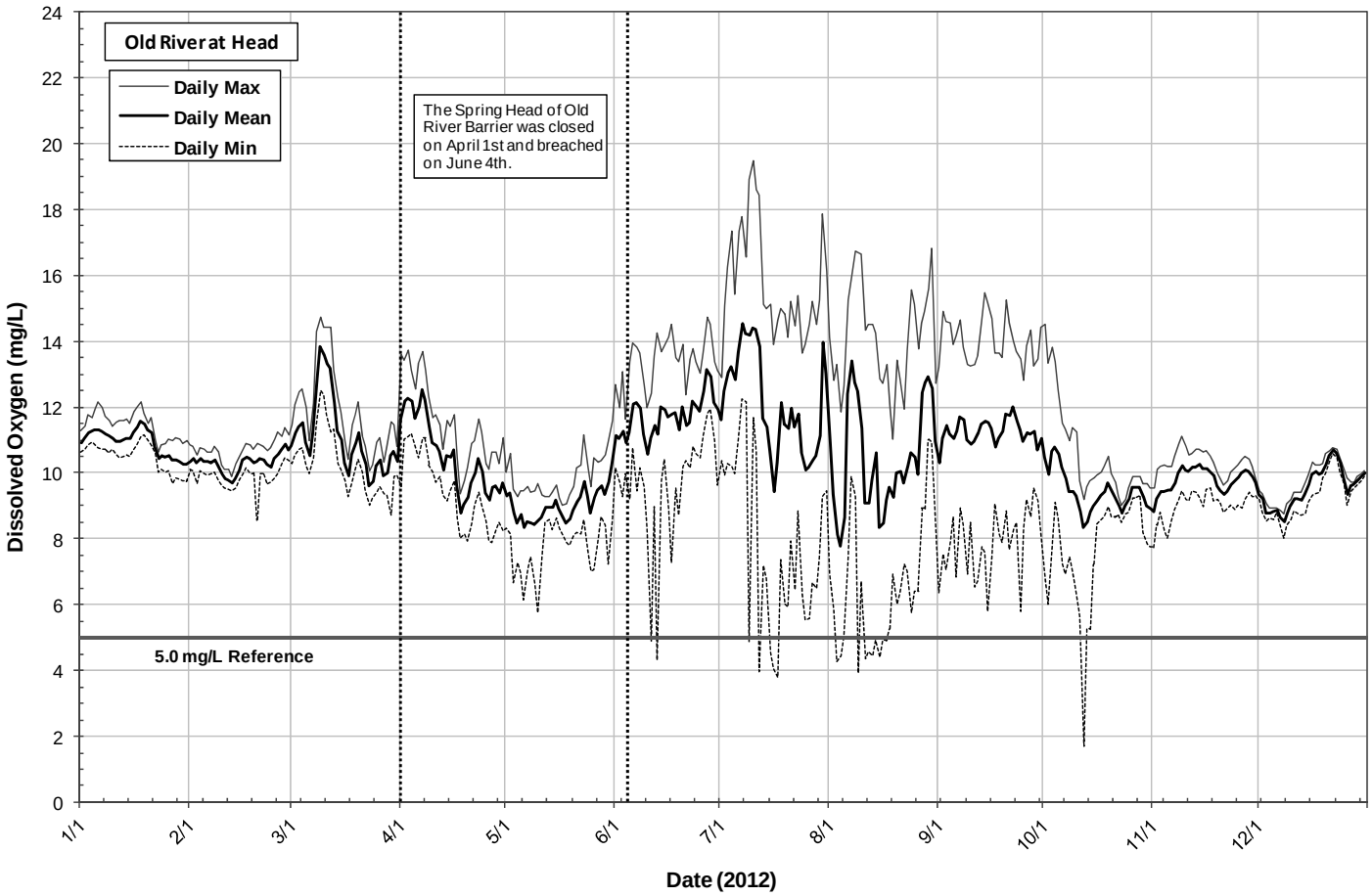

Victoria Canal
Daily Max
Daily Mean
Daily Min
The Middle River Barrier was closed on March 16th and breached on October 24th.
5.0 mg/L Reference
Dissolved Oxygen (mg/L)
Date (2012)
0
2
4
6
8
10
12
14
16
18
20
22
24
1/1
2/1
3/1
4/1
5/1
6/1
7/1
8/1
9/1
10/1
11/1
12/1

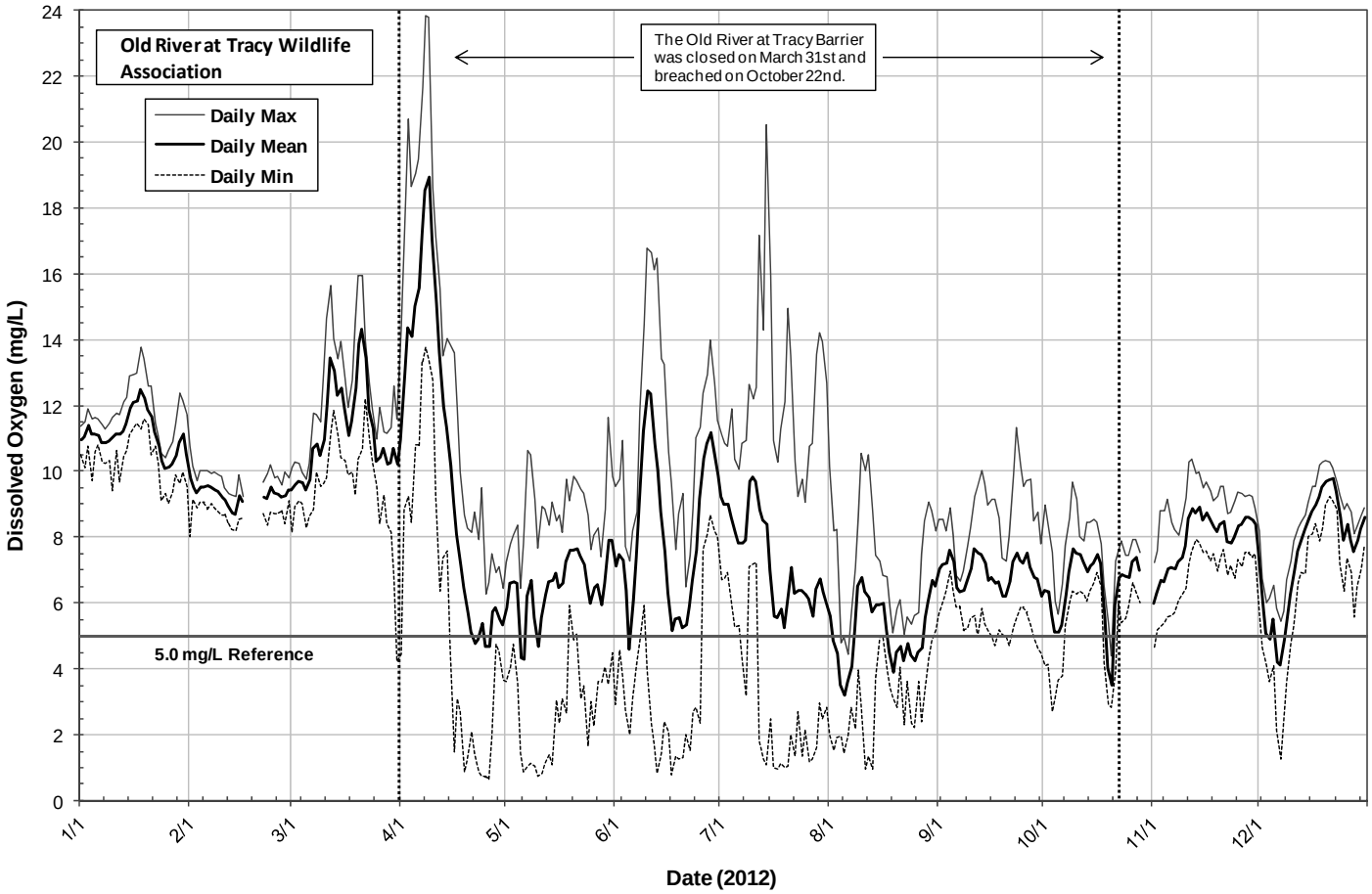

Middle River at Undine Road
Daily Max
Daily Mean
Daily Min
The Middle River Barrier was closed on March 16th and breached on October 24th.
5.0 mg/L Reference
Dissolved Oxygen (mg/L)
Date (2012)
0
2
4
6
8
10
12
14
16
18
20
22
24
1/1
2/1
3/1
4/1
5/1
6/1
7/1
8/1
9/1
10/1
11/1
12/1

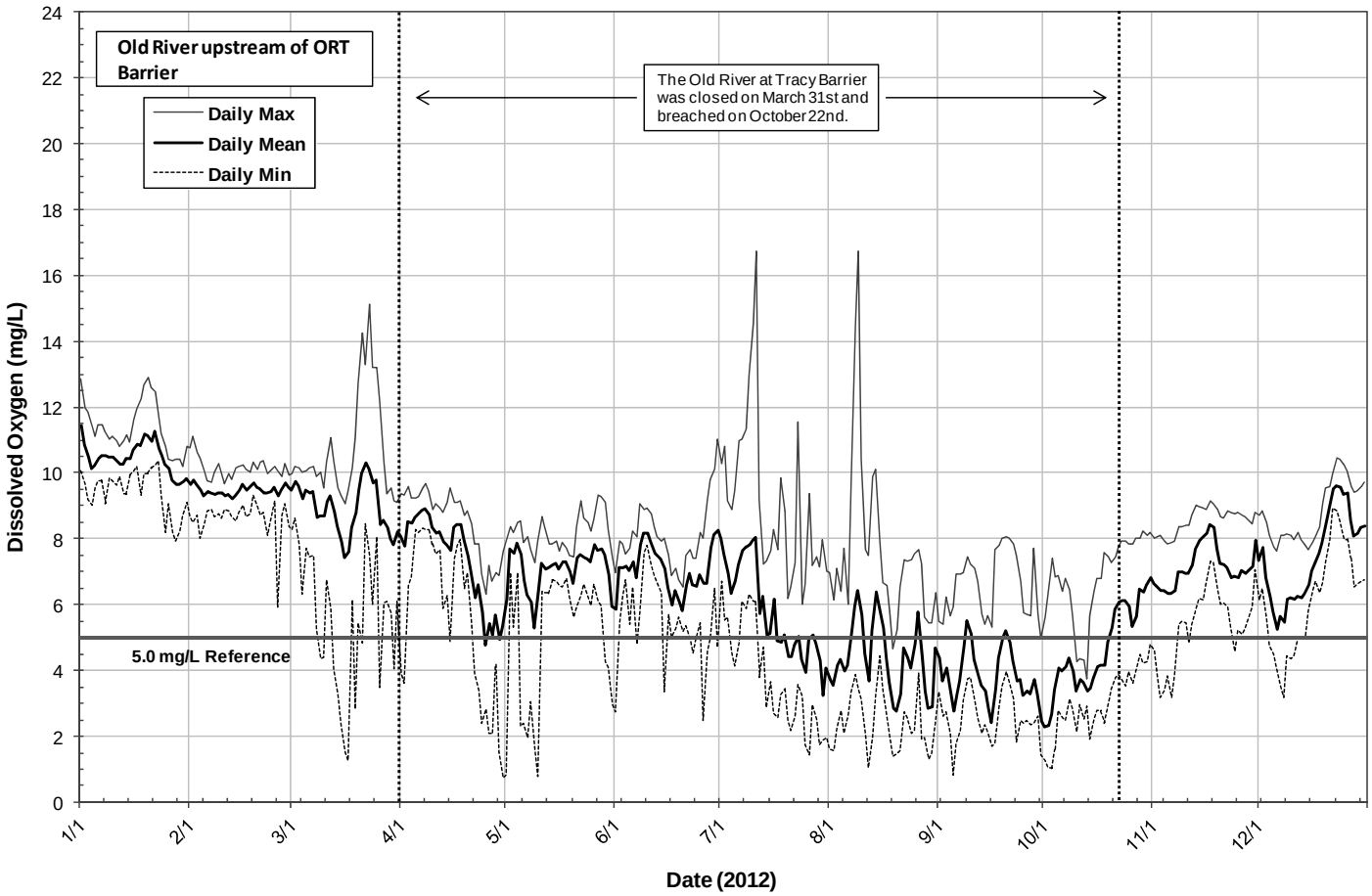

Middle River at Howard Road
Daily Max
Daily Mean
Daily Min
The Middle River Barrier was closed on March 16th and breached on October 24th.
5.0 mg/L Reference
Dissolved Oxygen (mg/L)
Date (2012)
0
2
4
6
8
10
12
14
16
18
20
22
24
1/1
2/1
3/1
4/1
5/1
6/1
7/1
8/1
9/1
10/1
11/1
12/1

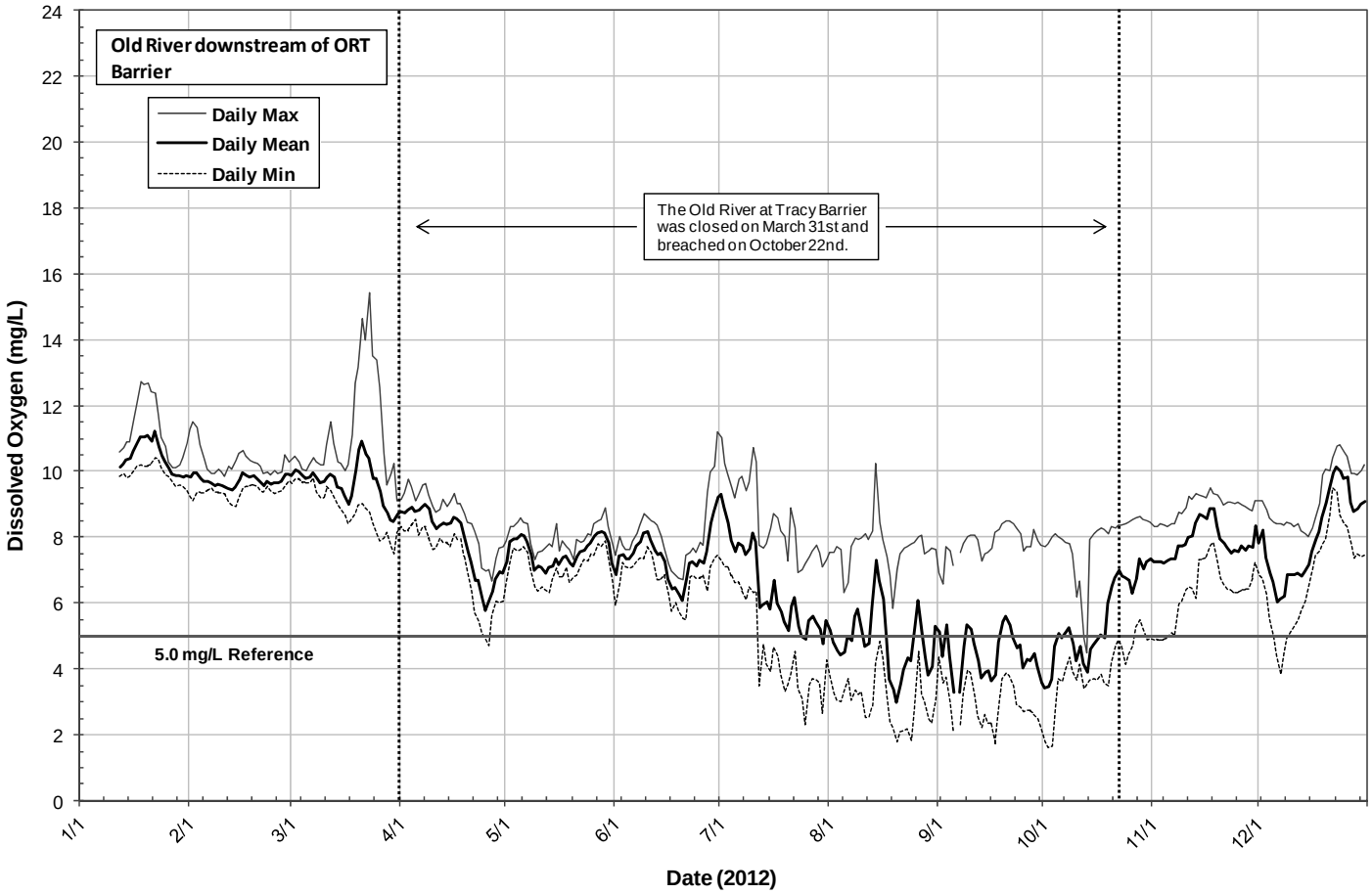

Middle River near Tracy Blvd
Daily Max
Daily Mean
Daily Min
The Middle River Barrier was closed on March 16th and breached on October 24th.
5.0 mg/L Reference
Dissolved Oxygen (mg/L)
Date (2012)
0
2
4
6
8
10
12
14
16
18
20
22
24
1/1
2/1
3/1
4/1
5/1
6/1
7/1
8/1
9/1
10/1
11/1
12/1

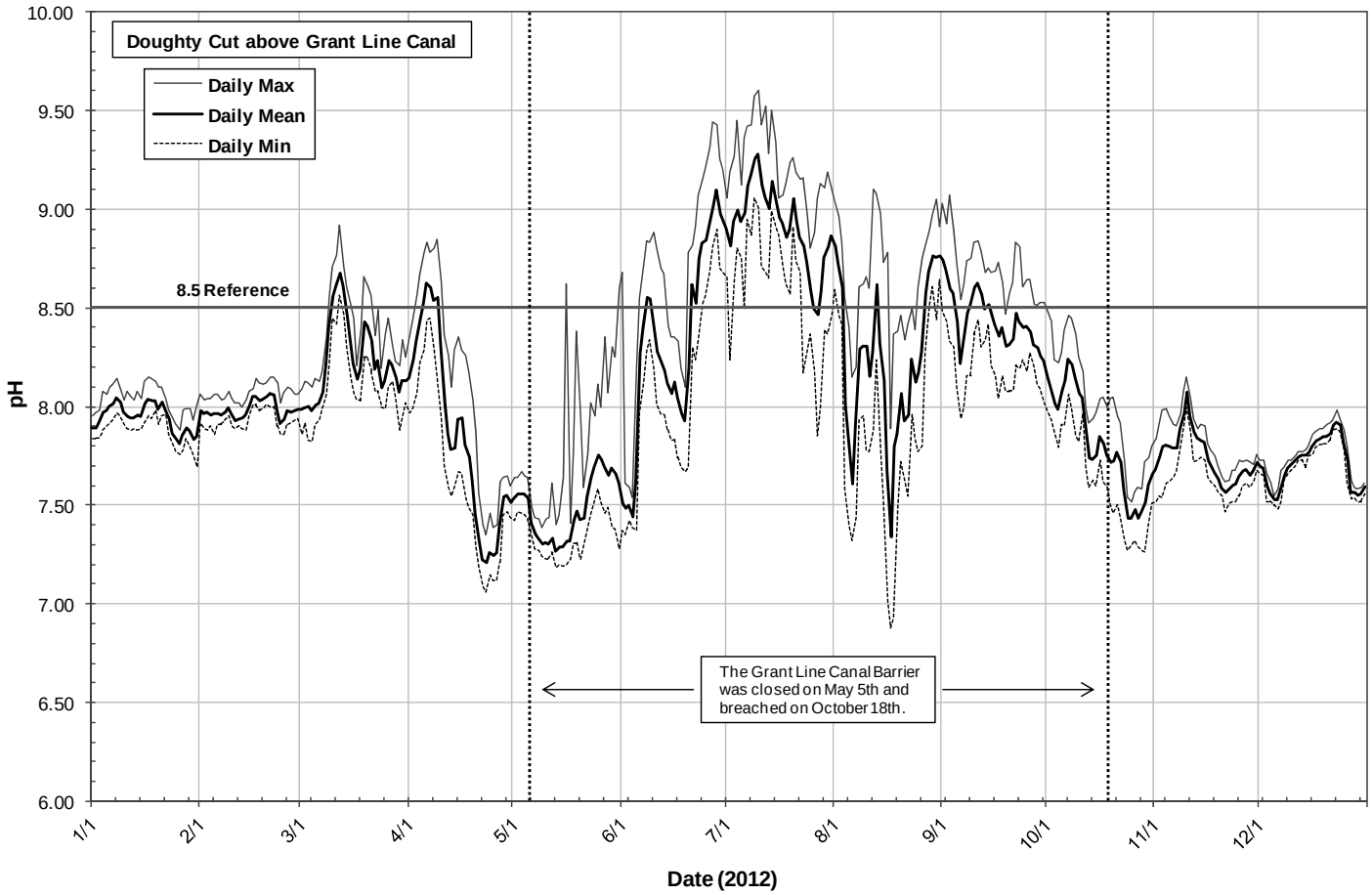

Middle River at Union Point
Daily Max
Daily Mean
Daily Min
The Middle River Barrier was closed on March 16th and breached on October 24th.
5.0 mg/L Reference
Dissolved Oxygen (mg/L)
Date (2012)
0
2
4
6
8
10
12
14
16
18
20
22
24
1/1
2/1
3/1
4/1
5/1
6/1
7/1
8/1
9/1
10/1
11/1
12/1

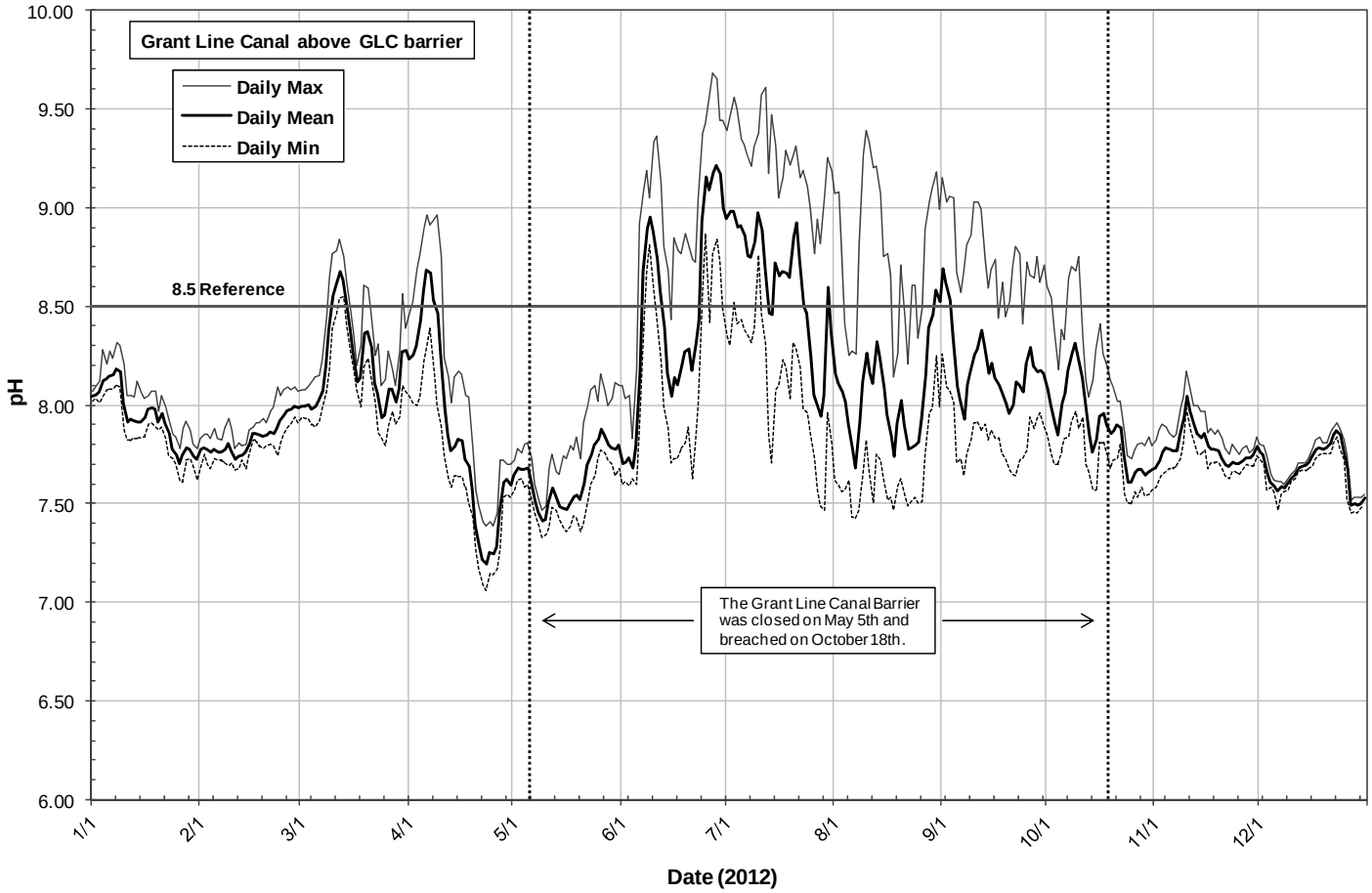

Old River at Head
Daily Max
Daily Mean
Daily Min
The Spring Head of Old River Barrier was closed on April 1st and breached on June 4th.
5.0 mg/L Reference
Dissolved Oxygen (mg/L)
Date (2012)
0
2
4
6
8
10
12
14
16
18
20
22
24
1/1
2/1
3/1
4/1
5/1
6/1
7/1
8/1
9/1
10/1
11/1
12/1

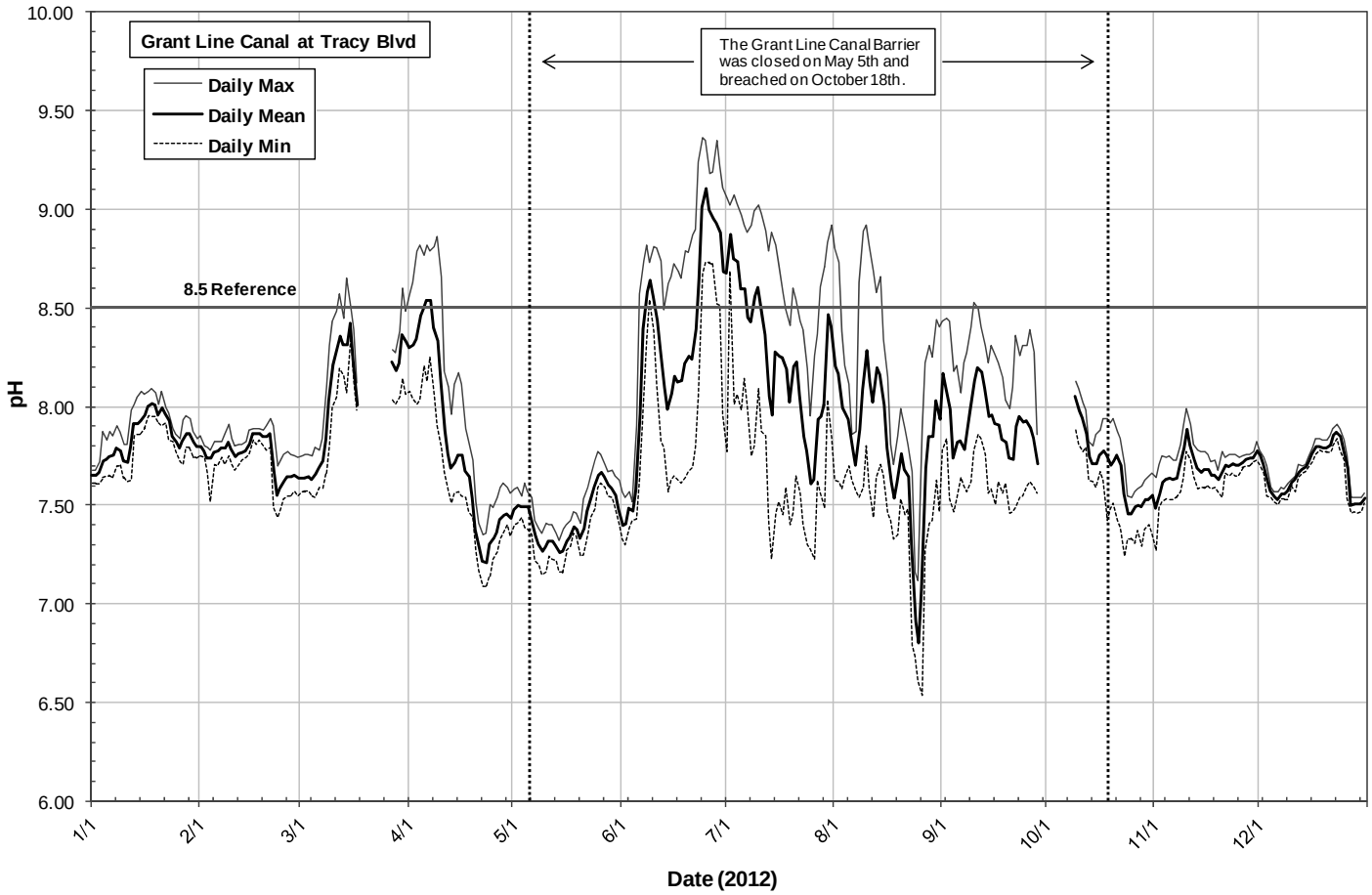

Old River at Tracy Wildlife Association
Daily Max
Daily Mean
Daily Min
The Old River at Tracy Barrier was closed on March 31st and breached on October 22nd.
5.0 mg/L Reference
Dissolved Oxygen (mg/L)
Date (2012)
0
2
4
6
8
10
12
14
16
18
20
22
24
1/1
2/1
3/1
4/1
5/1
6/1
7/1
8/1
9/1
10/1
11/1
12/1

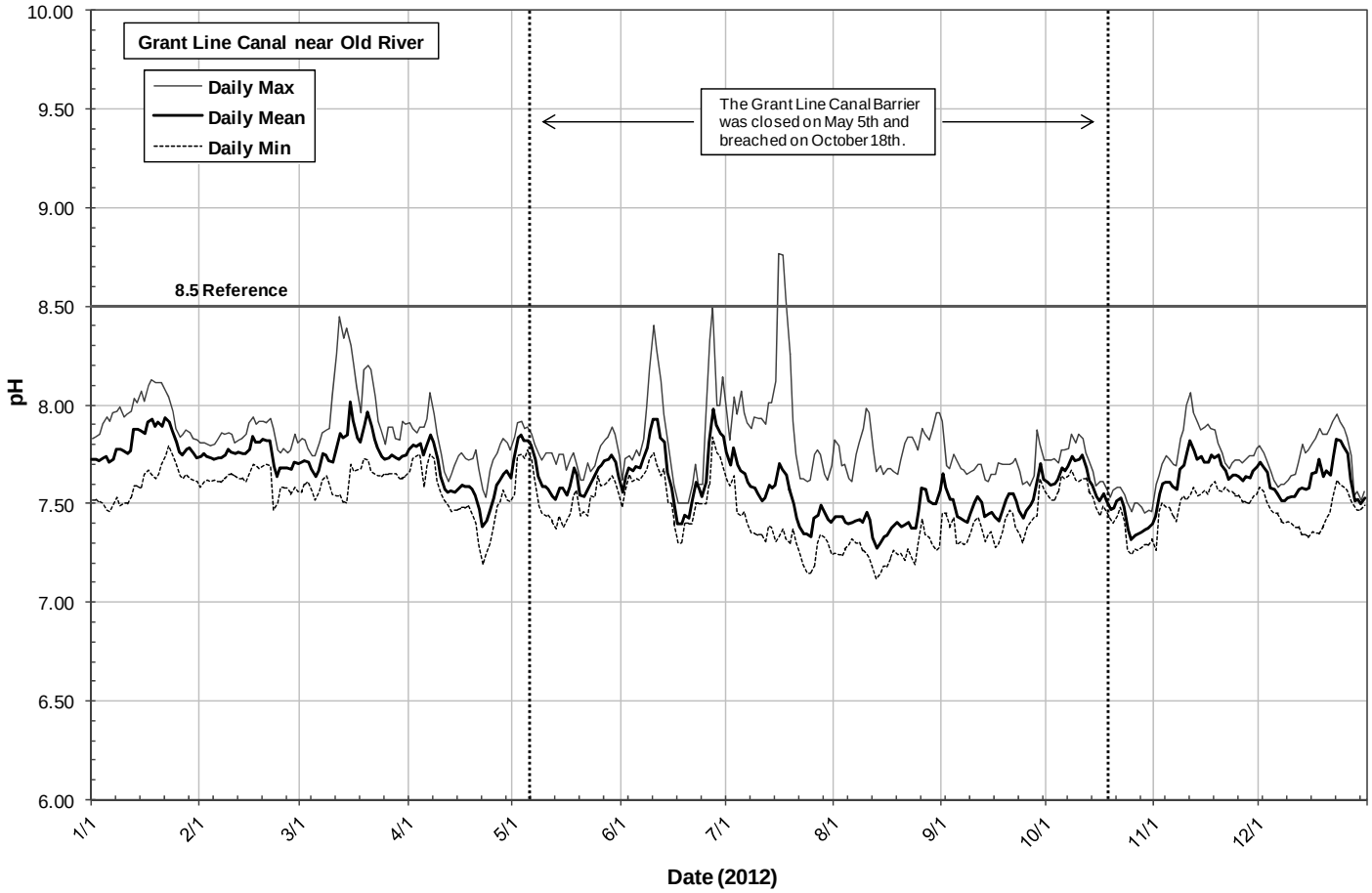

Old River upstream of ORT Barrier
Daily Max
Daily Mean
Daily Min
The Old River at Tracy Barrier was closed on March 31st and breached on October 22nd.
5.0 mg/L Reference
Dissolved Oxygen (mg/L)
Date (2012)
0
2
4
6
8
10
12
14
16
18
20
22
24
1/1
2/1
3/1
4/1
5/1
6/1
7/1
8/1
9/1
10/1
11/1
12/1

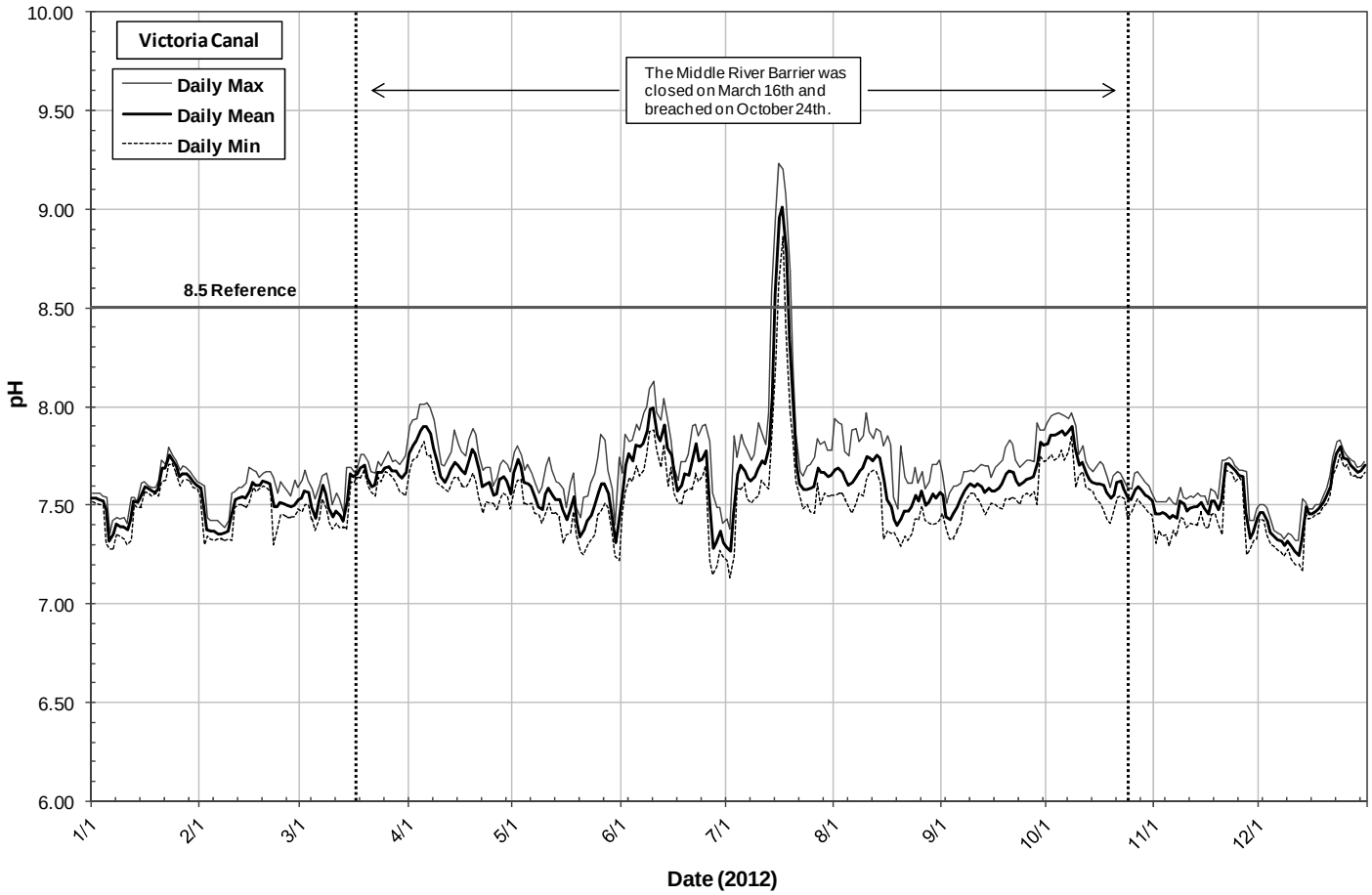

Old River downstream of ORT Barrier
Daily Max
Daily Mean
Daily Min
The Old River at Tracy Barrier was closed on March 31st and breached on October 22nd.
5.0 mg/L Reference
Dissolved Oxygen (mg/L)
Date (2012)
0
2
4
6
8
10
12
14
16
18
20
22
24
1/1
2/1
3/1
4/1
5/1
6/1
7/1
8/1
9/1
10/1
11/1
12/1

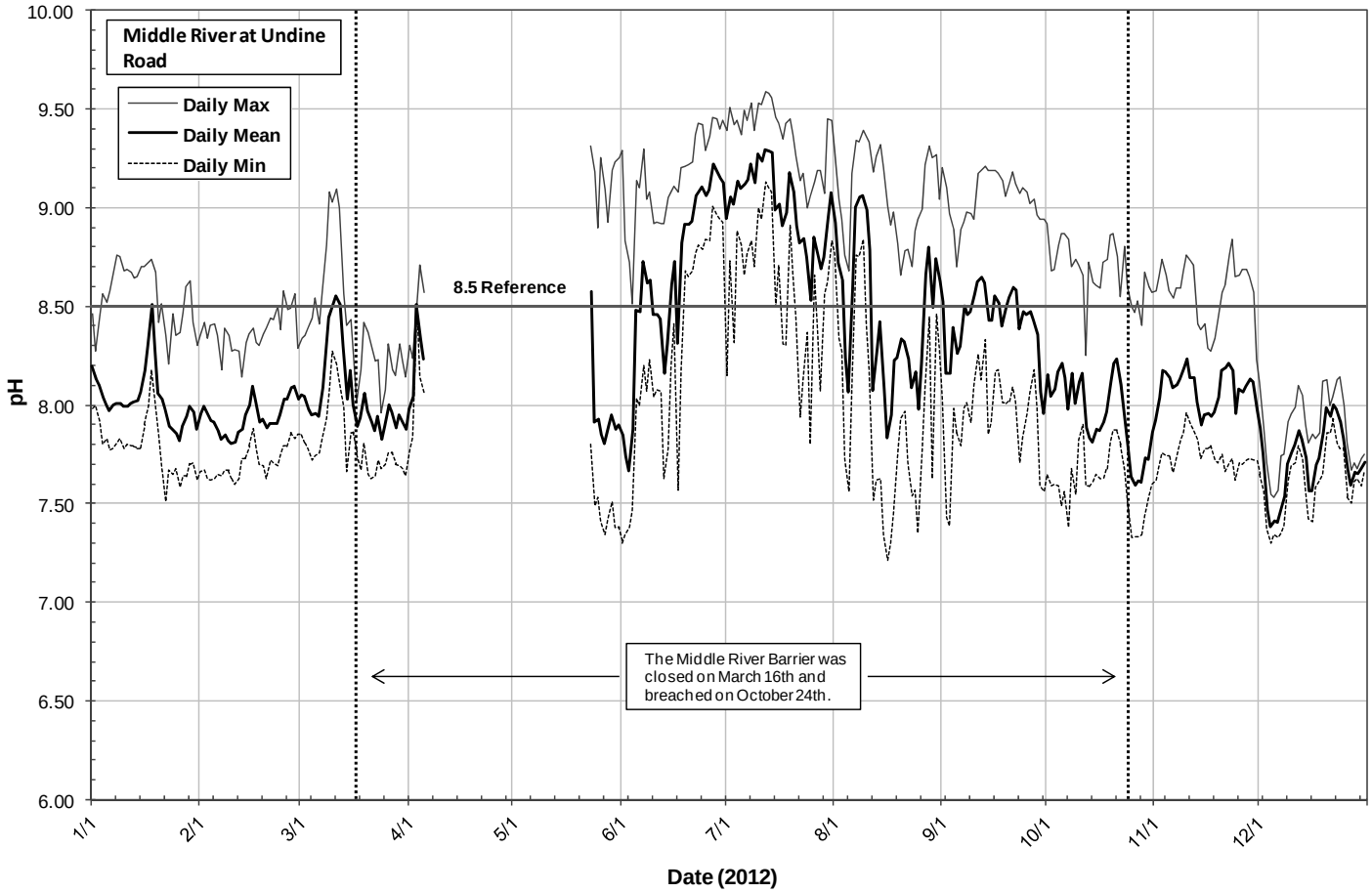

Doughty Cut above Grant Line Canal
Daily Max
Daily Mean
Daily Min
8.5 Reference
The Grant Line Canal Barrier was closed on May 5th and breached on October 18th.
pH
Date (2012)
10.00
9.50
9.00
8.50
8.00
7.50
7.00
6.50
6.00
1/1
2/1
3/1
4/1
5/1
6/1
7/1
8/1
9/1
10/1
11/1
12/1

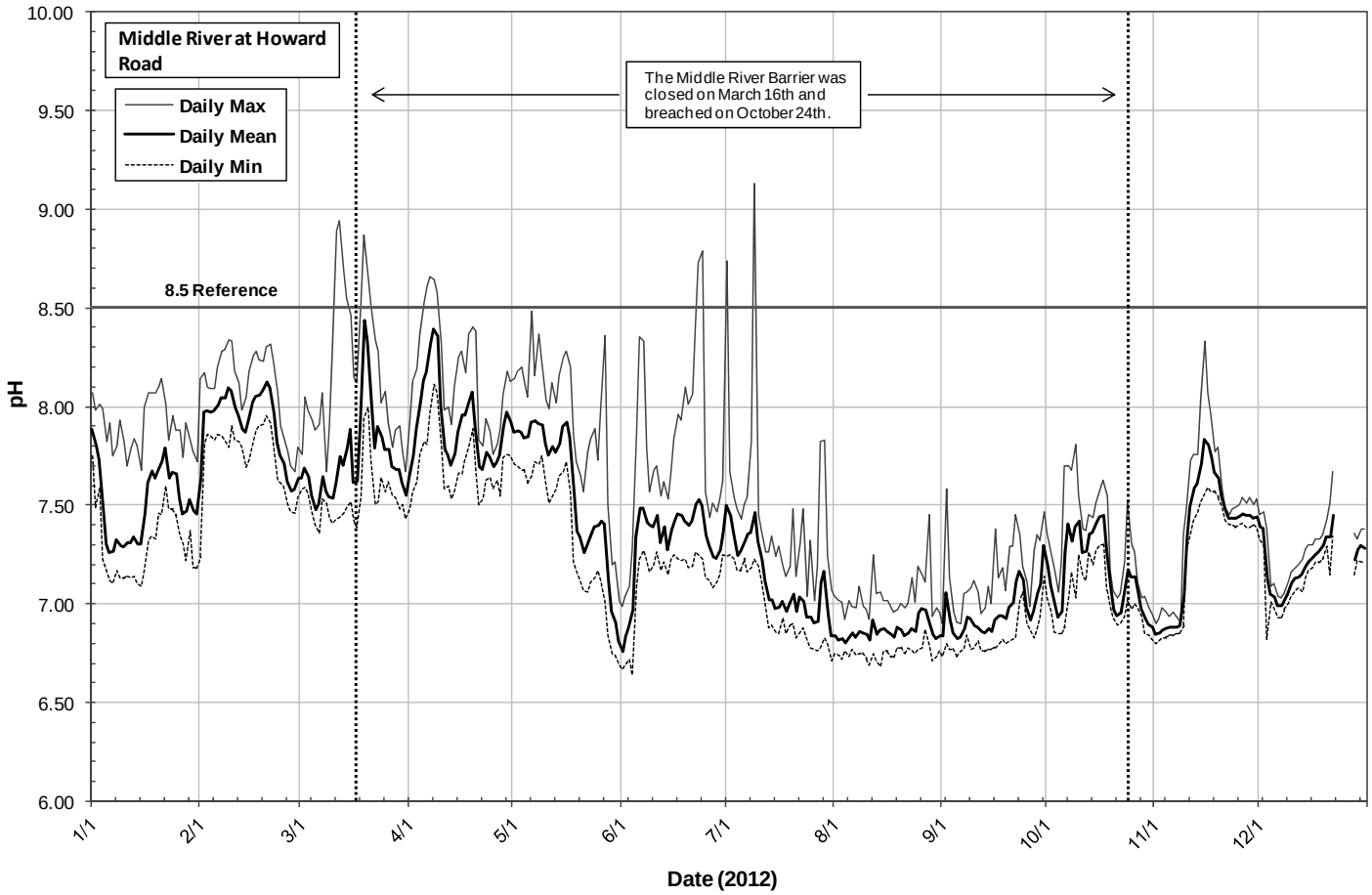

Grant Line Canal above GLC barrier
Daily Max
Daily Mean
Daily Min
8.5 Reference
The Grant Line Canal Barrier was closed on May 5th and breached on October 18th.
pH
Date (2012)
10.00
9.50
9.00
8.50
8.00
7.50
7.00
6.50
6.00
1/1
2/1
3/1
4/1
5/1
6/1
7/1
8/1
9/1
10/1
11/1
12/1

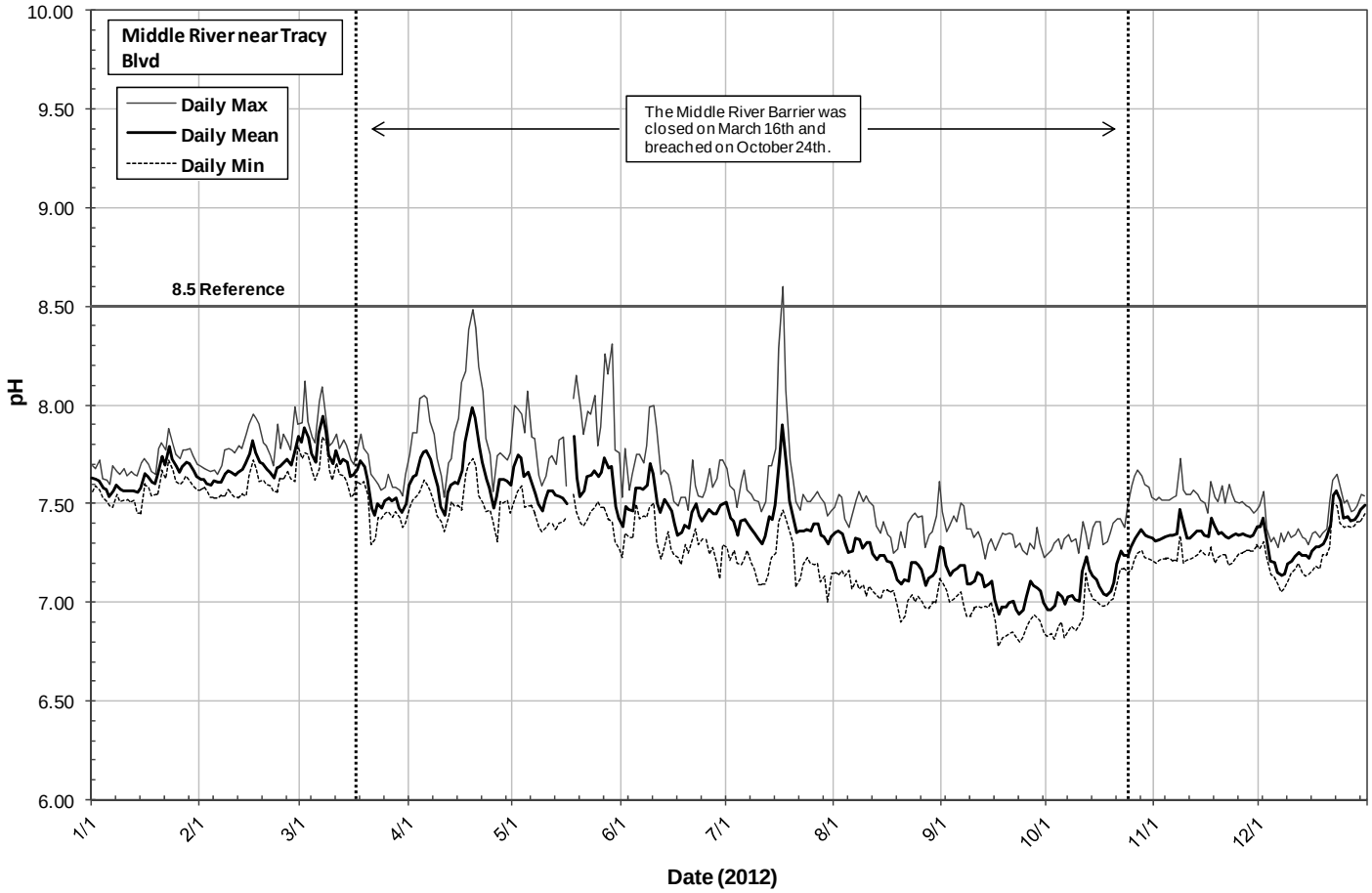

Grant Line Canal at Tracy Blvd
Daily Max
Daily Mean
Daily Min
The Grant Line Canal Barrier was closed on May 5th and breached on October 18th.
8.5 Reference
pH
10.00
9.50
9.00
8.50
8.00
7.50
7.00
6.50
6.00
1/1
2/1
3/1
4/1
5/1
6/1
7/1
8/1
9/1
10/1
11/1
12/1
Date (2012)

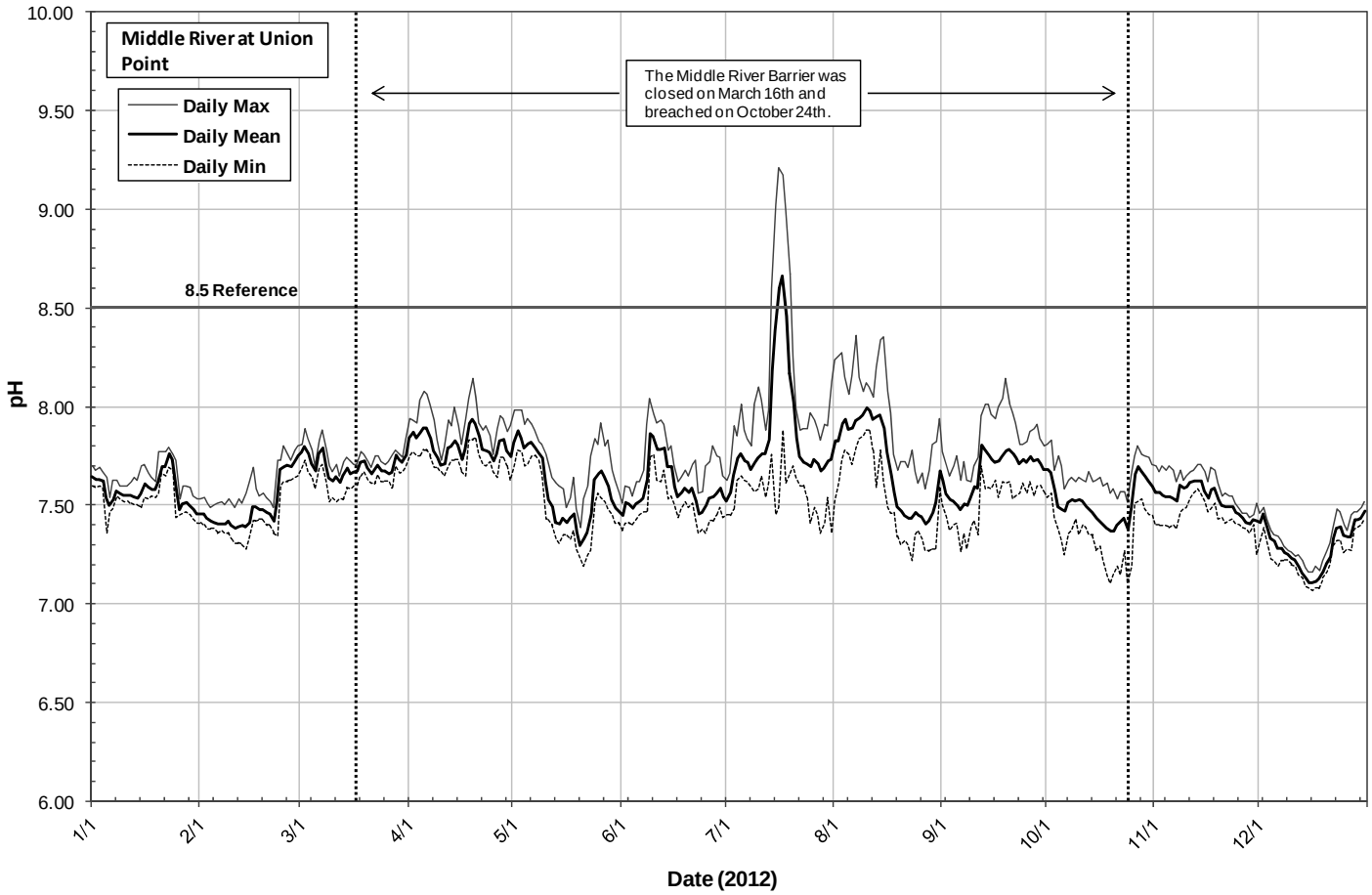

Grant Line Canal near Old River
Daily Max
Daily Mean
Daily Min
The Grant Line Canal Barrier was closed on May 5th and breached on October 18th.
8.5 Reference
pH
10.00
9.50
9.00
8.50
8.00
7.50
7.00
6.50
6.00
1/1
2/1
3/1
4/1
5/1
6/1
7/1
8/1
9/1
10/1
11/1
12/1
Date (2012)

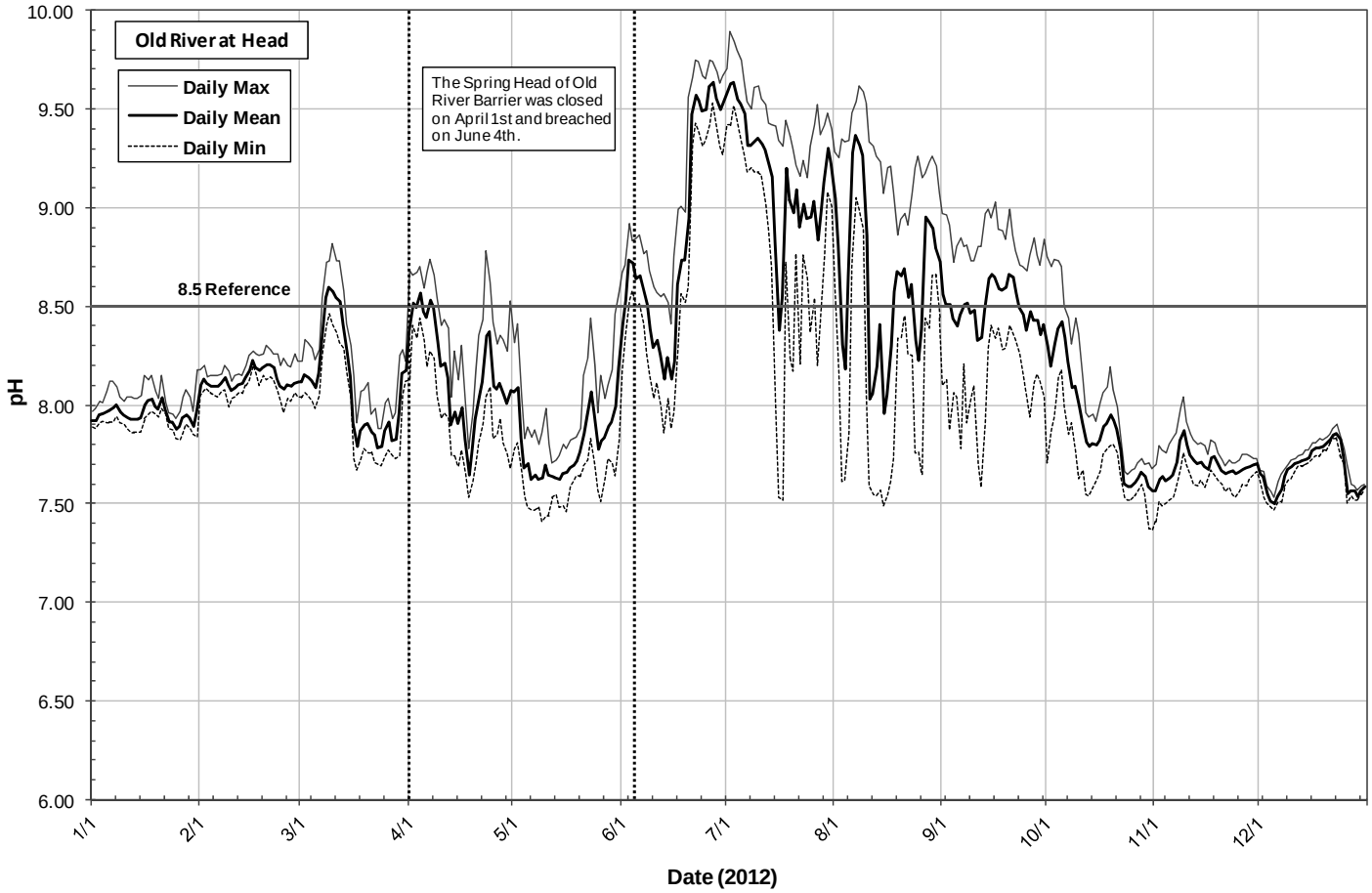

Victoria Canal
Daily Max
Daily Mean
Daily Min
The Middle River Barrier was closed on March 16th and breached on October 24th.
8.5 Reference
pH
10.00
9.50
9.00
8.50
8.00
7.50
7.00
6.50
6.00
1/1
2/1
3/1
4/1
5/1
6/1
7/1
8/1
9/1
10/1
11/1
12/1
Date (2012)

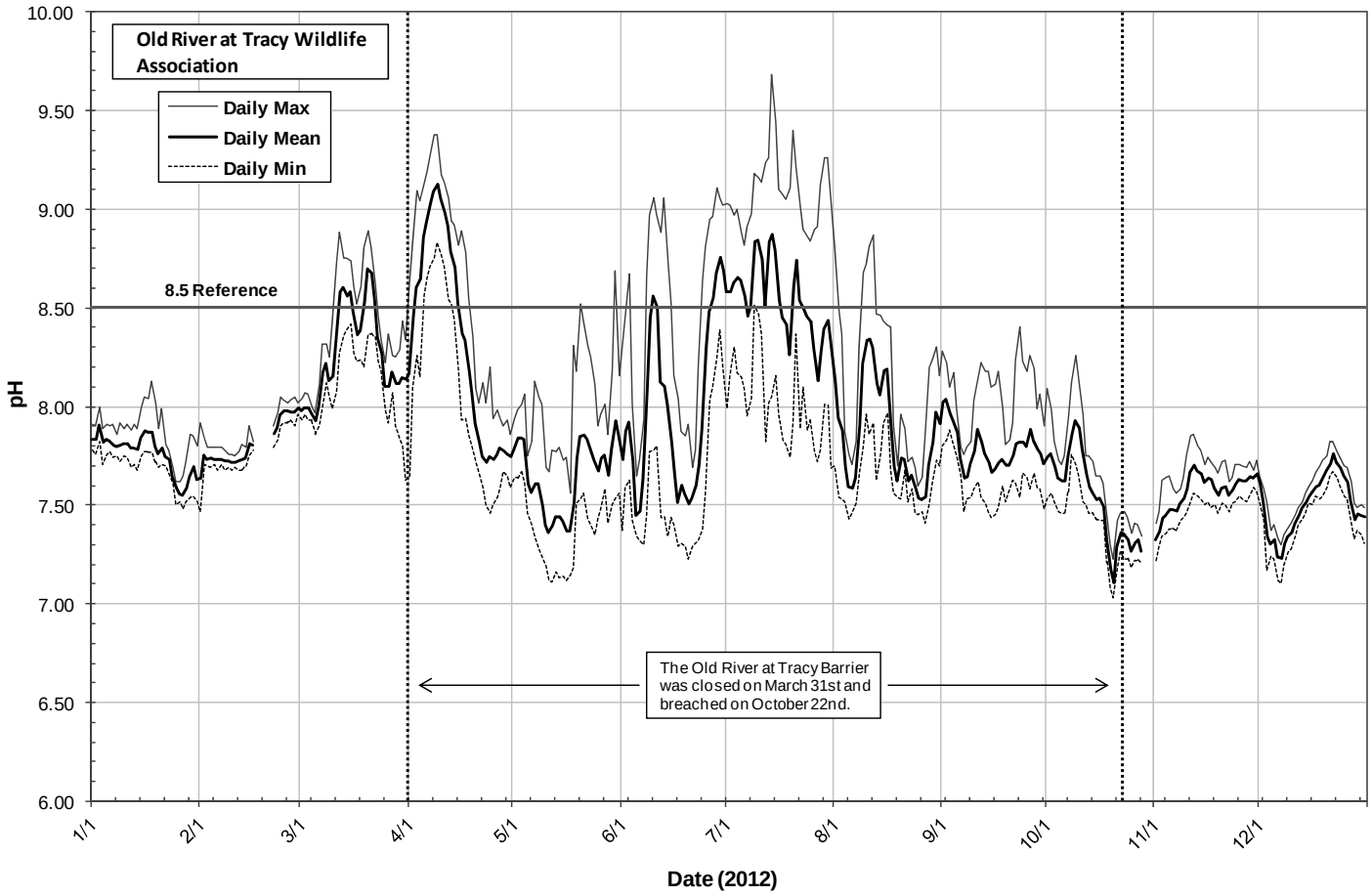

Middle River at Undine Road
Daily Max
Daily Mean
Daily Min
8.5 Reference
The Middle River Barrier was closed on March 16th and breached on October 24th.
pH
10.00
9.50
9.00
8.50
8.00
7.50
7.00
6.50
6.00
1/1
2/1
3/1
4/1
5/1
6/1
7/1
8/1
9/1
10/1
11/1
12/1
Date (2012)

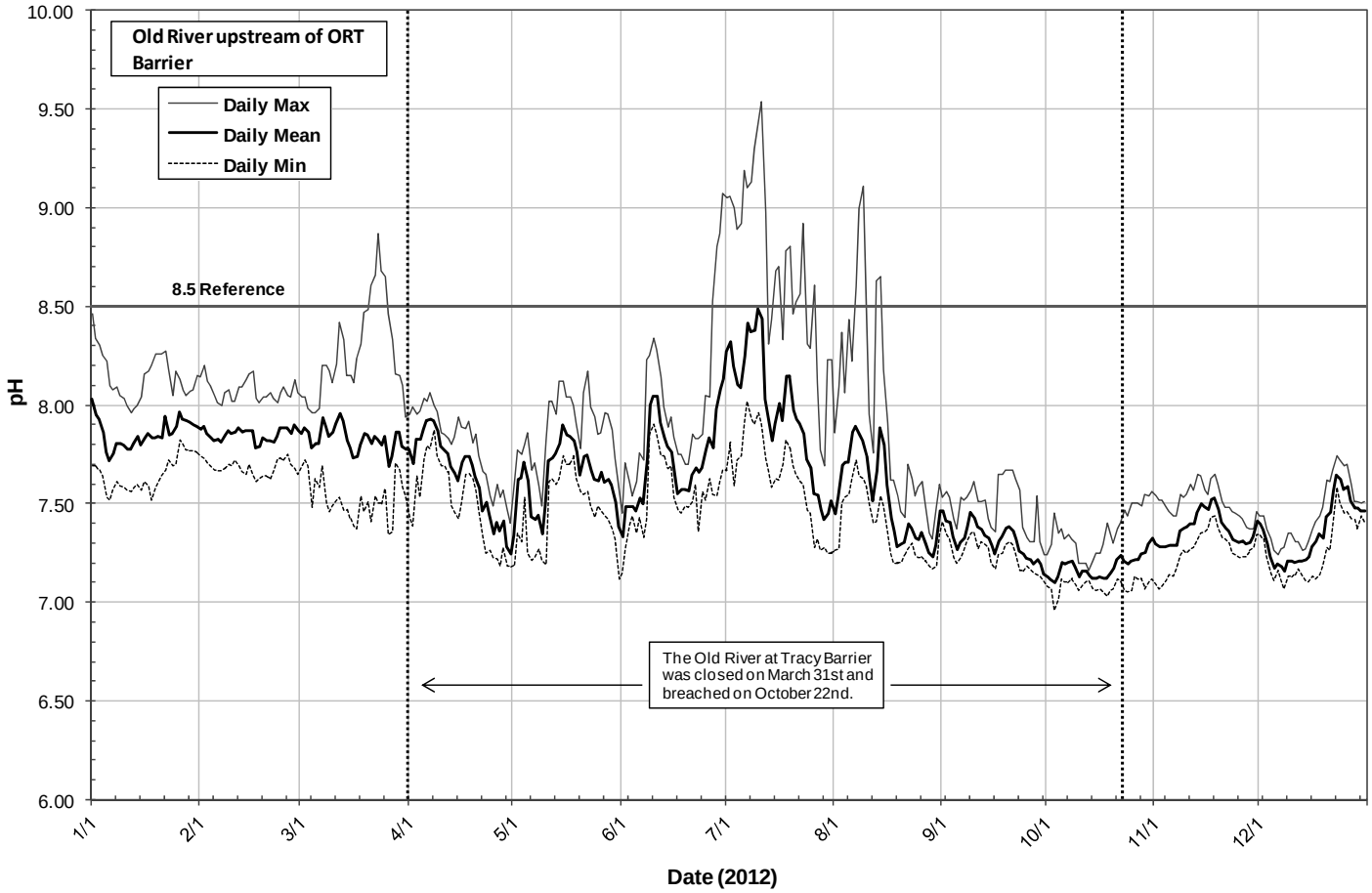

Middle River at Howard Road
Daily Max
Daily Mean
Daily Min
The Middle River Barrier was closed on March 16th and breached on October 24th.
8.5 Reference
pH
10.00
9.50
9.00
8.50
8.00
7.50
7.00
6.50
6.00
1/1
2/1
3/1
4/1
5/1
6/1
7/1
8/1
9/1
10/1
11/1
12/1
Date (2012)

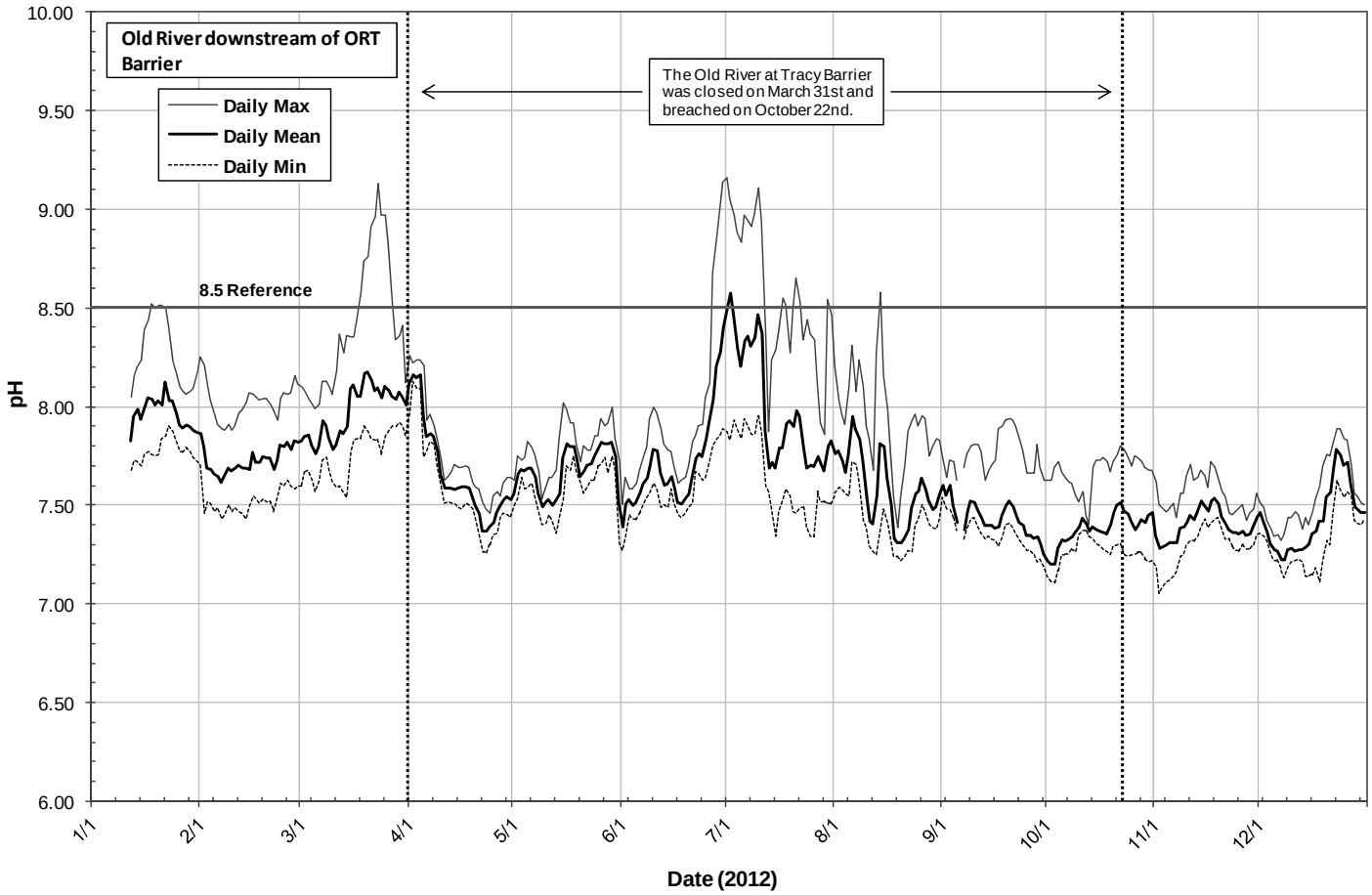

Middle River near Tracy Blvd
Daily Max
Daily Mean
Daily Min
The Middle River Barrier was closed on March 16th and breached on October 24th.
8.5 Reference
pH
10.00
9.50
9.00
8.50
8.00
7.50
7.00
6.50
6.00
1/1
2/1
3/1
4/1
5/1
6/1
7/1
8/1
9/1
10/1
11/1
12/1
Date (2012)

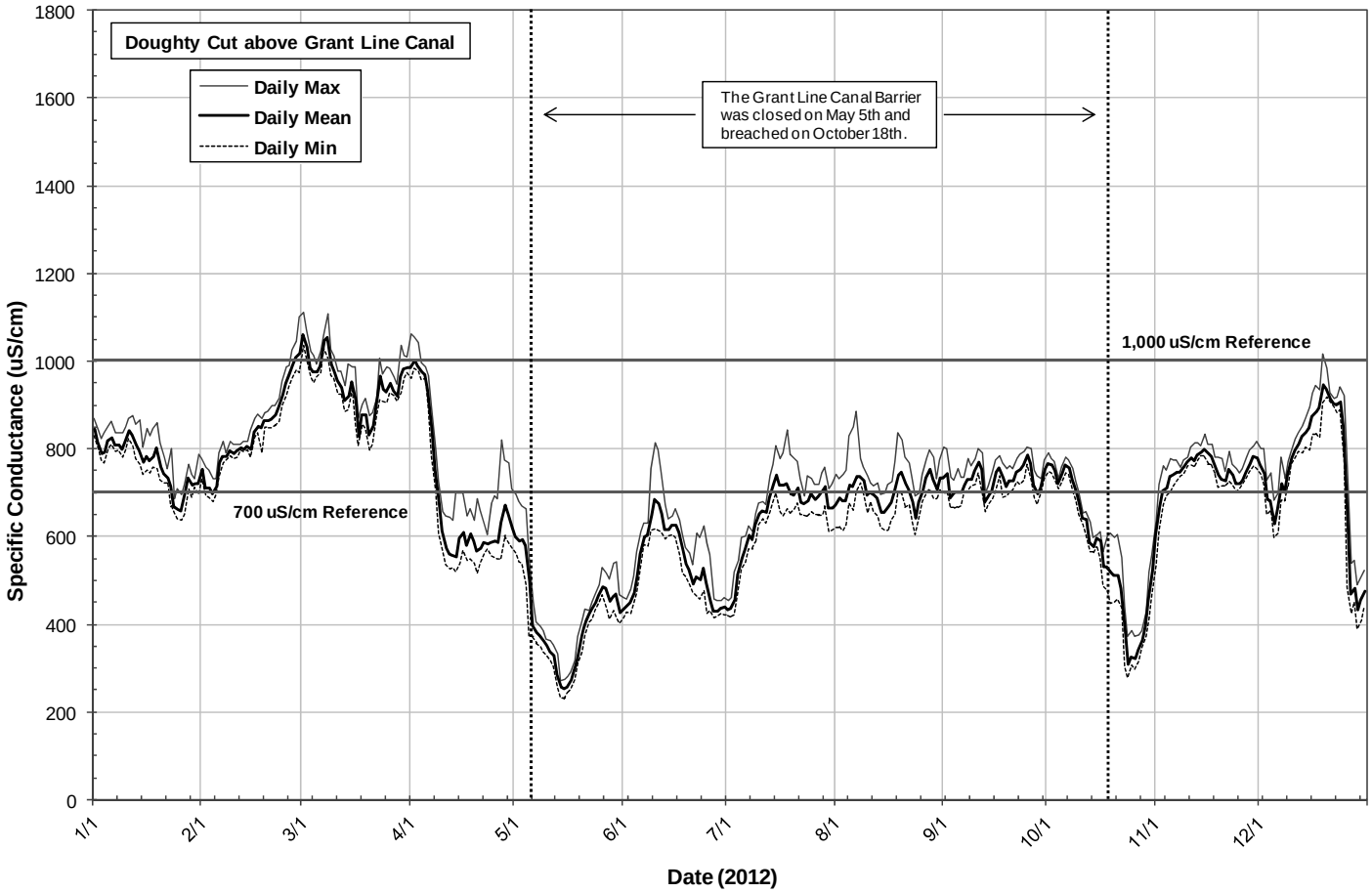

Middle River at Union Point
Daily Max
Daily Mean
Daily Min
The Middle River Barrier was closed on March 16th and breached on October 24th.
8.5 Reference
pH
10.00
9.50
9.00
8.50
8.00
7.50
7.00
6.50
6.00
1/1
2/1
3/1
4/1
5/1
6/1
7/1
8/1
9/1
10/1
11/1
12/1
Date (2012)

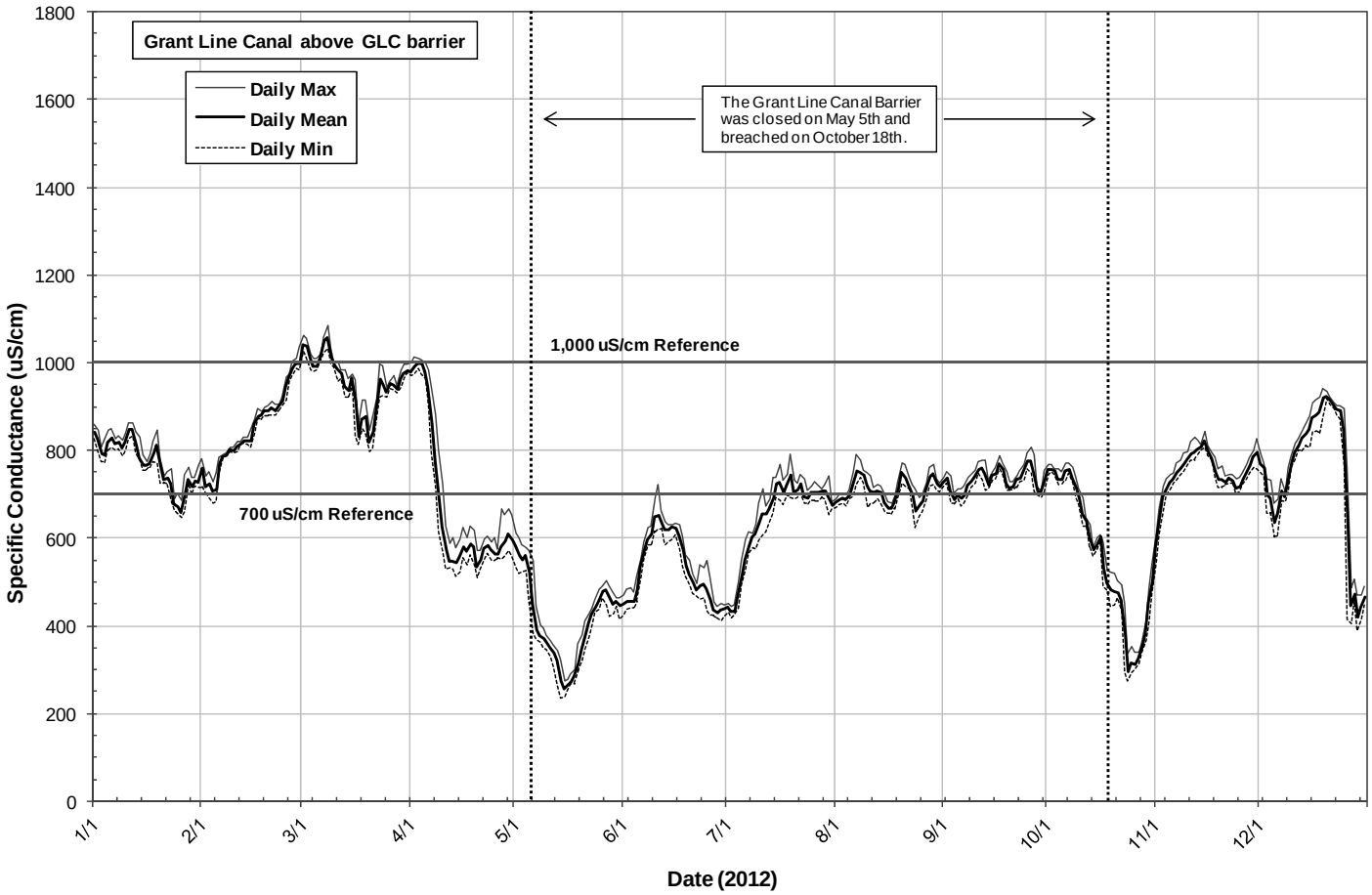

Old River at Head
Daily Max
Daily Mean
Daily Min
The Spring Head of Old River Barrier was closed on April 1st and breached on June 4th.
8.5 Reference
pH
10.00
9.50
9.00
8.50
8.00
7.50
7.00
6.50
6.00
1/1
2/1
3/1
4/1
5/1
6/1
7/1
8/1
9/1
10/1
11/1
12/1
Date (2012)

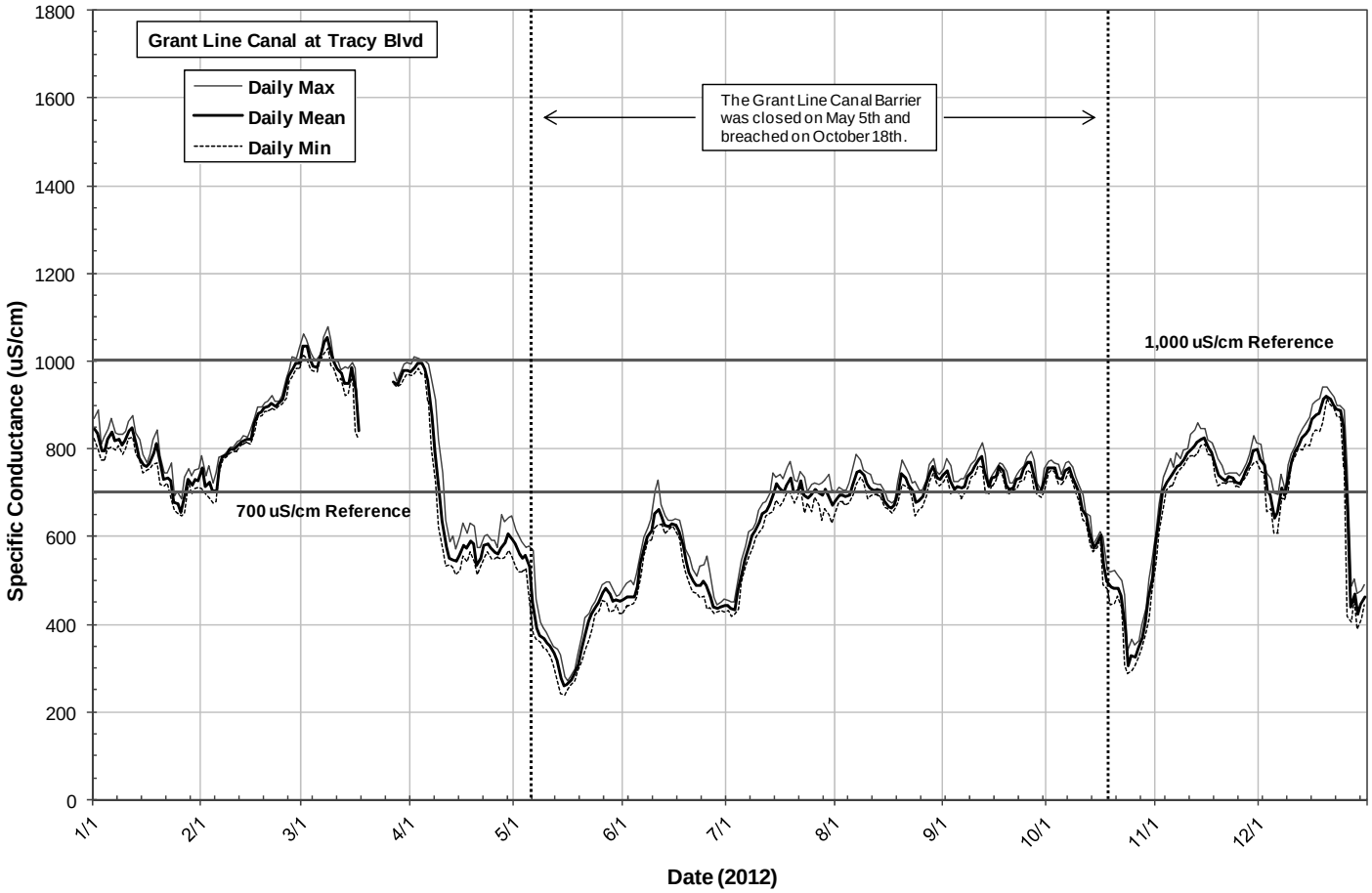

Old River at Tracy Wildlife Association
Daily Max
Daily Mean
Daily Min
8.5 Reference
The Old River at Tracy Barrier was closed on March 31st and breached on October 22nd.
pH
Date (2012)
10.00
9.50
9.00
8.50
8.00
7.50
7.00
6.50
6.00
1/1
2/1
3/1
4/1
5/1
6/1
7/1
8/1
9/1
10/1
11/1
12/1

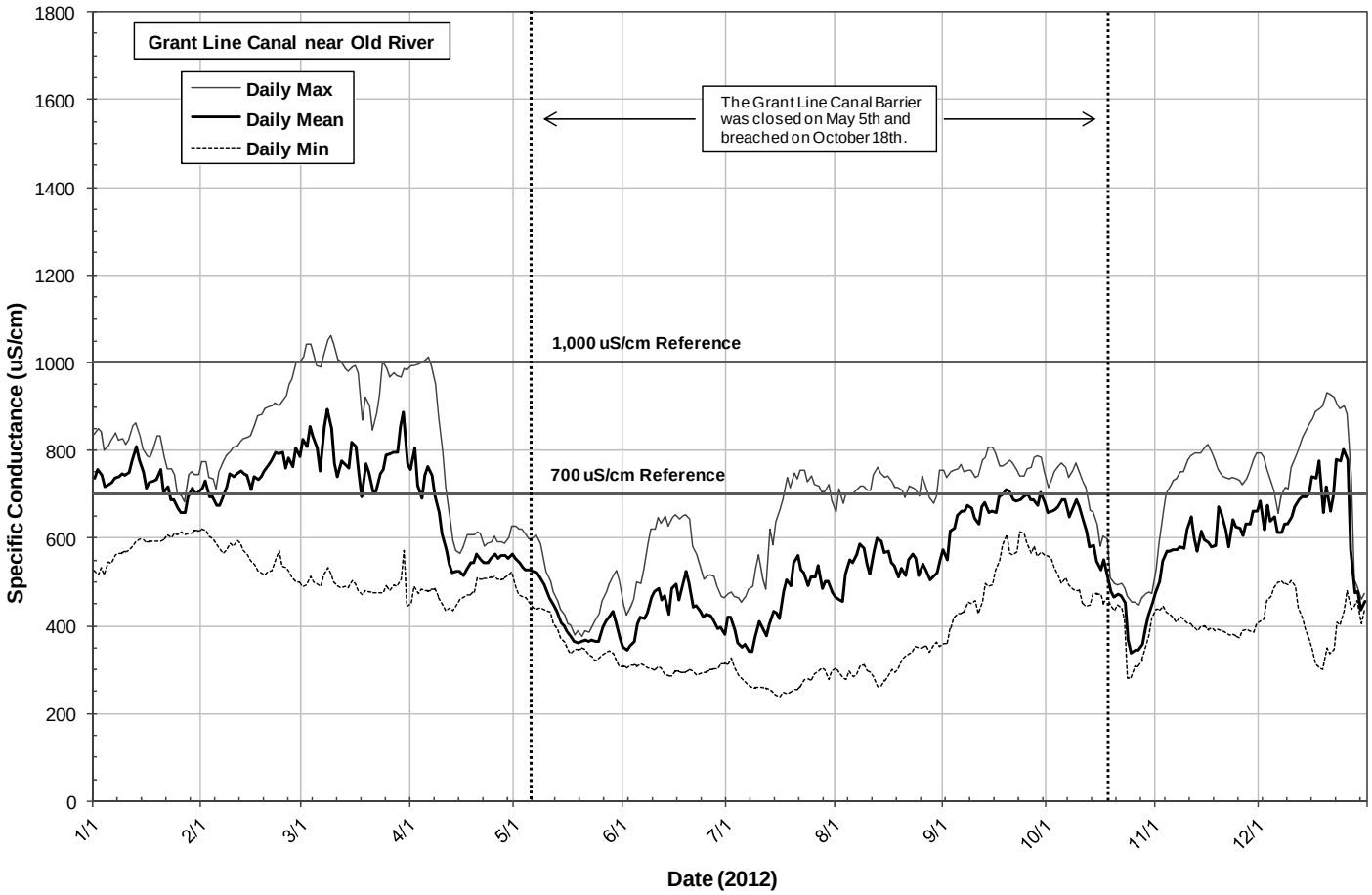

Old River upstream of ORT Barrier
Daily Max
Daily Mean
Daily Min
8.5 Reference
The Old River at Tracy Barrier was closed on March 31st and breached on October 22nd.
pH
Date (2012)
10.00
9.50
9.00
8.50
8.00
7.50
7.00
6.50
6.00
1/1
2/1
3/1
4/1
5/1
6/1
7/1
8/1
9/1
10/1
11/1
12/1

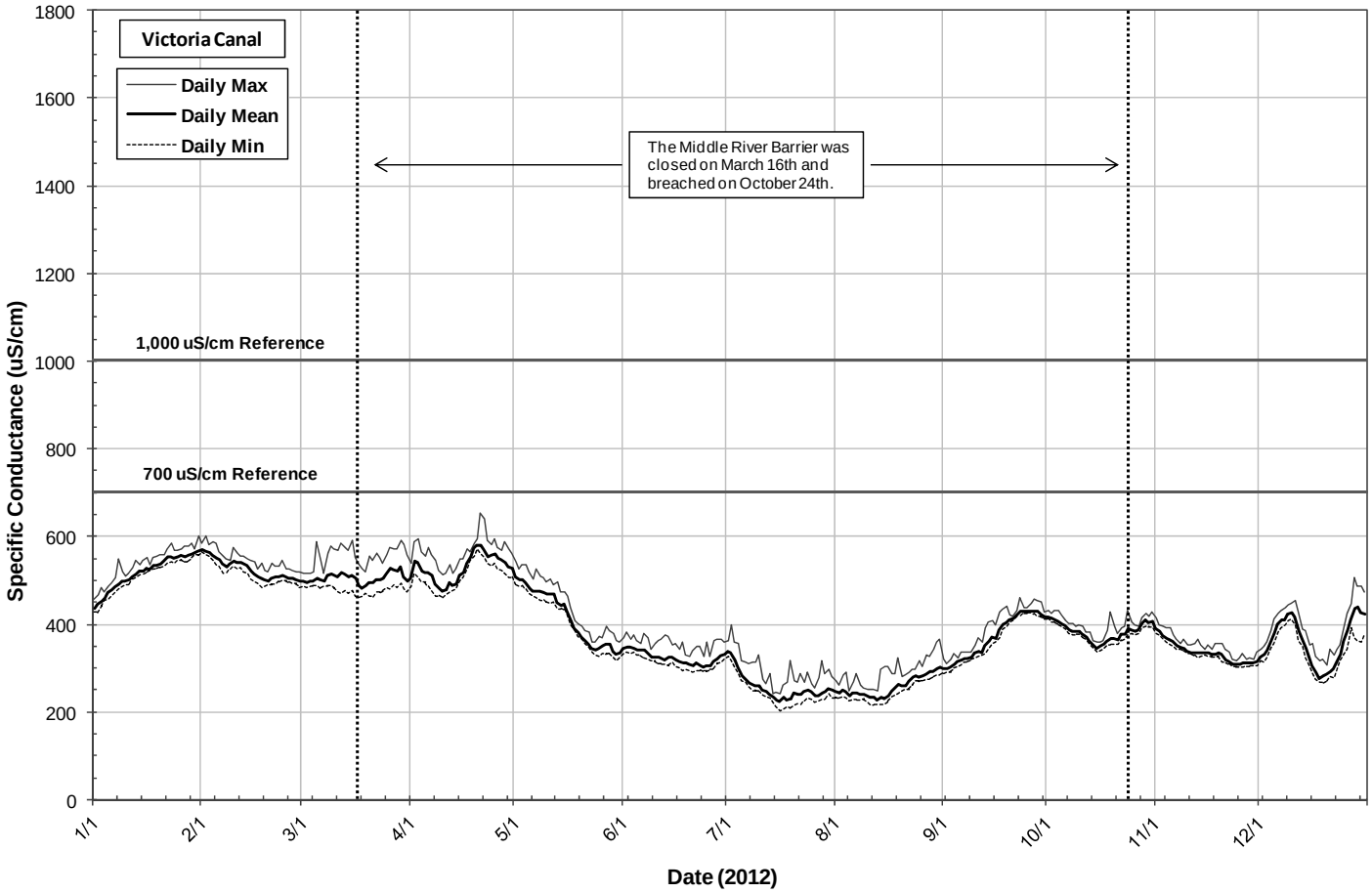

Old River downstream of ORT Barrier
Daily Max
Daily Mean
Daily Min
The Old River at Tracy Barrier was closed on March 31st and breached on October 22nd.
8.5 Reference
pH
10.00
9.50
9.00
8.50
8.00
7.50
7.00
6.50
6.00
1/1
2/1
3/1
4/1
5/1
6/1
7/1
8/1
9/1
10/1
11/1
12/1
Date (2012)

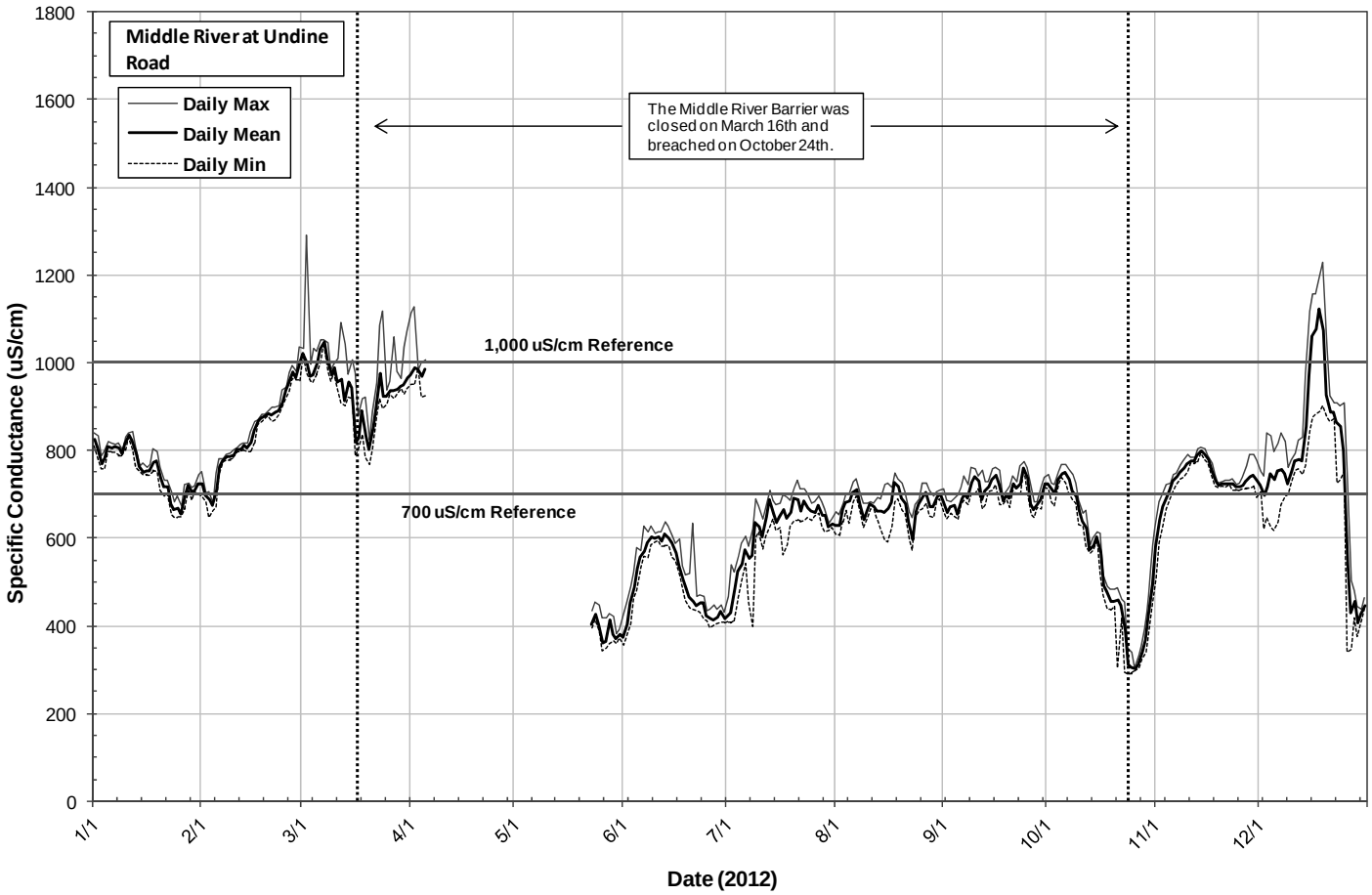

Doughty Cut above Grant Line Canal
Daily Max
Daily Mean
Daily Min
The Grant Line Canal Barrier was closed on May 5th and breached on October 18th.
1,000 uS/cm Reference
700 uS/cm Reference
Specific Conductance (uS/cm)
1800
1600
1400
1200
1000
800
600
400
200
0
1/1
2/1
3/1
4/1
5/1
6/1
7/1
8/1
9/1
10/1
11/1
12/1
Date (2012)

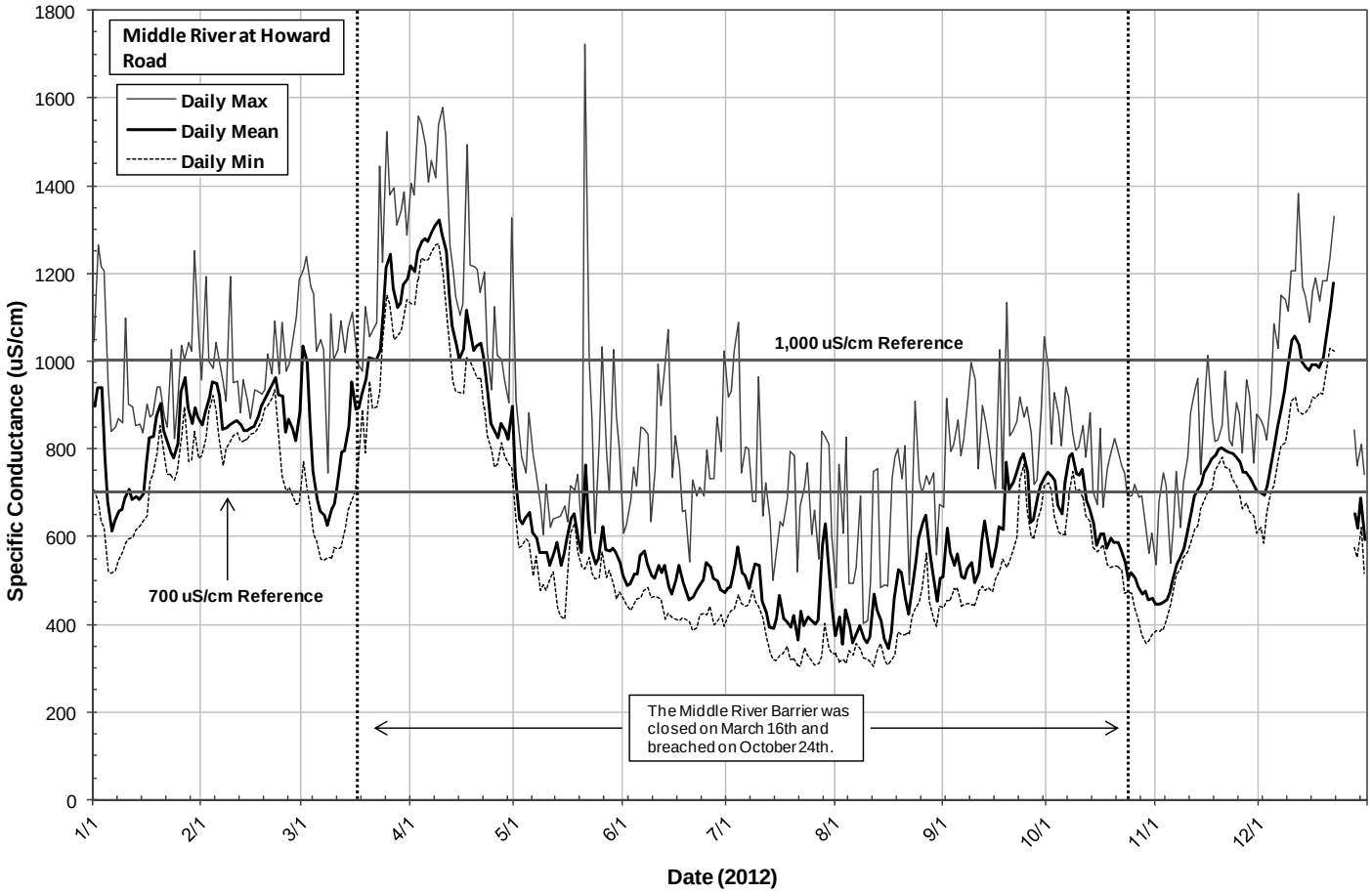

Grant Line Canal above GLC barrier
Daily Max
Daily Mean
Daily Min
The Grant Line Canal Barrier was closed on May 5th and breached on October 18th.
1,000 uS/cm Reference
700 uS/cm Reference
Specific Conductance (uS/cm)
Date (2012)
1/1
2/1
3/1
4/1
5/1
6/1
7/1
8/1
9/1
10/1
11/1
12/1

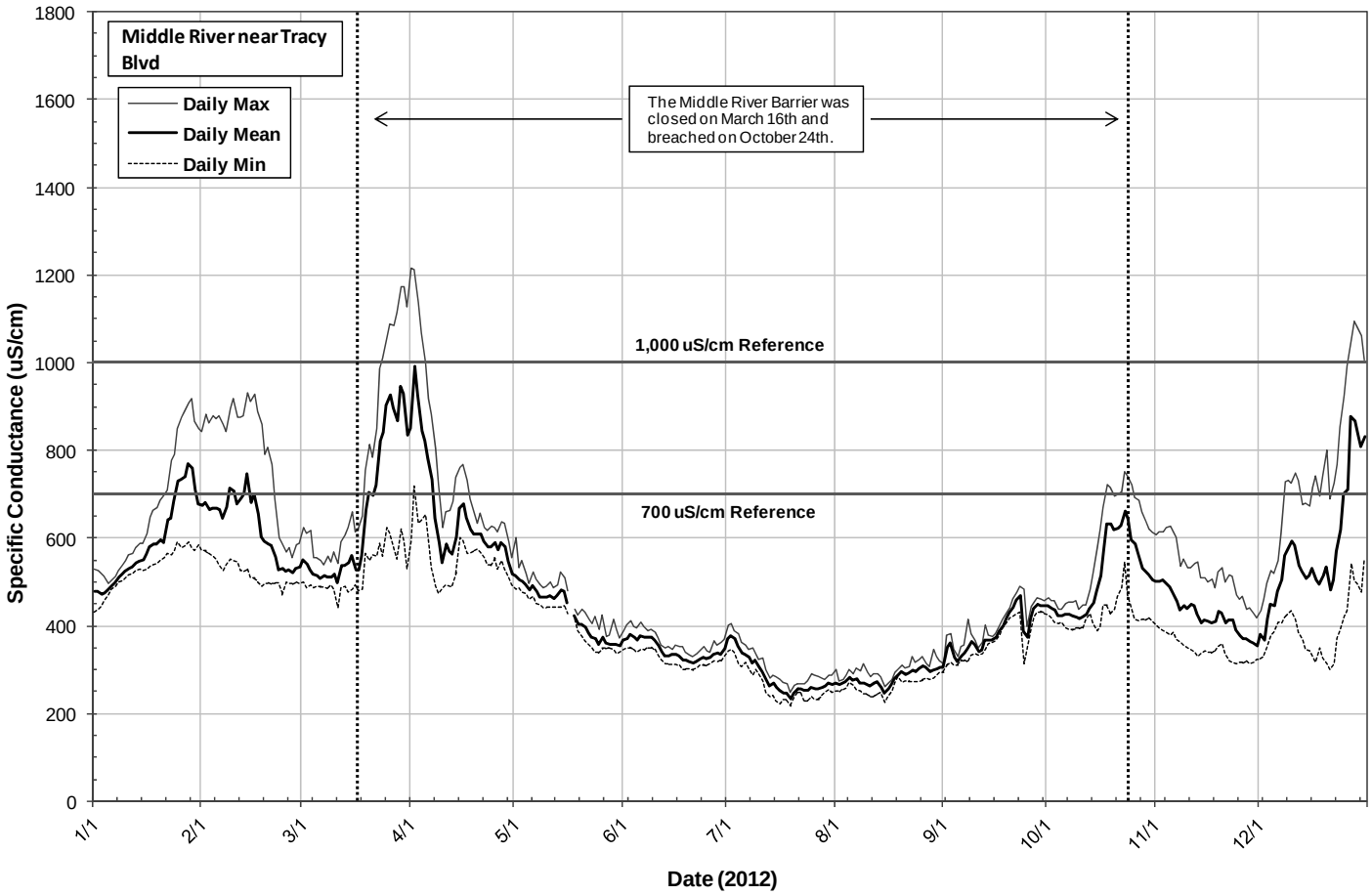

Grant Line Canal at Tracy Blvd
Daily Max
Daily Mean
Daily Min
The Grant Line Canal Barrier was closed on May 5th and breached on October 18th.
1,000 uS/cm Reference
700 uS/cm Reference
Specific Conductance (uS/cm)
Date (2012)
1/1
2/1
3/1
4/1
5/1
6/1
7/1
8/1
9/1
10/1
11/1
12/1

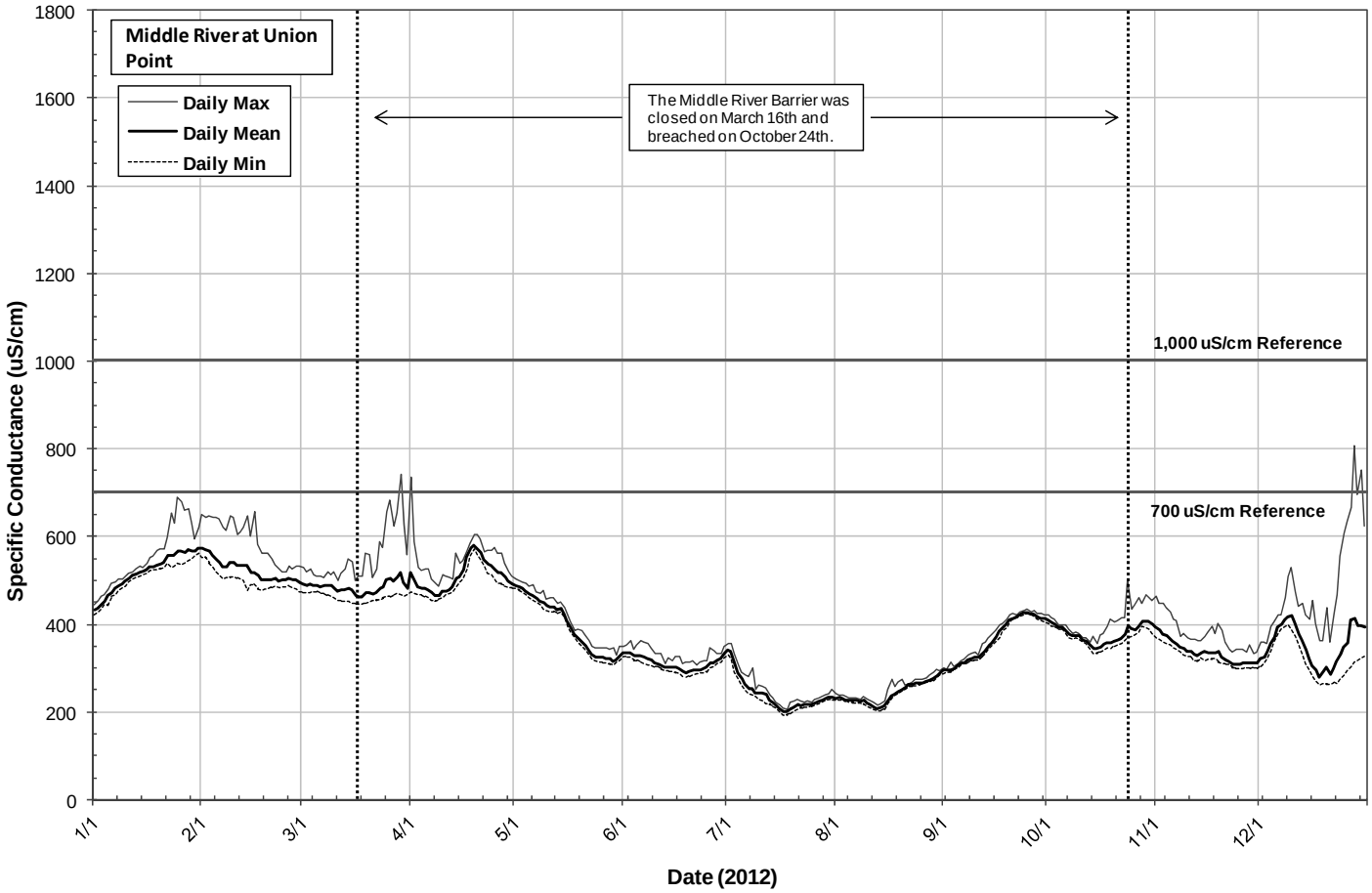

Grant Line Canal near Old River
Daily Max
Daily Mean
Daily Min
The Grant Line Canal Barrier was closed on May 5th and breached on October 18th.
1,000 uS/cm Reference
700 uS/cm Reference
Specific Conductance (uS/cm)
Date (2012)
1/1
2/1
3/1
4/1
5/1
6/1
7/1
8/1
9/1
10/1
11/1
12/1

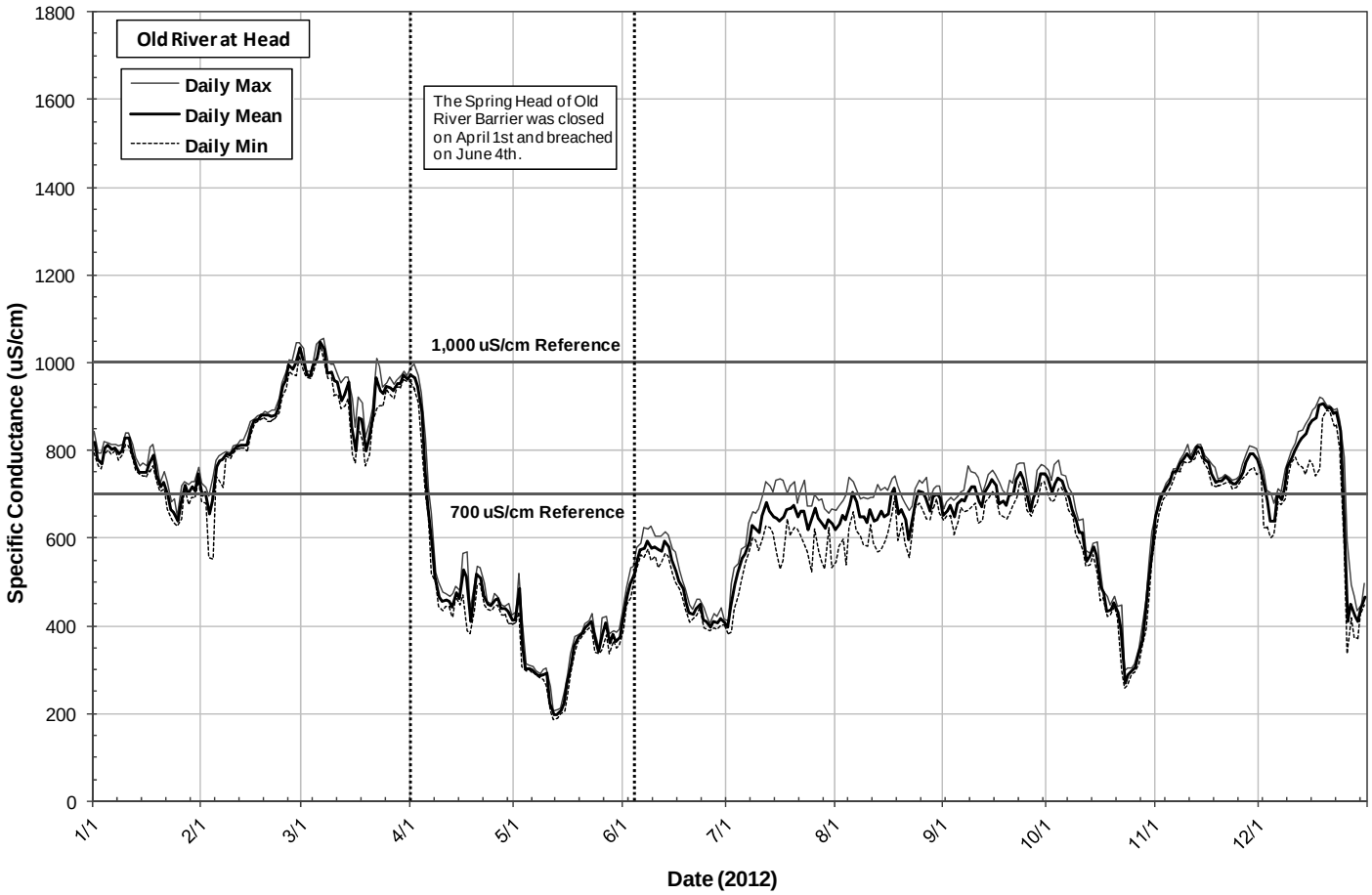

Victoria Canal
Daily Max
Daily Mean
Daily Min
The Middle River Barrier was closed on March 16th and breached on October 24th.
1,000 uS/cm Reference
700 uS/cm Reference
Specific Conductance (uS/cm)
Date (2012)
1/1
2/1
3/1
4/1
5/1
6/1
7/1
8/1
9/1
10/1
11/1
12/1

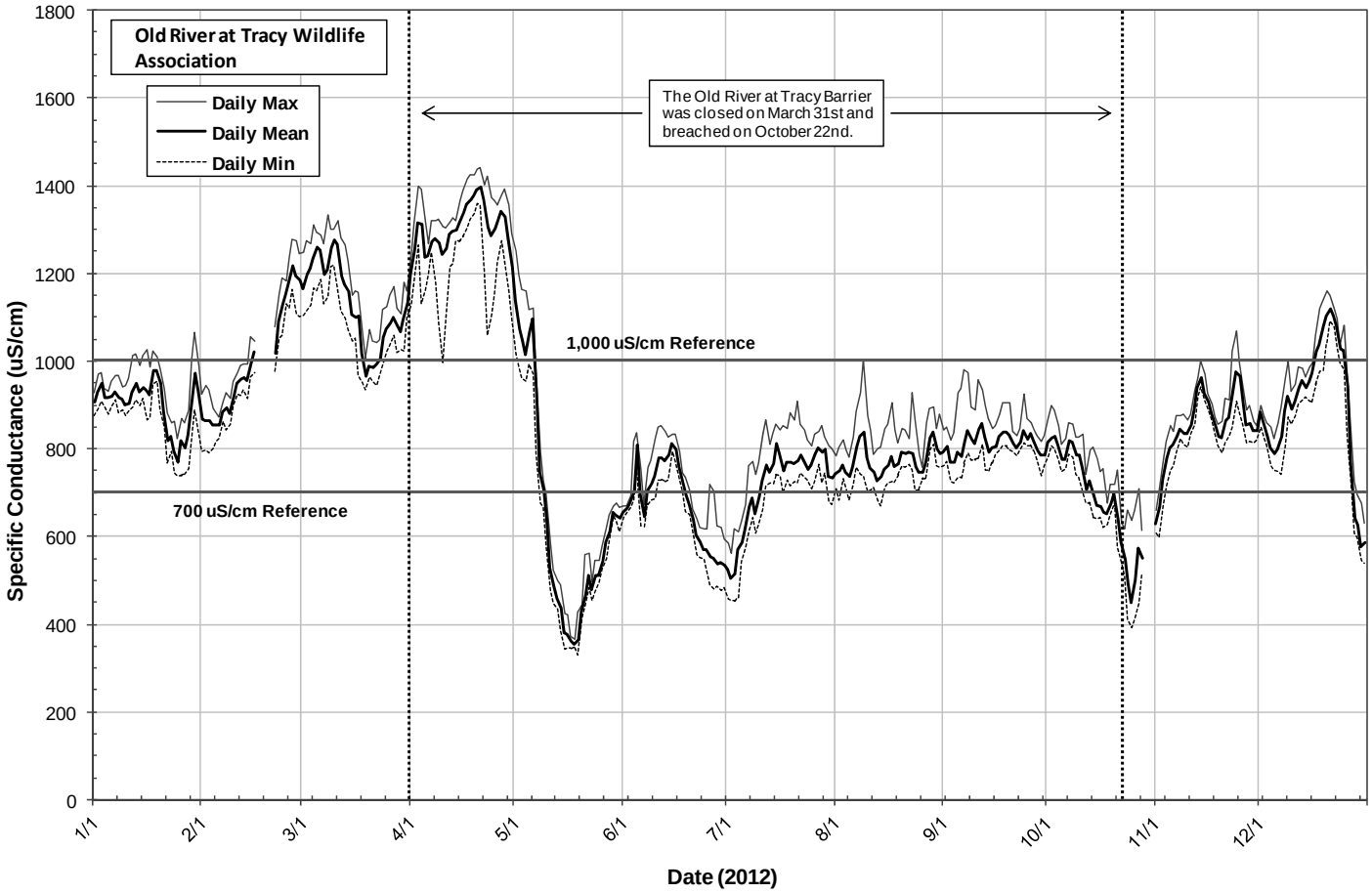

Middle River at Undine Road
Daily Max
Daily Mean
Daily Min
The Middle River Barrier was closed on March 16th and breached on October 24th.
1,000 uS/cm Reference
700 uS/cm Reference
Specific Conductance (uS/cm)
Date (2012)
1/1
2/1
3/1
4/1
5/1
6/1
7/1
8/1
9/1
10/1
11/1
12/1

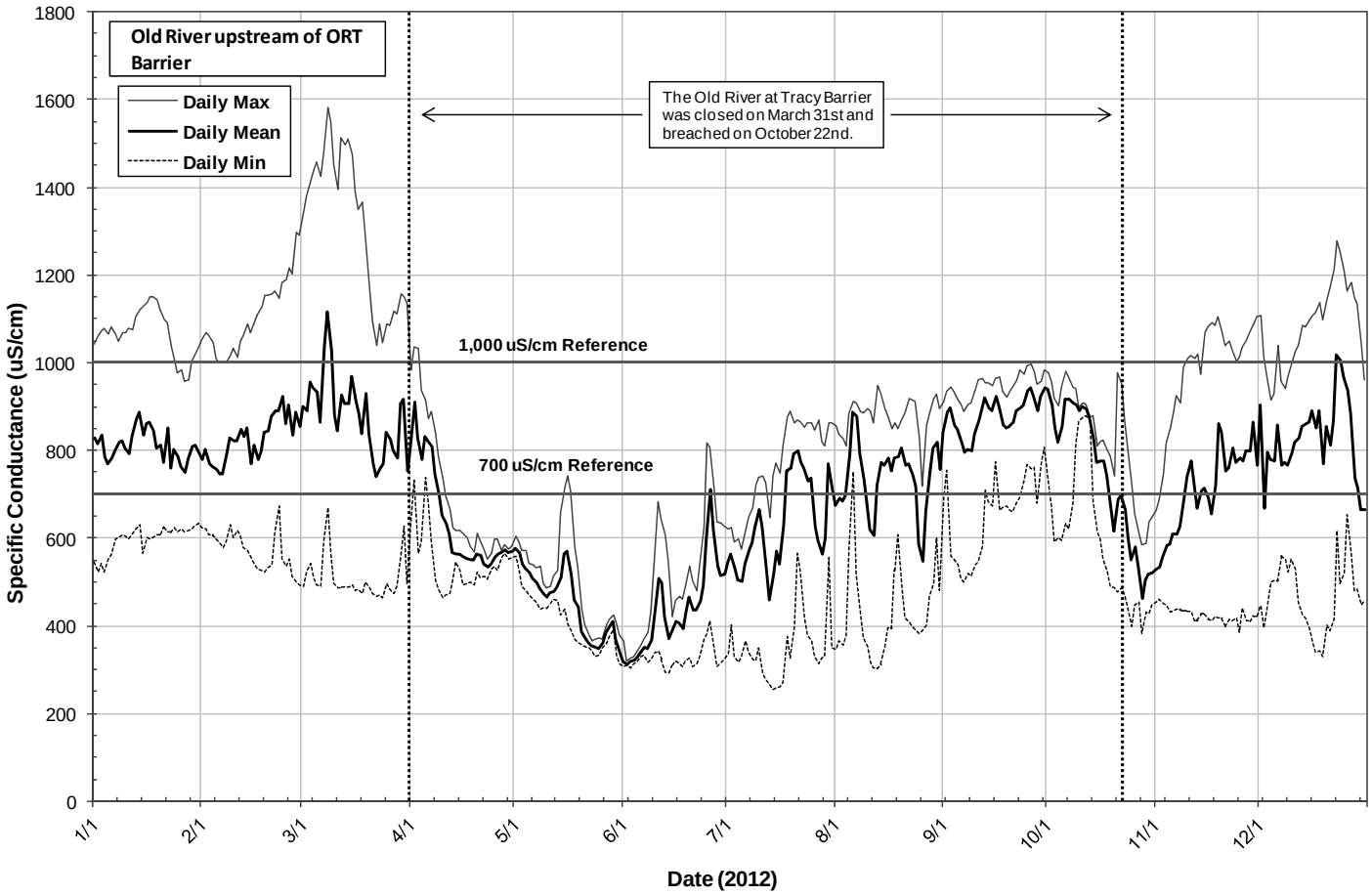

Middle River at Howard Road
Daily Max
Daily Mean
Daily Min
1,000 uS/cm Reference
700 uS/cm Reference
The Middle River Barrier was closed on March 16th and breached on October 24th.
Specific Conductance (uS/cm)
Date (2012)
1/1
2/1
3/1
4/1
5/1
6/1
7/1
8/1
9/1
10/1
11/1
12/1

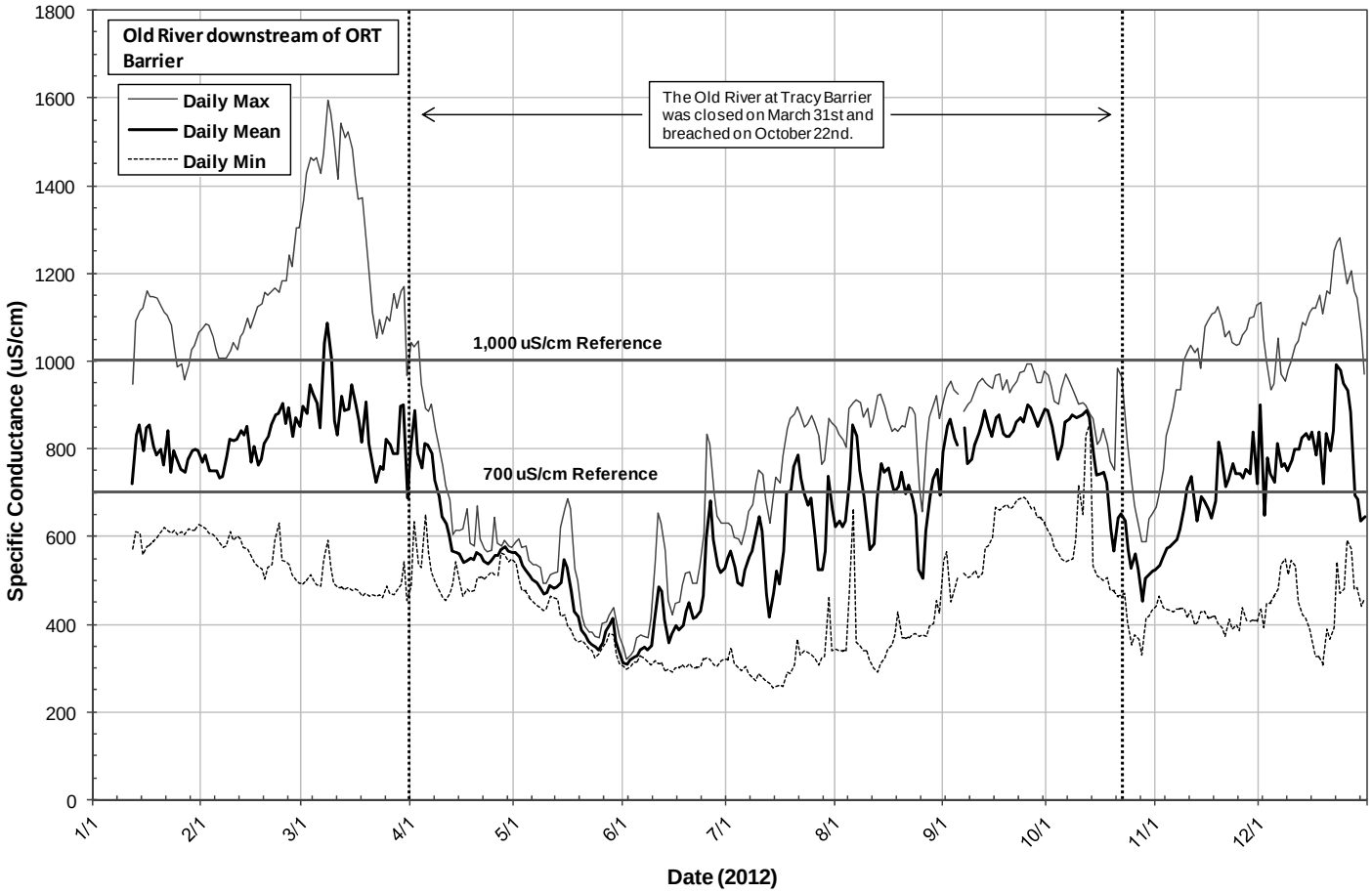

Middle River near Tracy Blvd
Daily Max
Daily Mean
Daily Min
The Middle River Barrier was closed on March 16th and breached on October 24th.
1,000 uS/cm Reference
700 uS/cm Reference
Specific Conductance (uS/cm)
Date (2012)
1/1
2/1
3/1
4/1
5/1
6/1
7/1
8/1
9/1
10/1
11/1
12/1

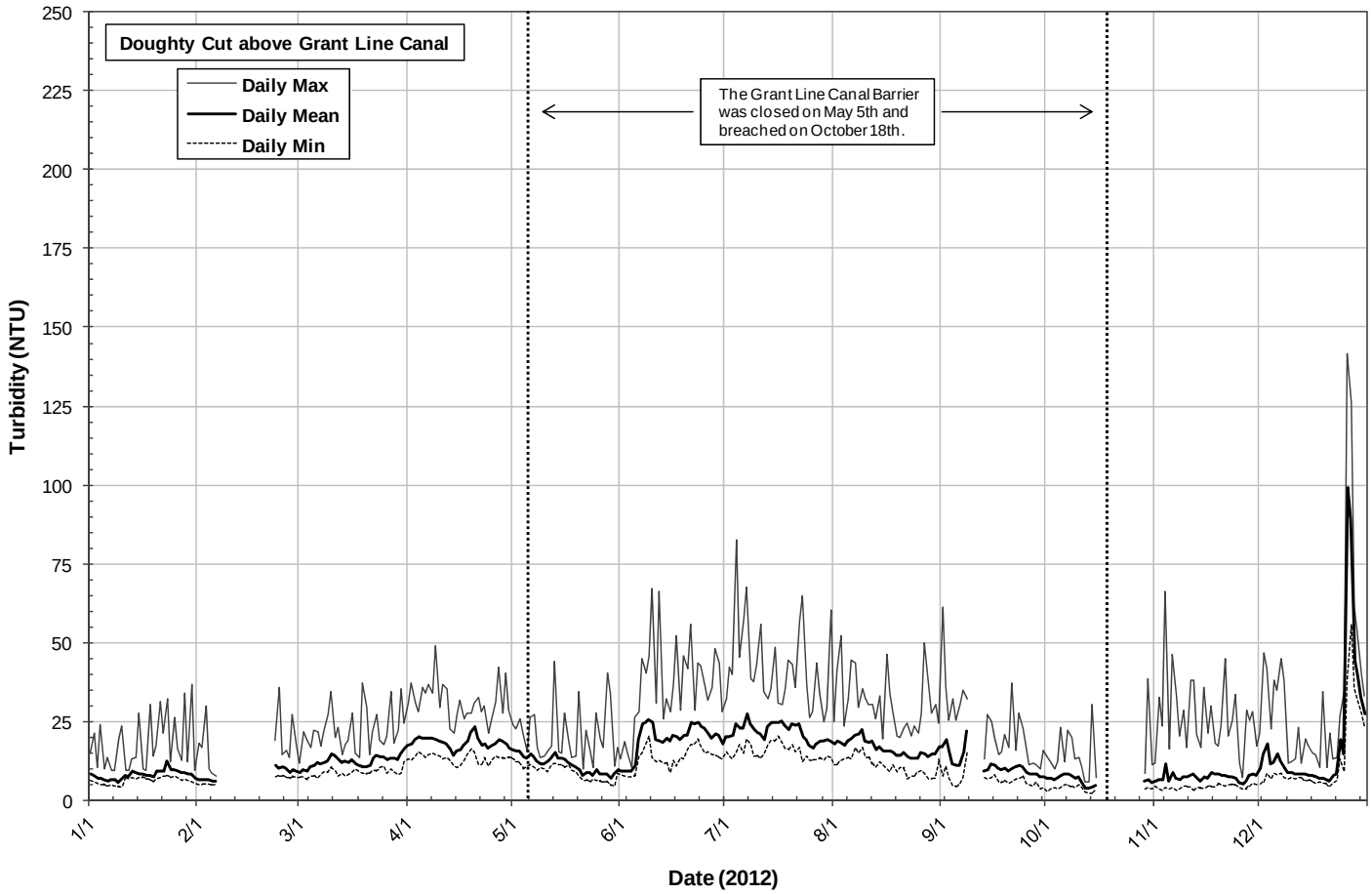

Middle River at Union Point
Daily Max
Daily Mean
Daily Min
The Middle River Barrier was closed on March 16th and breached on October 24th.
1,000 uS/cm Reference
700 uS/cm Reference
Specific Conductance (uS/cm)
Date (2012)
1/1
2/1
3/1
4/1
5/1
6/1
7/1
8/1
9/1
10/1
11/1
12/1

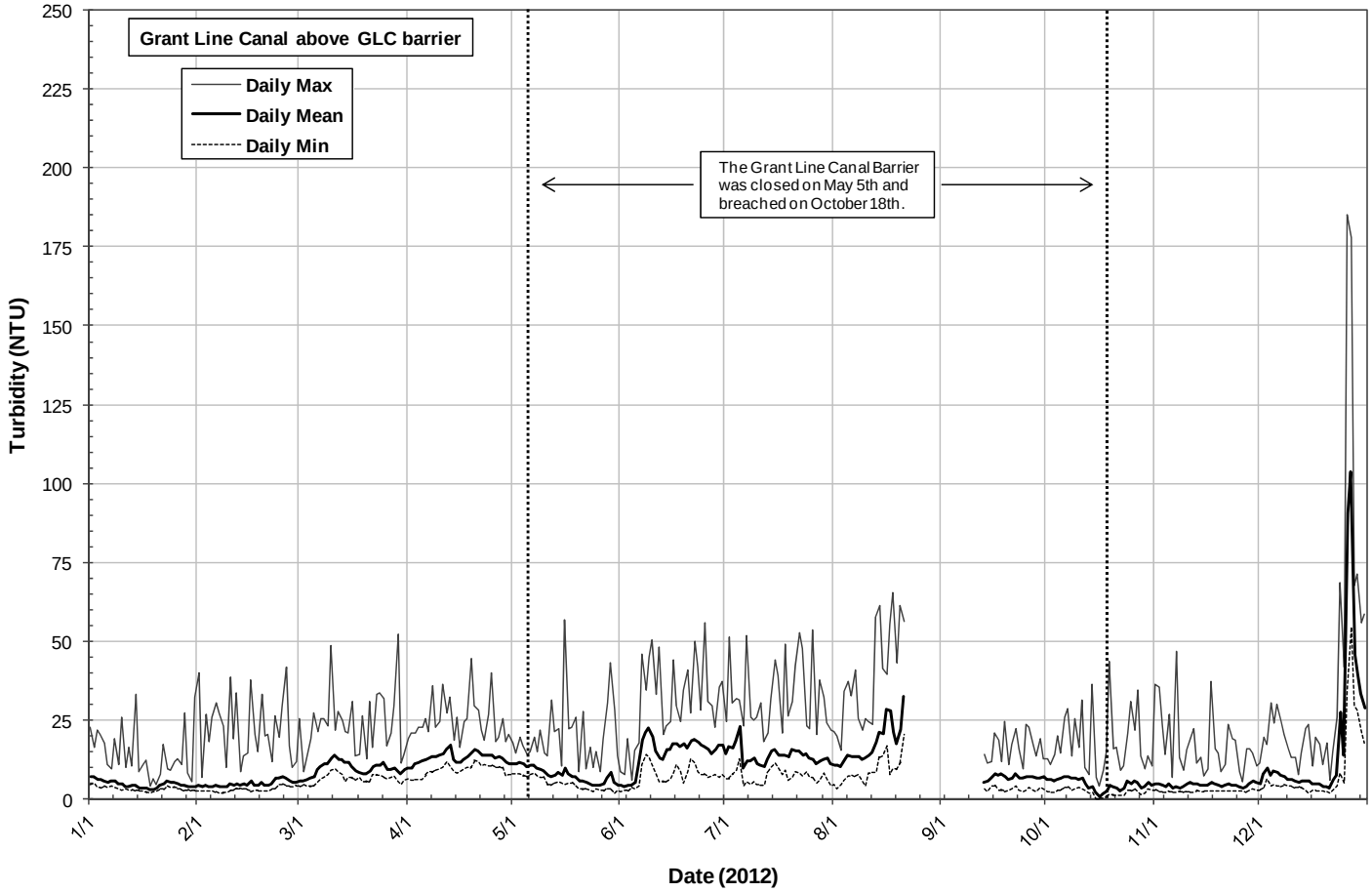

Old River at Head
Daily Max
Daily Mean
Daily Min
The Spring Head of Old River Barrier was closed on April 1st and breached on June 4th.
1,000 uS/cm Reference
700 uS/cm Reference
Specific Conductance (uS/cm)
Date (2012)
1/1
2/1
3/1
4/1
5/1
6/1
7/1
8/1
9/1
10/1
11/1
12/1

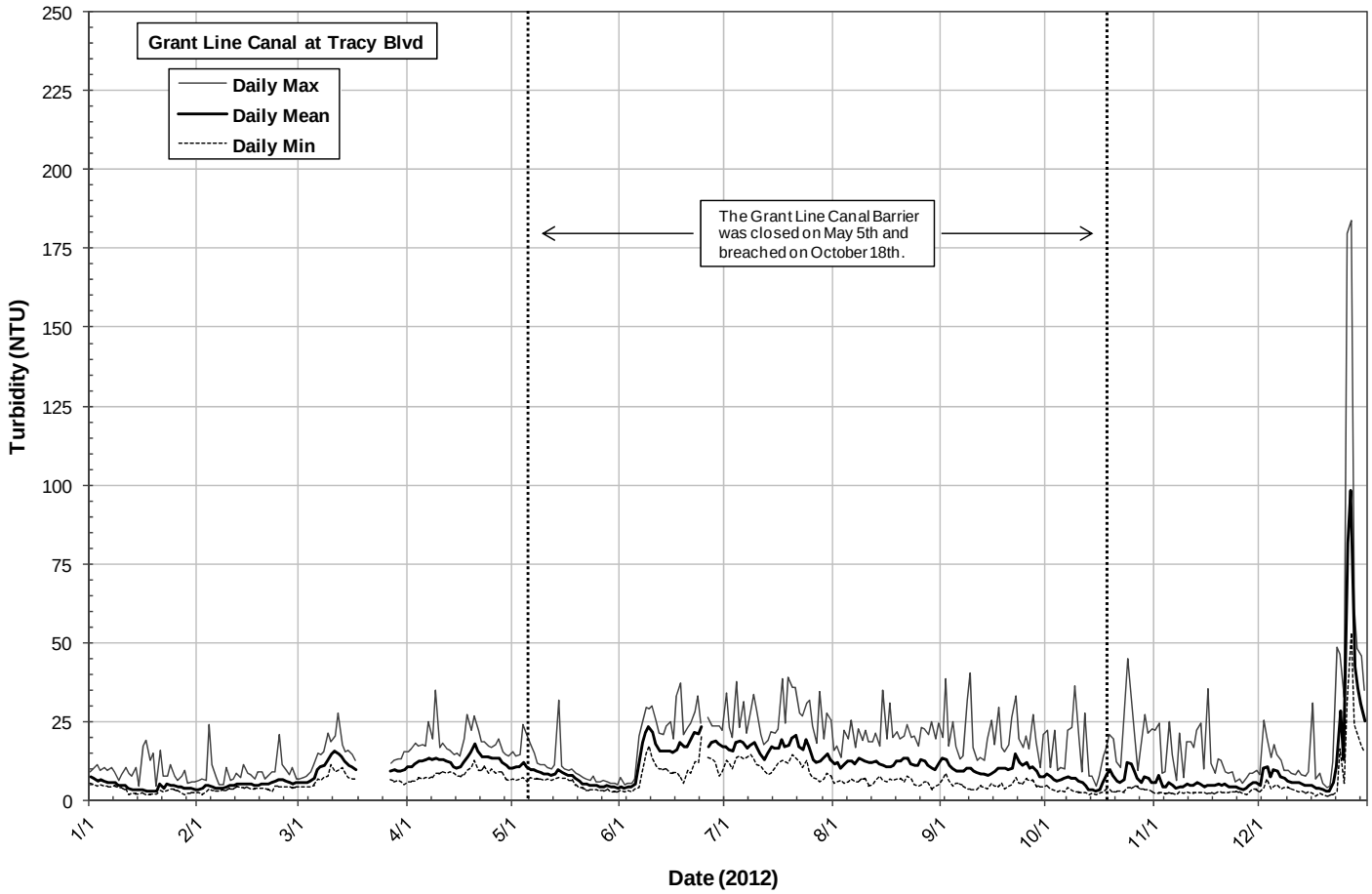

Old River at Tracy Wildlife Association
Daily Max
Daily Mean
Daily Min
The Old River at Tracy Barrier was closed on March 31st and breached on October 22nd.
1,000 uS/cm Reference
700 uS/cm Reference
Specific Conductance (uS/cm)
Date (2012)
1/1
2/1
3/1
4/1
5/1
6/1
7/1
8/1
9/1
10/1
11/1
12/1

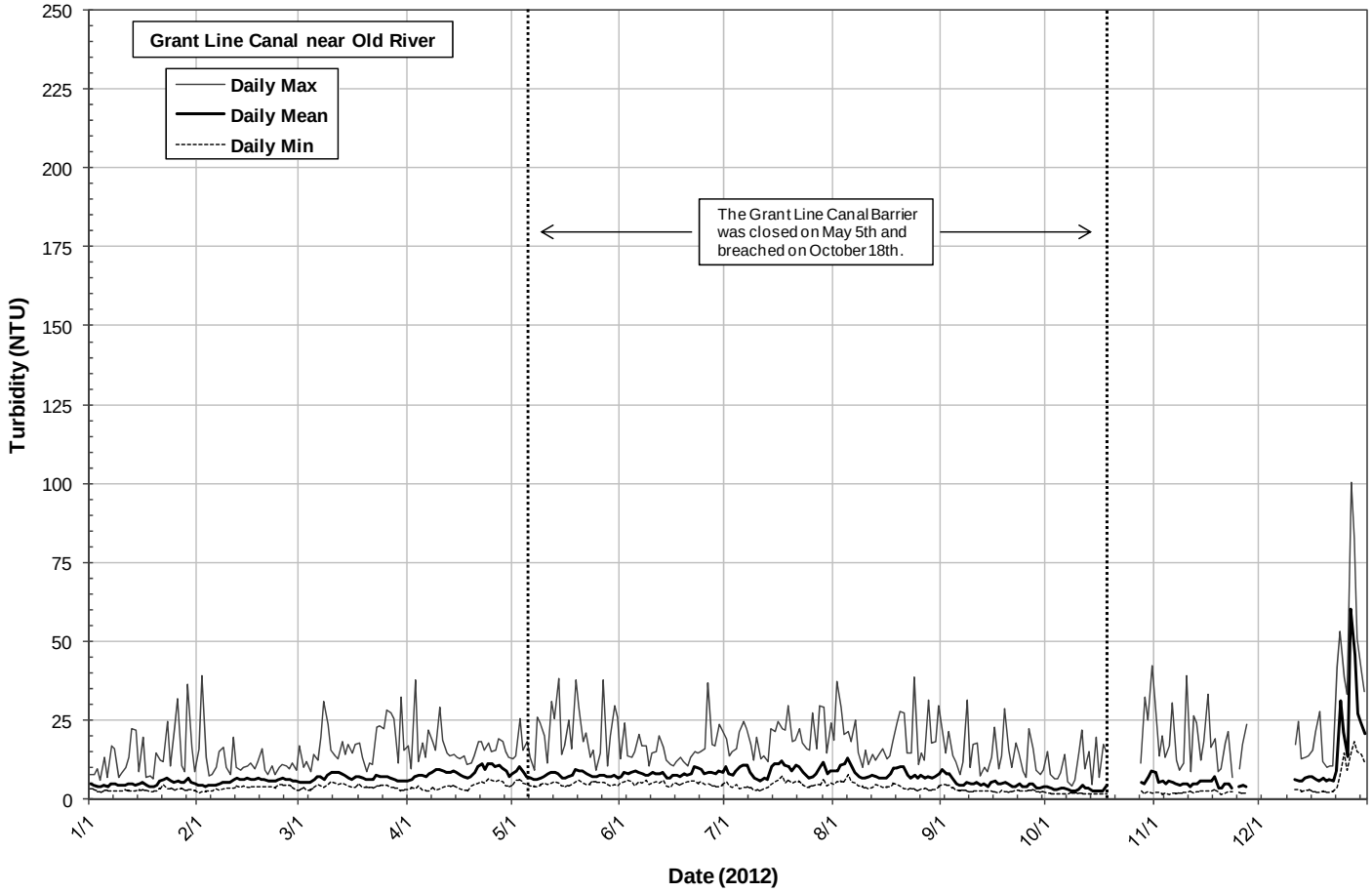

Old River upstream of ORT Barrier
Daily Max
Daily Mean
Daily Min
The Old River at Tracy Barrier was closed on March 31st and breached on October 22nd.
1,000 uS/cm Reference
700 uS/cm Reference
Specific Conductance (uS/cm)
Date (2012)
1/1
2/1
3/1
4/1
5/1
6/1
7/1
8/1
9/1
10/1
11/1
12/1

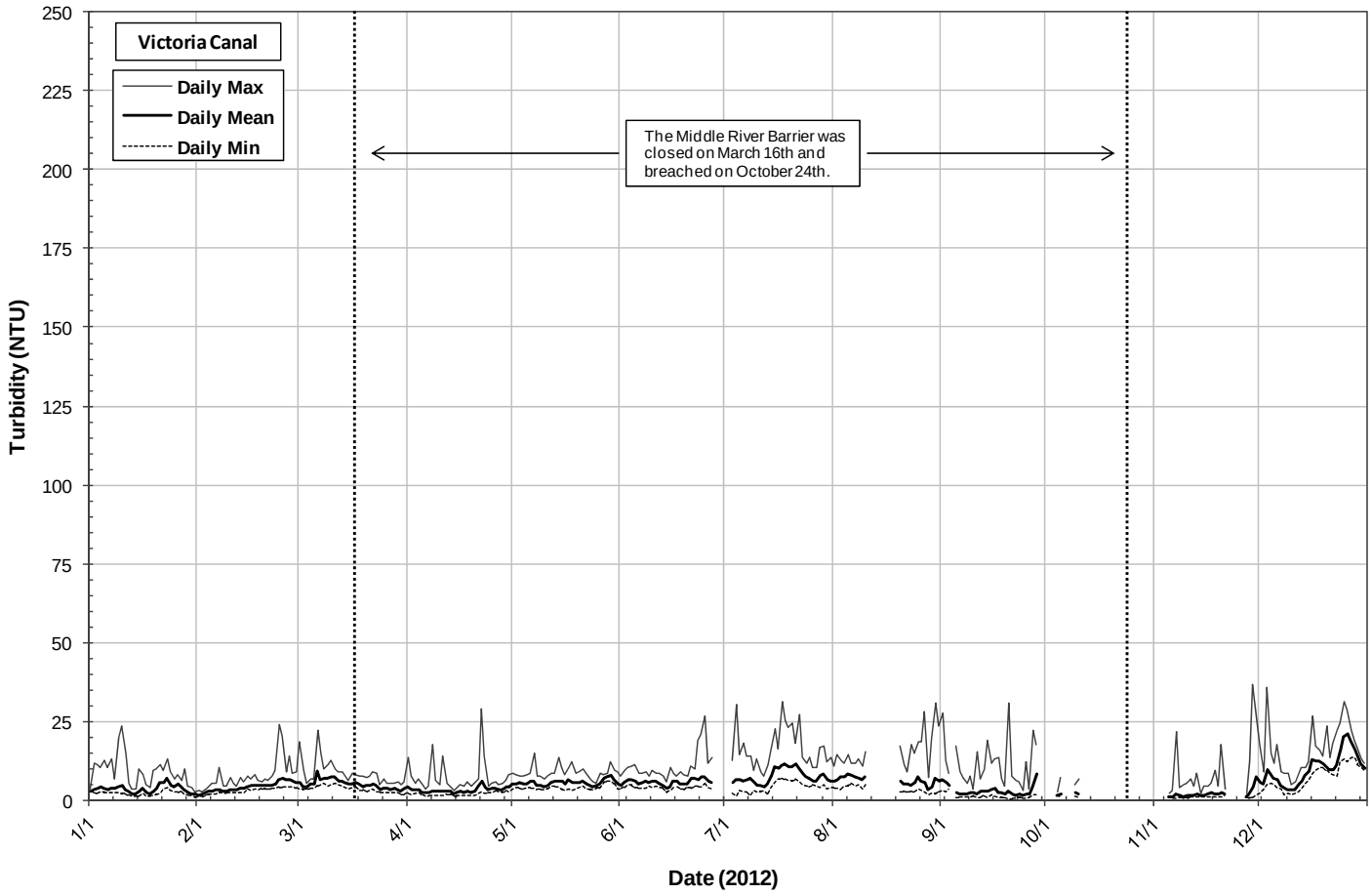

Old River downstream of ORT Barrier
Daily Max
Daily Mean
Daily Min
The Old River at Tracy Barrier was closed on March 31st and breached on October 22nd.
1,000 uS/cm Reference
700 uS/cm Reference
Specific Conductance (uS/cm)
Date (2012)
1/1
2/1
3/1
4/1
5/1
6/1
7/1
8/1
9/1
10/1
11/1
12/1

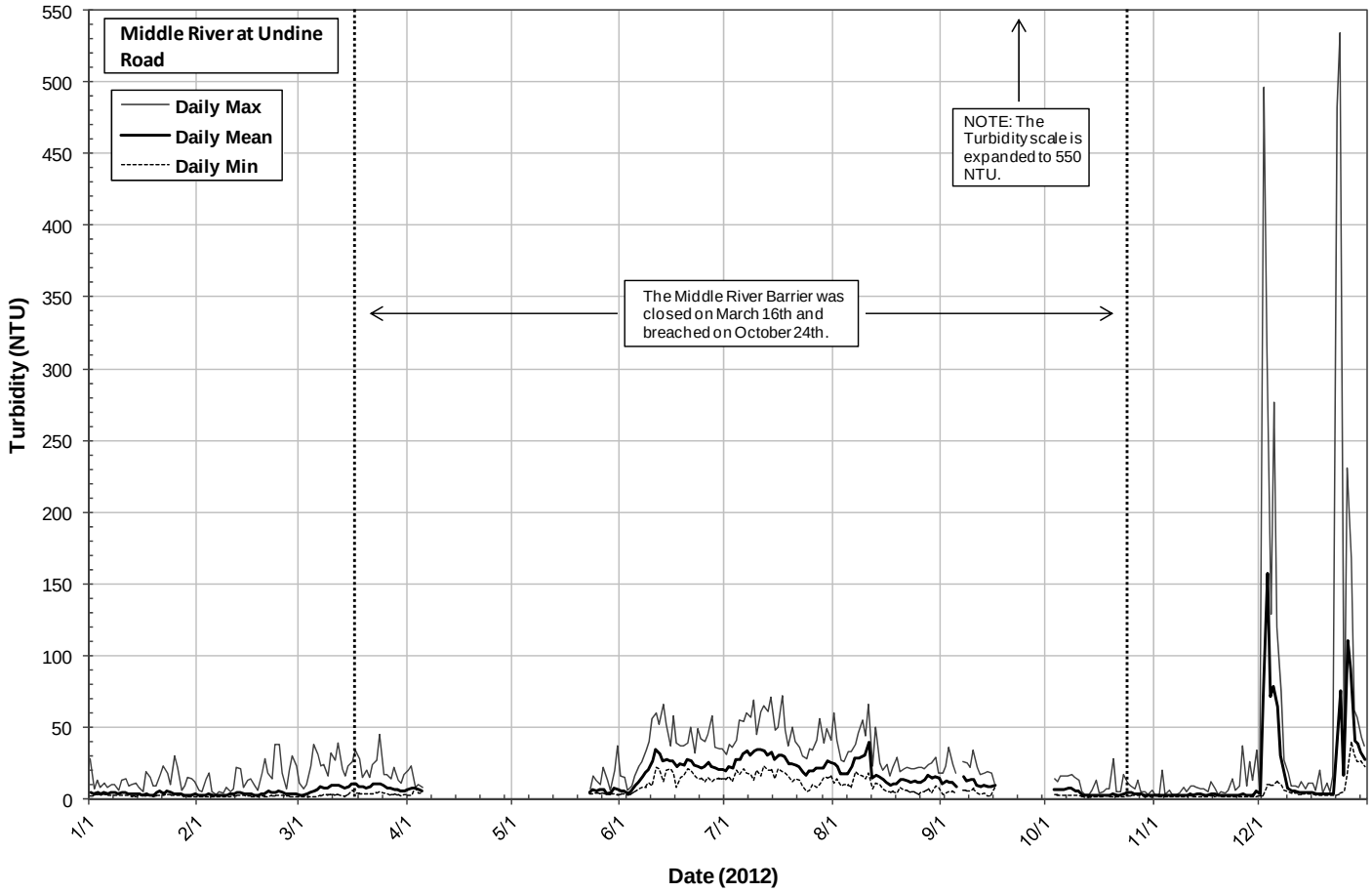

Doughty Cut above Grant Line Canal
Daily Max
Daily Mean
Daily Min
The Grant Line Canal Barrier was closed on May 5th and breached on October 18th.
Turbidity (NTU)
Date (2012)
250
225
200
175
150
125
100
75
50
25
0
1/1
2/1
3/1
4/1
5/1
6/1
7/1
8/1
9/1
10/1
11/1
12/1

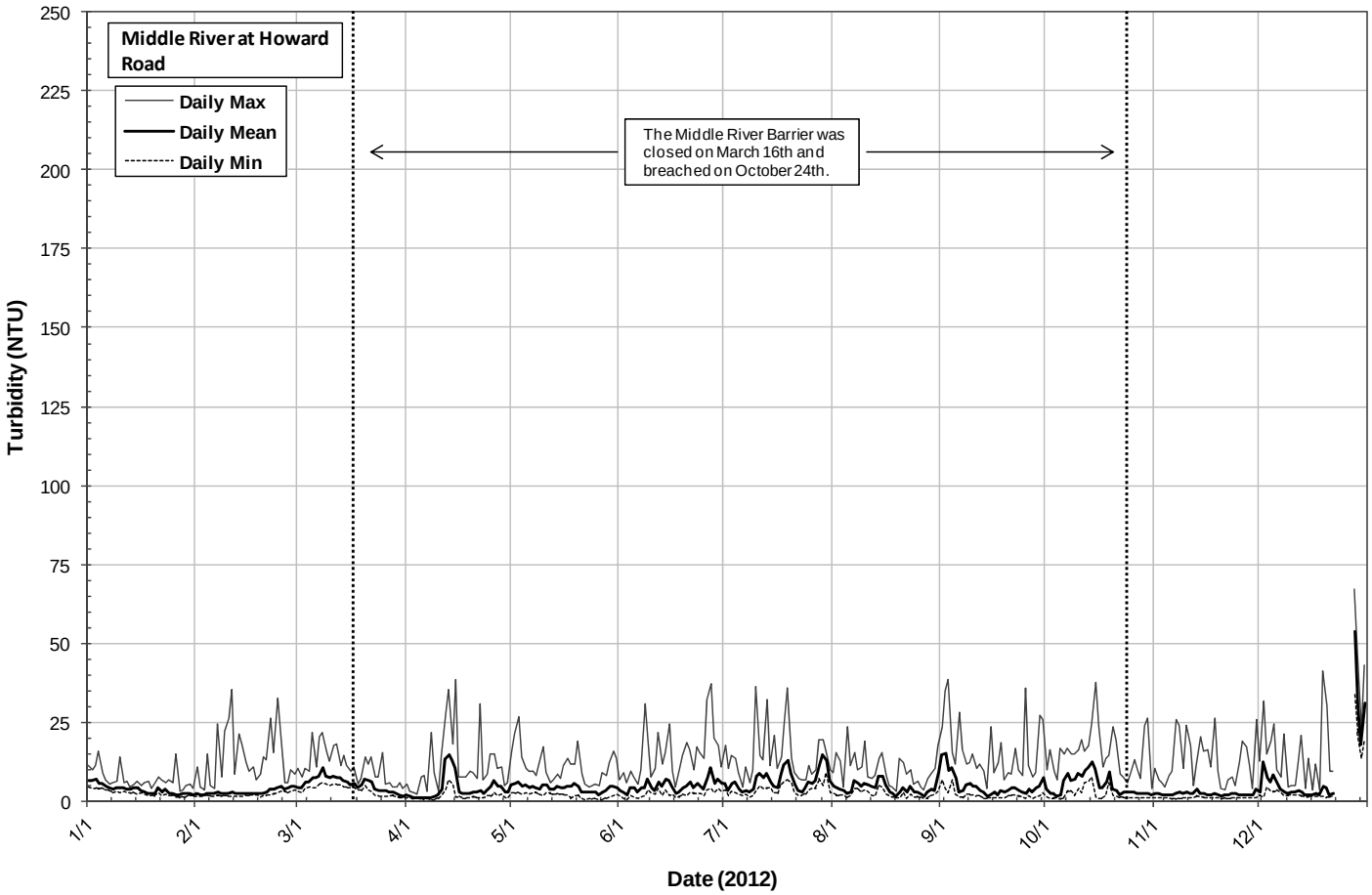

Grant Line Canal above GLC barrier
Daily Max
Daily Mean
Daily Min
The Grant Line Canal Barrier was closed on May 5th and breached on October 18th.
Turbidity (NTU)
Date (2012)
250
225
200
175
150
125
100
75
50
25
0
1/1
2/1
3/1
4/1
5/1
6/1
7/1
8/1
9/1
10/1
11/1
12/1

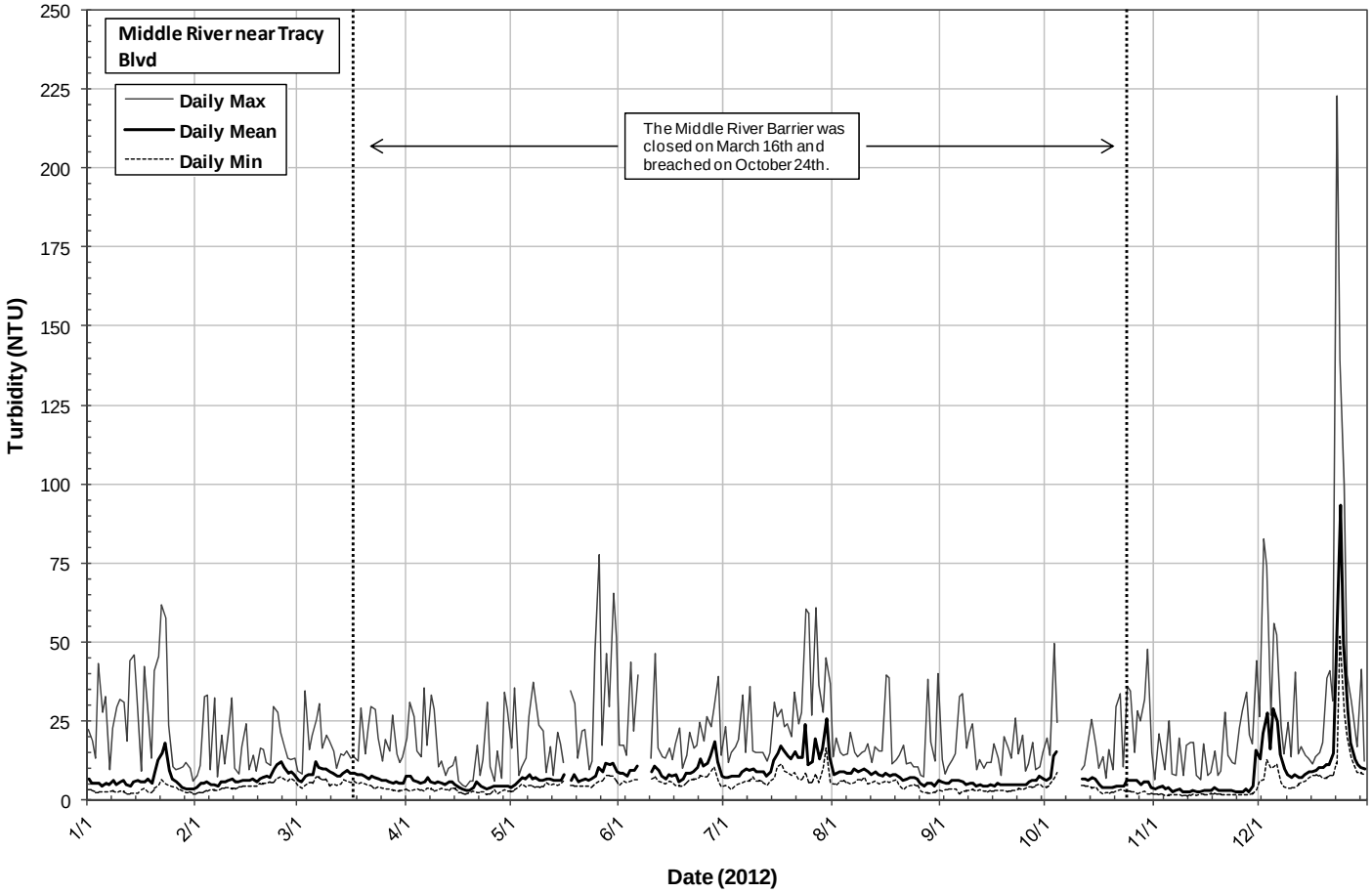

Grant Line Canal at Tracy Blvd
Daily Max
Daily Mean
Daily Min
The Grant Line Canal Barrier was closed on May 5th and breached on October 18th.
Turbidity (NTU)
Date (2012)
250
225
200
175
150
125
100
75
50
25
0
1/1
2/1
3/1
4/1
5/1
6/1
7/1
8/1
9/1
10/1
11/1
12/1

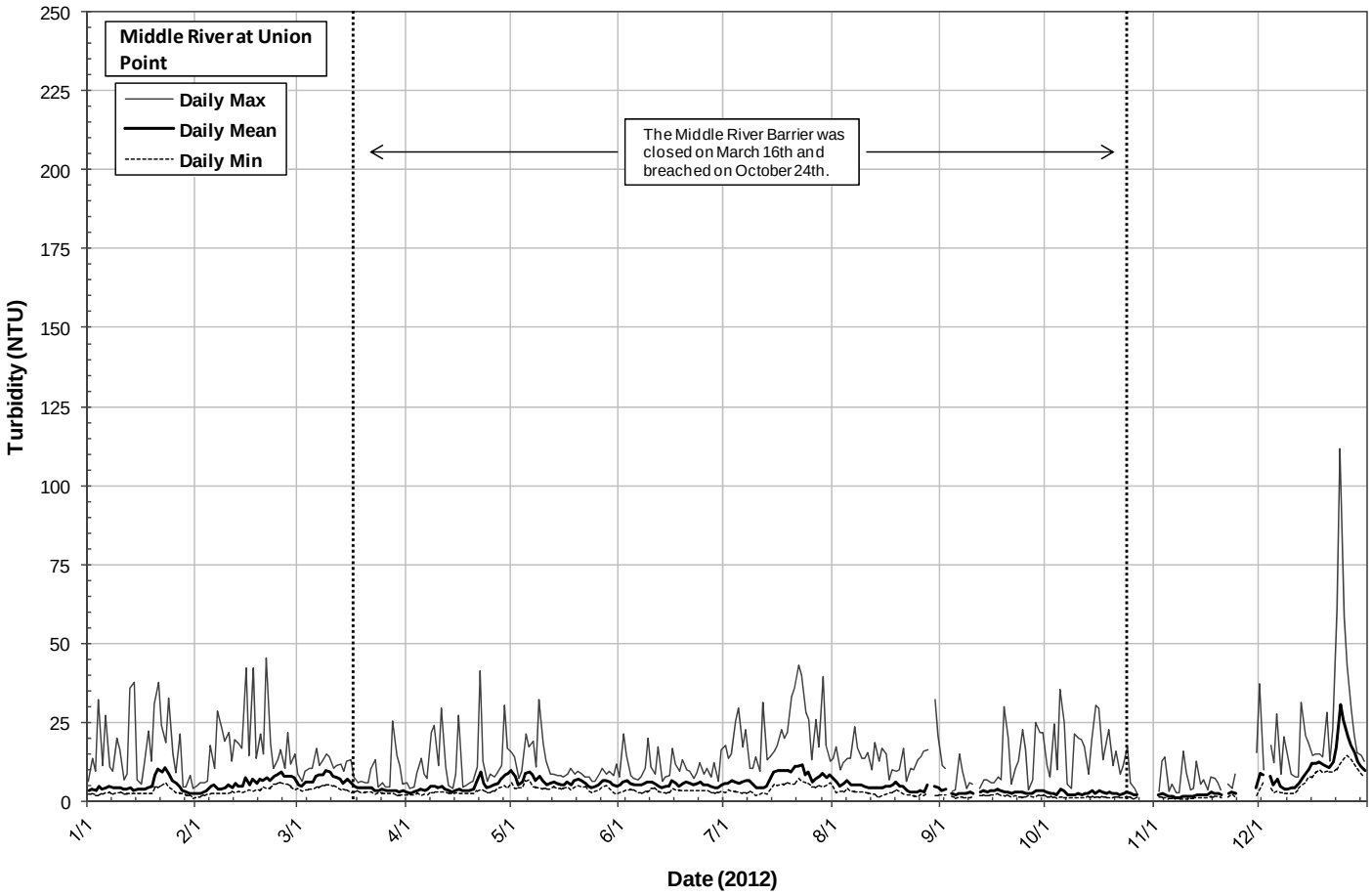

Grant Line Canal near Old River
Daily Max
Daily Mean
Daily Min
The Grant Line Canal Barrier was closed on May 5th and breached on October 18th.
Turbidity (NTU)
Date (2012)
250
225
200
175
150
125
100
75
50
25
0
1/1
2/1
3/1
4/1
5/1
6/1
7/1
8/1
9/1
10/1
11/1
12/1

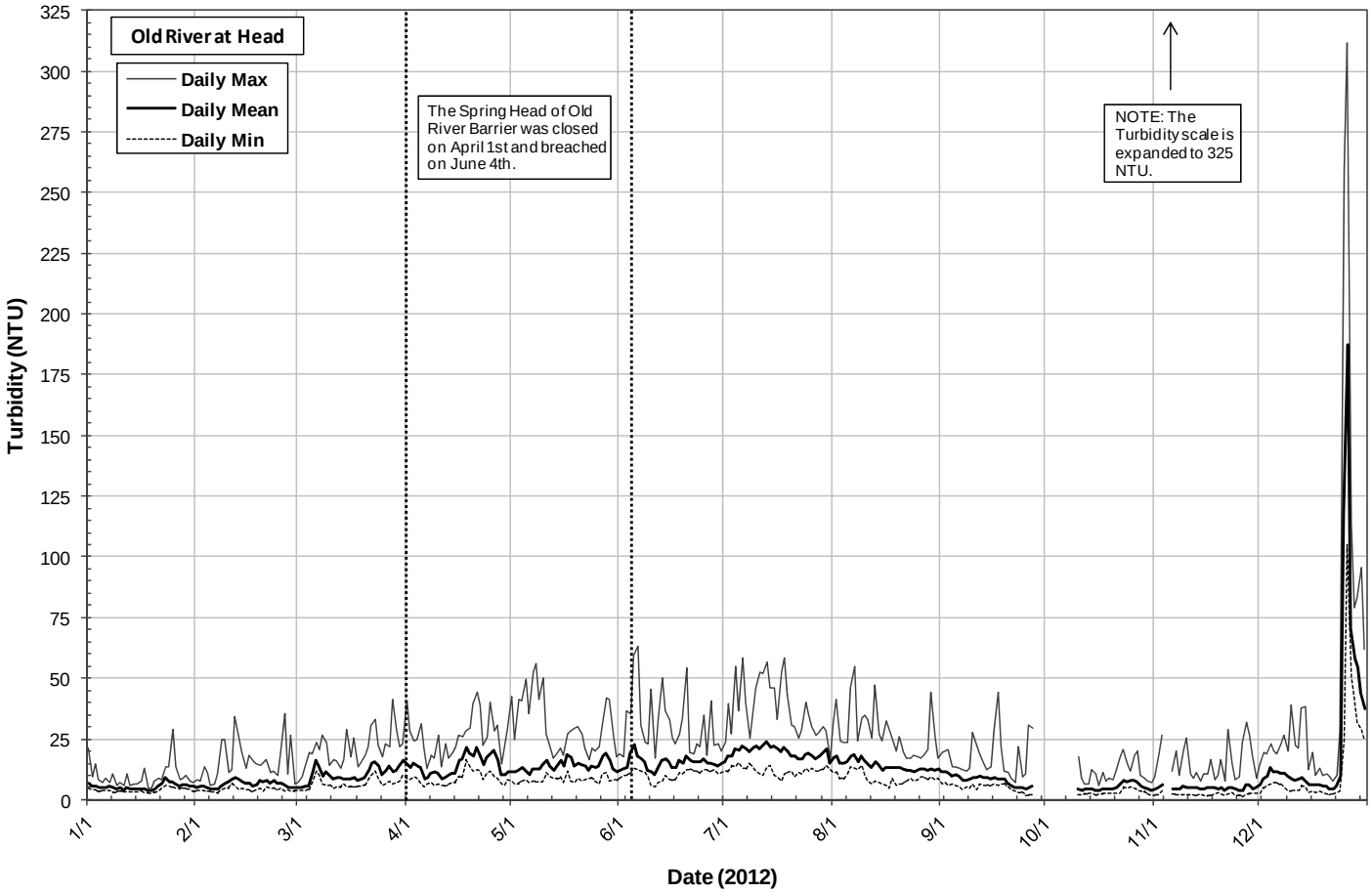

Victoria Canal
Daily Max
Daily Mean
Daily Min
The Middle River Barrier was closed on March 16th and breached on October 24th.
Turbidity (NTU)
Date (2012)
250
225
200
175
150
125
100
75
50
25
0
1/1
2/1
3/1
4/1
5/1
6/1
7/1
8/1
9/1
10/1
11/1
12/1

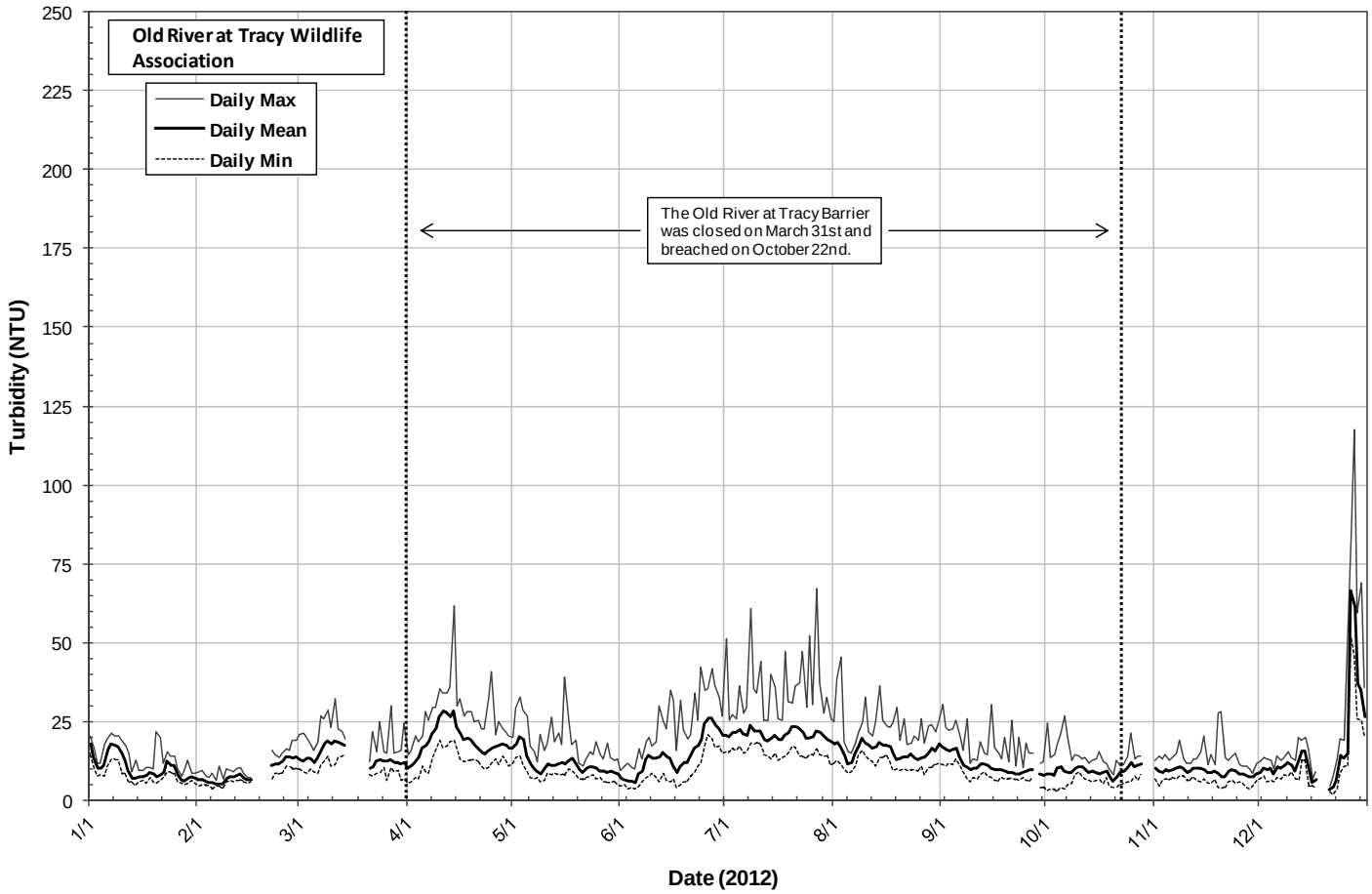

Middle River at Undine Road
Daily Max
Daily Mean
Daily Min
NOTE: The Turbidity scale is expanded to 550 NTU.
The Middle River Barrier was closed on March 16th and breached on October 24th.
Turbidity (NTU)
Date (2012)
550
500
450
400
350
300
250
200
150
100
50
0
1/1
2/1
3/1
4/1
5/1
6/1
7/1
8/1
9/1
10/1
11/1
12/1

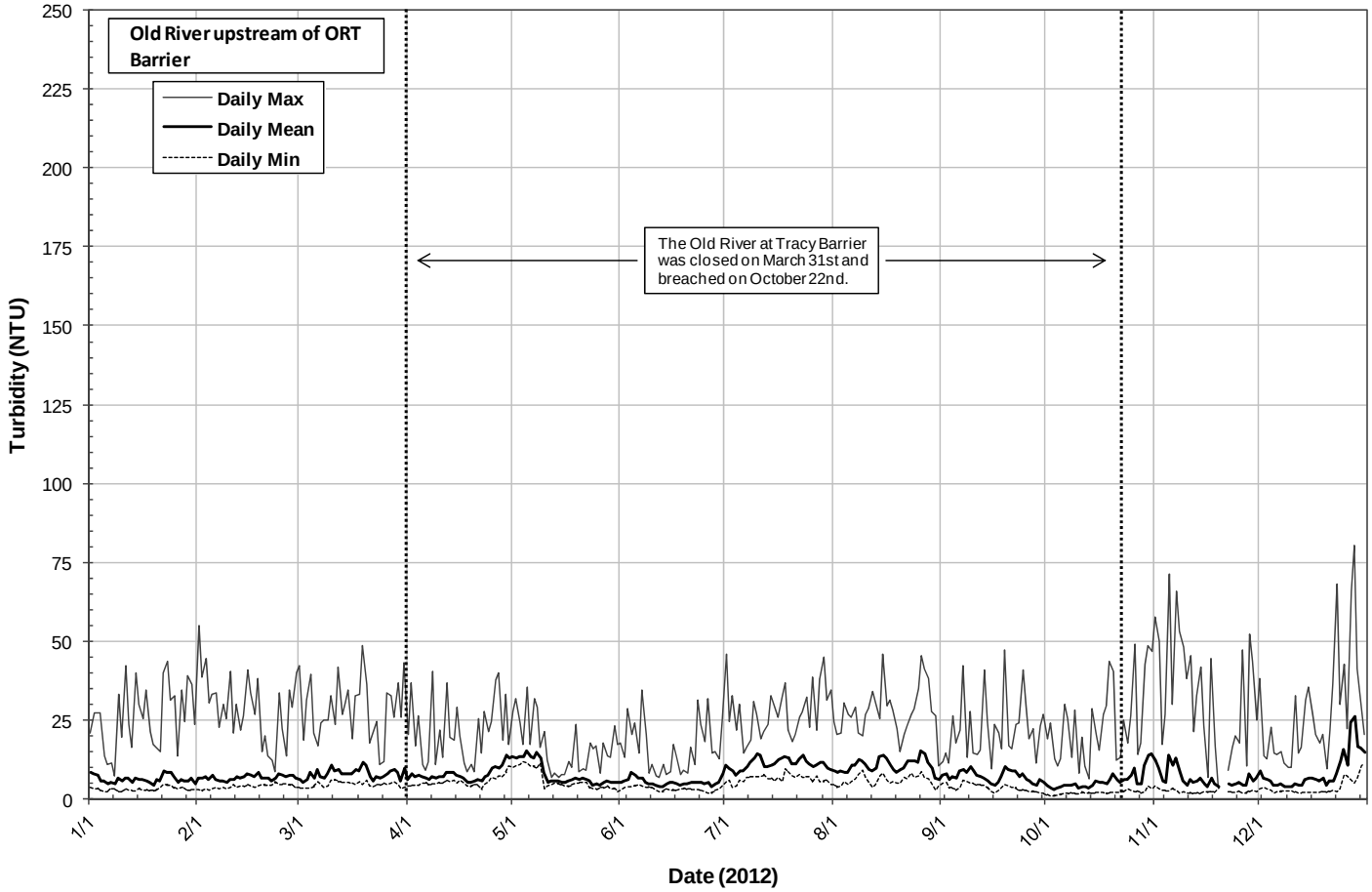

Middle River at Howard Road
Daily Max
Daily Mean
Daily Min
The Middle River Barrier was closed on March 16th and breached on October 24th.
Turbidity (NTU)
Date (2012)
250
225
200
175
150
125
100
75
50
25
0
1/1
2/1
3/1
4/1
5/1
6/1
7/1
8/1
9/1
10/1
11/1
12/1

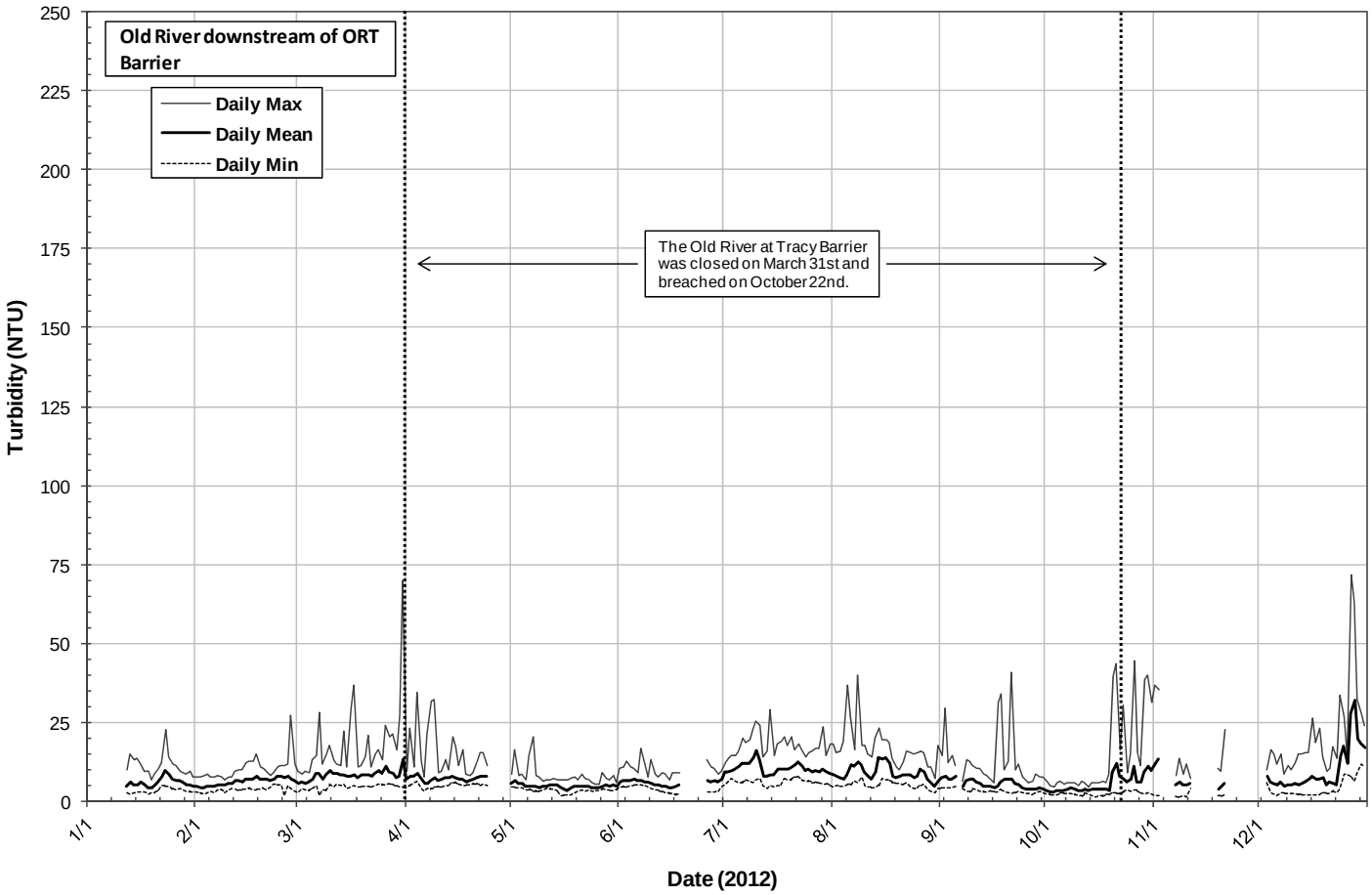

Middle River near Tracy Blvd
Daily Max
Daily Mean
Daily Min
The Middle River Barrier was closed on March 16th and breached on October 24th.
Turbidity (NTU)
Date (2012)
250
225
200
175
150
125
100
75
50
25
0
1/1
2/1
3/1
4/1
5/1
6/1
7/1
8/1
9/1
10/1
11/1
12/1


Middle River at Union Point
Daily Max
Daily Mean
Daily Min
The Middle River Barrier was closed on March 16th and breached on October 24th.
Turbidity (NTU)
Date (2012)
250
225
200
175
150
125
100
75
50
25
0
1/1
2/1
3/1
4/1
5/1
6/1
7/1
8/1
9/1
10/1
11/1
12/1


Old River at Head
Daily Max
Daily Mean
Daily Min
The Spring Head of Old River Barrier was closed on April 1st and breached on June 4th.
NOTE: The Turbidity scale is expanded to 325 NTU.
Turbidity (NTU)
Date (2012)
325
300
275
250
225
200
175
150
125
100
75
50
25
0
1/1
2/1
3/1
4/1
5/1
6/1
7/1
8/1
9/1
10/1
11/1
12/1


Old River at Tracy Wildlife Association
Daily Max
Daily Mean
Daily Min
The Old River at Tracy Barrier was closed on March 31st and breached on October 22nd.
Turbidity (NTU)
Date (2012)
250
225
200
175
150
125
100
75
50
25
0
1/1
2/1
3/1
4/1
5/1
6/1
7/1
8/1
9/1
10/1
11/1
12/1


Old River upstream of ORT Barrier
Daily Max
Daily Mean
Daily Min
The Old River at Tracy Barrier was closed on March 31st and breached on October 22nd.
Turbidity (NTU)
Date (2012)
250
225
200
175
150
125
100
75
50
25
0
1/1
2/1
3/1
4/1
5/1
6/1
7/1
8/1
9/1
10/1
11/1
12/1


Old River downstream of ORT Barrier
Daily Max
Daily Mean
Daily Min
The Old River at Tracy Barrier was closed on March 31st and breached on October 22nd.
Turbidity (NTU)
250
225
200
175
150
125
100
75
50
25
0
1/1
2/1
3/1
4/1
5/1
6/1
7/1
8/1
9/1
10/1
11/1
12/1
Date (2012)

Results for the Upstream-Downstream Analysis for the Grant Line Canal barrier

	Monthly Median DO Conc (mg/L) [a]		Mann-Whitney Test Results [b]		
Month	**Upstream Station - GLC above the barrier**	**Downstream Station - GLC at Tracy Blvd**	**p-value**	**Difference between Monthly Medians (mg/L)**	**Station with significantly higher DO values [c]**
January	11.43	11.12	0.017	0.32	GLAB
February	10.15	9.91	0.0001	0.24	GLAB
March	10.78	10.48	NS	NS	NS
April	9.41	8.90	NS	NS	NS
May	7.71	7.56	NS	NS	NS
June	9.60	8.89	NS	NS	NS
July	8.48	5.16	<0.0001	3.32	GLAB
August	7.30	4.55	<0.0001	2.75	GLAB
September	10.00	8.02	<0.0001	1.98	GLAB
October	9.08	8.66	<0.0001	0.41	GLAB
November	9.60	9.45	0.032	0.15	GLAB
December	9.61	9.36	NS	NS	NS

(a) The monthly medians are actually the medians of the daily medians for the month. For example, in this analysis the monthly median for January is the median of all of the daily medians for the month of January.

(b) "NS" stands for "no significant difference between the two stations".

(c) "GLTR" represents the Grant Line Canal at Tracy Blvd station. "GLAB" represents the Grant Line Canal above the GLC barrier station.

Results for the Upstream-Downstream Analysis for the Middle River barrier

	Monthly Median DO Conc (mg/L) [a]		Mann-Whitney Test Results [b]		
Month	**Upstream Station - MR near Tracy Blvd**	**Downstream Station - MR at Union Point**	**p-value**	**Difference between Monthly Medians (mg/L)**	**Station with significantly higher DO values [c]**
January	10.51	10.16	<0.0001	0.35	MRNT
February	9.79	9.48	<0.0001	0.31	MRNT
March	8.74	9.17	0.012	0.43	MRUP
April	8.97	9.14	NS	NS	NS
May	7.88	7.83	NS	NS	NS
June	6.73	7.77	<0.0001	1.04	MRUP
July	5.96	7.75	<0.0001	1.80	MRUP
August	5.51	7.85	<0.0001	2.34	MRUP
September	5.64	8.08	<0.0001	2.44	MRUP
October	5.41	8.11	<0.0001	2.70	MRUP
November	8.79	8.74	NS	NS	NS
December	8.86	8.75	NS	NS	NS

(d) The monthly medians are actually the medians of the daily medians for the month. For example, in this analysis the monthly median for January is the median of all of the daily medians for the month of January.

(e) "NS" stands for "no significant difference between the two stations".

(f) "MRNT" represents the Middle River near Tracy Blvd station. "MRUP" represents the Middle River at Union Point station.

Table 6-18: Results for the Upstream-Downstream Analysis for the Old River at Tracy barrier

	Monthly Median DO Conc (mg/L) [a]		Mann-Whitney Test Results [b]		
Month	**Upstream Station - OR u/s ORT barrier**	**Downstream Station - OR d/s ORT barrier**	**p-value**	**Difference between Monthly Medians (mg/L)**	**Station with significantly higher DO values [c]**
January	10.42	10.37	NS	NS	NS
February	9.45	9.65	<0.0001	0.20	ORDB
March	8.95	9.66	0.0026	0.71	ORDB
April	7.98	8.37	NS	NS	NS
May	7.24	7.53	0.0047	0.29	ORDB
June	7.13	7.34	NS	NS	NS
July	4.99	5.64	0.0132	0.65	ORDB
August	4.07	4.49	NS	NS	NS
September	3.20	3.77	NS	NS	NS
October	3.86	4.58	0.0226	0.73	ORDB
November	7.02	8.02	<0.0001	1.00	ORDB
December	7.29	7.86	NS	NS	NS

(g) The monthly medians are actually the medians of the daily medians for the month. For example, in this analysis the monthly median for January is the median of all of the daily medians for the month of January.

(h) "NS" stands for "no significant difference between the two stations".

(i) "ORDB" represents the Old River downstream of the ORT barrier station.

Appendix 7: Sound Monitoring Data

Memo

To:	Jacob McQuirk-DWR		
From:	Chris Shields	**Email:**	Chris.Shields@atkinsglobal.com
Phone:	916-325-1424	**Date:**	11 May 2012
Ref:		**cc:**	Roy Leidy-AECOM
Subject:	2012 South Delta Temporary Barriers Project		

Introduction

The South Delta Temporary Barriers Project (TBP) is an ongoing project that calls for the seasonal construction of temporary rock barriers to ensure that local agricultural diverters within the South Delta Water Agency do not experience adverse water level and circulation impacts caused by the State Water Project (SWP) and the Central Valley Project (CVP). The temporary rock barriers are designed to function as flow control structures that trap tidal waters behind them during high tide, improving water levels and circulation for local south Delta farmers, as well as improve migration of Central Valley fall-run Chinook salmon originating in the San Joaquin River watershed by blocking movements into the Old River Channel from the mainstem San Joaquin River, reducing potential entrapment within the SWP and CVP pumps. Temporary rock barriers were installed at Middle River, Old River near Tracy and Head of Old River.

Adhering to the project description provided to the National Marine Fisheries Service (NMFS) for the purposes of Section 7 consultation, the amount of sound generated in the aquatic environment during construction of temporary rock barriers installed would be monitored. The ecological surrogate identified in the Biological Opinion for 2012 South Delta Temporary Barriers Project regarding underwater noise monitoring is as follows:

- Ecological Surrogates

  The analysis of the effects of the proposed TBP anticipates that the construction and removal of each barrier will result in acoustic noise generated in the aquatic environment that exceeds typical ambient background conditions for the action area. Based on the types of vehicles and equipment to be used, the methods described for construction and removal of the barriers, and the effects analysis conducted for this consultation, the amount of sound generated in the aquatic environment associated with the construction and removal of each barrier shall not exceed 150 dB at a distance of 100 meters from the source activity at any time.

MONITORING METHODOLOGY

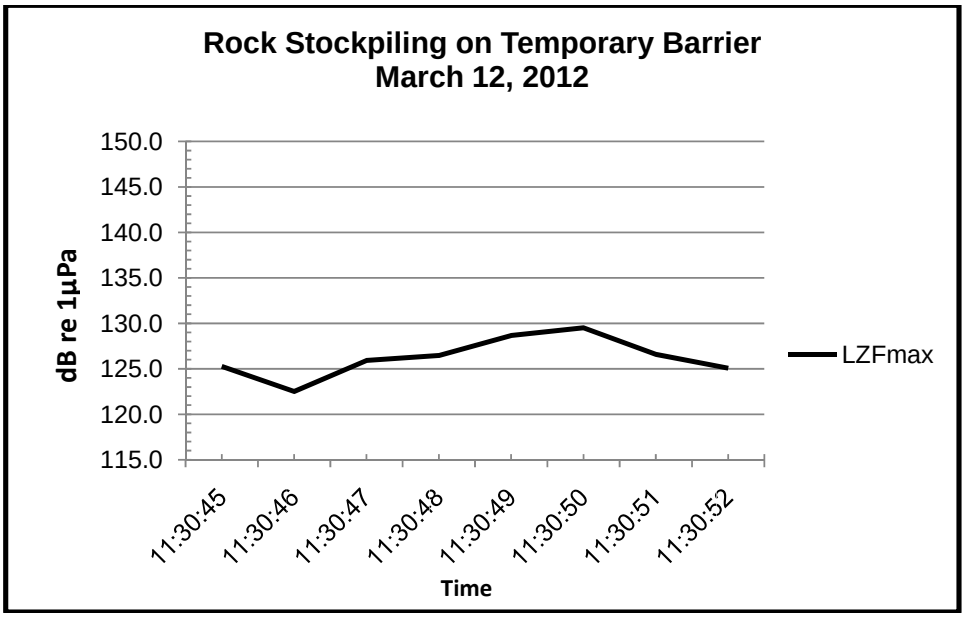
Underwater noise levels were measured using a Larson Davis Laboratories (LDL) Model 831 precision integrating sound level meter (SLM) with a Reson TC4013 omni-directional hydrophone. The SLM was calibrated with a G.R.A.S. Pistonphone Type 42AF to ensure that the measurements would be accurate. All underwater measurements were taken at a distance of 100 meters from in-stream temporary rock barrier construction locations. The SLM was manually operated. The SLM logged data every second of activation recording the date, time, and maximum underwater noise level. The SLM was activated during rock placement and piling on top of the temporary barrier, while rock piles were pushed into the river and in-stream rock placement by clam-bucket. The monitoring of underwater noise levels focused on the aquatic noise levels generated during rock placement, specifically, noise levels generated during rock placement within the water channel. Instantaneous maximum underwater noise levels are denoted as dB LZFmax in this memo and are relative to dB re 1µPa.

RESULTS

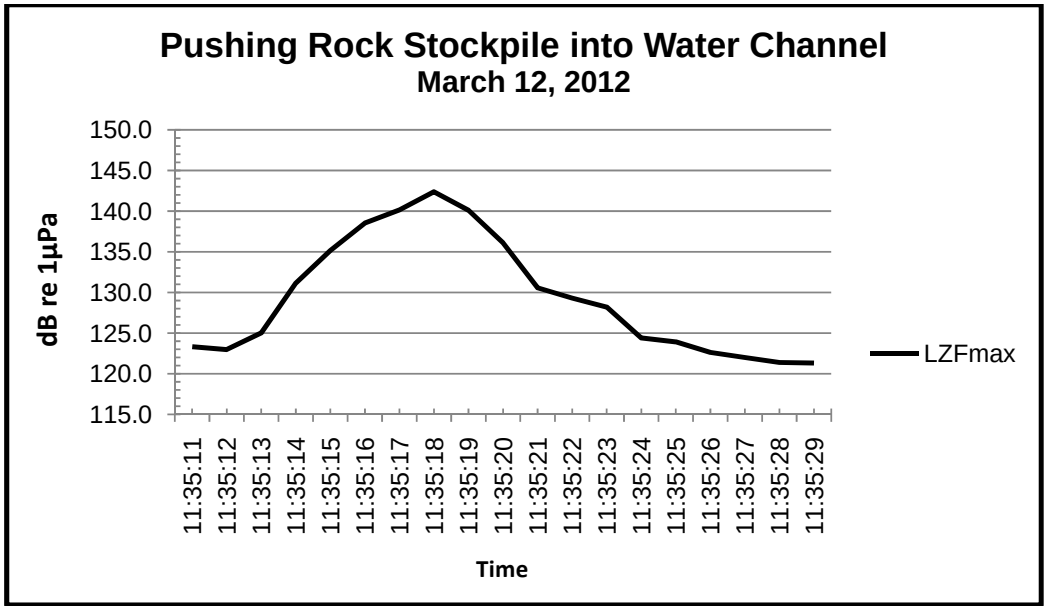
Middle River

Underwater noise levels attributable to the construction of the temporary rock barrier at Middle River were monitored on March 12 and 13, 2012. The Middle River temporary barrier was constructed utilizing one dozer, one excavator and several rock delivery trucks. Rock was stockpiled on the levee road adjacent to the temporary rock barrier construction site by trucks. The excavator would then re-position the rocks down the levee slope and at the levee toe so that the dozer could access the rock. The dozer would scoop rock into the bucket and transport the rock to the edge of the temporary rock barrier, originating from the levee toe and into the channel, for placement and stockpiling. Rock would be stockpiled at the end of the forming temporary rock barrier before being pushed into the channel. This method was repeated throughout the day as the temporary rock barrier construction continued into the water channel. The results are summarized below and complete data sheets are included in the Appendix A:

- Ambient noise level: 115-120 dB LZFmax
- Rock stockpiling: 119-143 dB LZFmax - A graphical representation of typical underwater noise levels due to rock stockpiling on the temporary rock barrier is shown below.



- Pushing rock stockpile into water channel: 130-148 dB LZFmax - A graphical representation of typical underwater noise levels due to pushing stockpiled rock on the temporary rock barrier into the water channel is shown below.

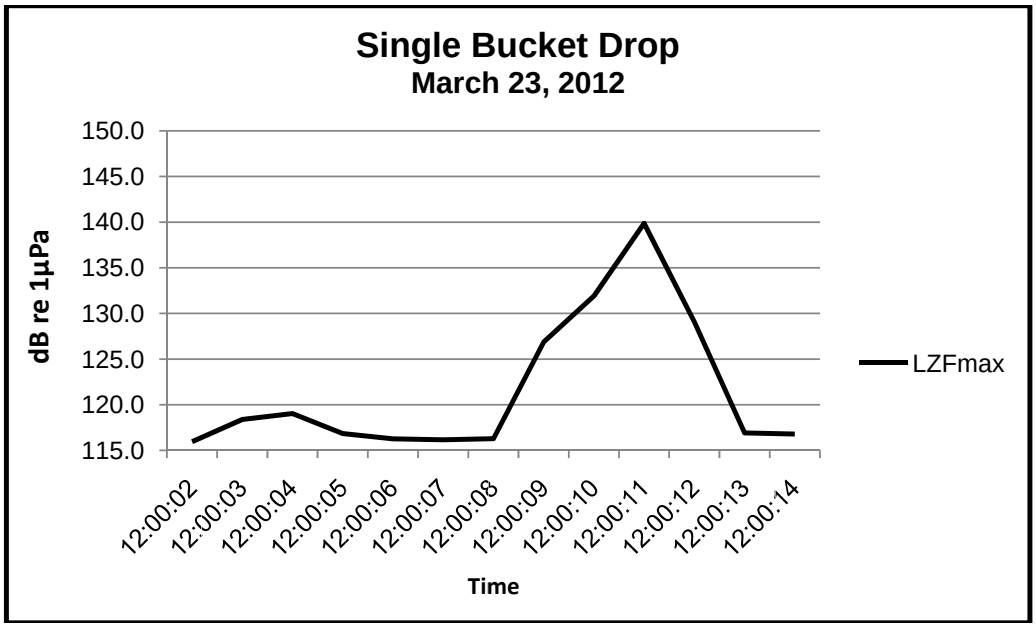


Head of Old River

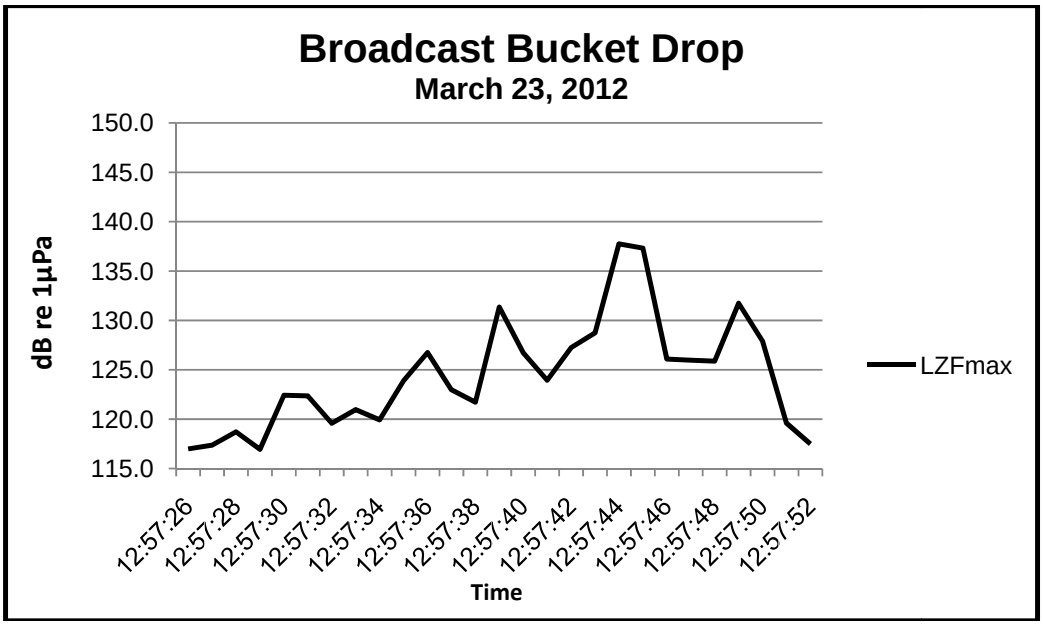
Underwater noise levels attributable to the construction of the temporary rock barrier at Head of Old River were monitored on March 22 and 23, 2012. The Head of Old River temporary barrier was constructed utilizing one dozer, one barge calm bucket and several rock delivery trucks. Rock was stockpiled on the water side of the levee along the river bank adjacent to the temporary rock barrier construction site by trucks. The dozer would then re-position the rocks at the edge of the river bank so that the barge excavator could access the rock. The barge excavator would scoop rock into the bucket and swing the rock over the temporary rock barrier for placement. Rock was deposited in a single bucket drop, spread over an area of the rock barrier in a broadcasting motion, or by a submerged bucket drop. The majority of rock deposits consisted of the bucket dropping in a freefall with a full load of rock onto the temporary barrier, and then the bucket would be dragged along the length of the submerged rock barrier. The bucket was dragged along the rock barrier to locate gaps or to evenly spread the rock along the barrier when the barrier was near the desired elevation. These events varied in duration. These methods were repeated throughout the day as the temporary rock barrier construction continued into the water channel. The results are summarized below and complete data sheets are included in the Appendix B:

- Ambient noise level: 115-121 dB LZFmax

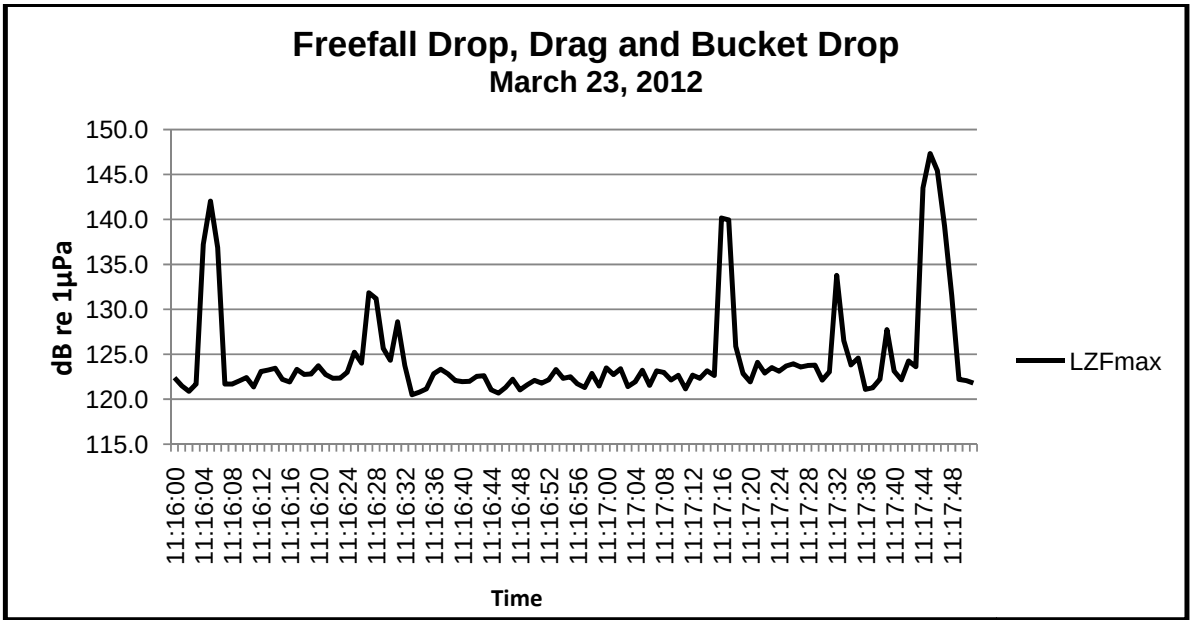
- Single bucket drop: 135-140 dB LZFmax - A graphical representation of typical underwater noise levels due to a single bucket drop on the temporary rock barrier is shown below.



- Broadcast bucket drop: 125-138 dB LZFmax - A graphical representation of typical underwater noise levels due to a broadcast bucket drop on the temporary rock barrier is shown below.



- Freefall drop, drag and bucket drop: 131-147 dB LZFmax - A graphical representation of typical underwater noise levels due to a freefall drop, drag and bucket drop on the temporary rock barrier is shown below.



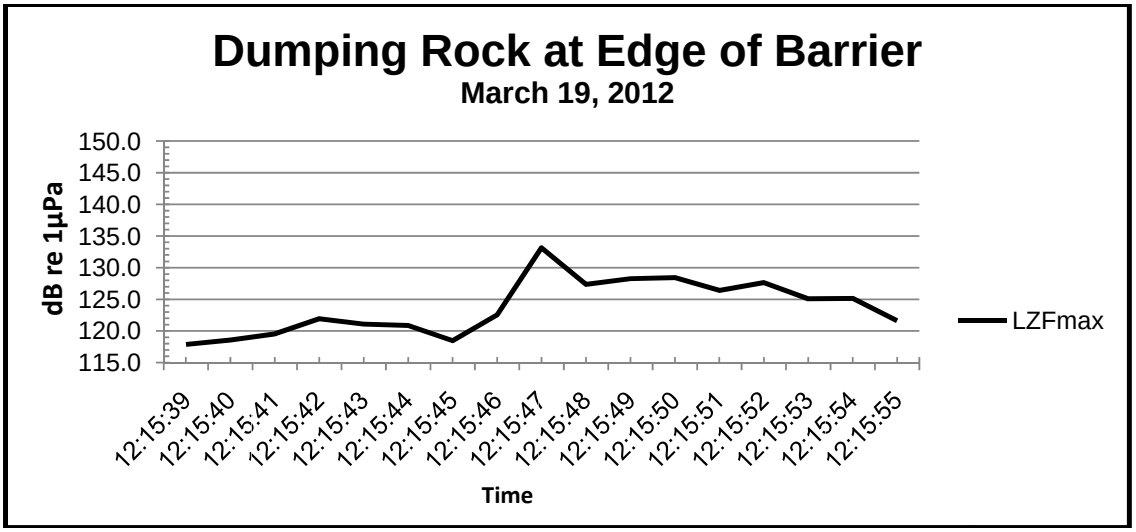
Old River near Tracy

Underwater noise levels attributable to the construction of the temporary rock barrier at Old River near Tracy were monitored on March 19, 20 and 26, 2012. The Old River near Tracy temporary barrier was constructed utilizing one dozer, one excavator, one clam bucket and one rock delivery truck on March 19 and 20. Rock was stockpiled on agricultural property to the east of the temporary rock barrier construction site and loaded onto the truck using the excavator. Rock was transported to the site with the truck and dumped at the edge of the rock barrier adjacent to the levee, forming the boat launch pad. Rock was either stockpiled along the edge of the temporary barrier with some errant rocks entering the water or dumped directly into the water channel. After stockpiling a considerable amount of rock, the dozer would then push the stockpiled rock into the water channel. The dozer would make several short back and forth movements on the forming launch pad as it was pushing the rock into the water channel.

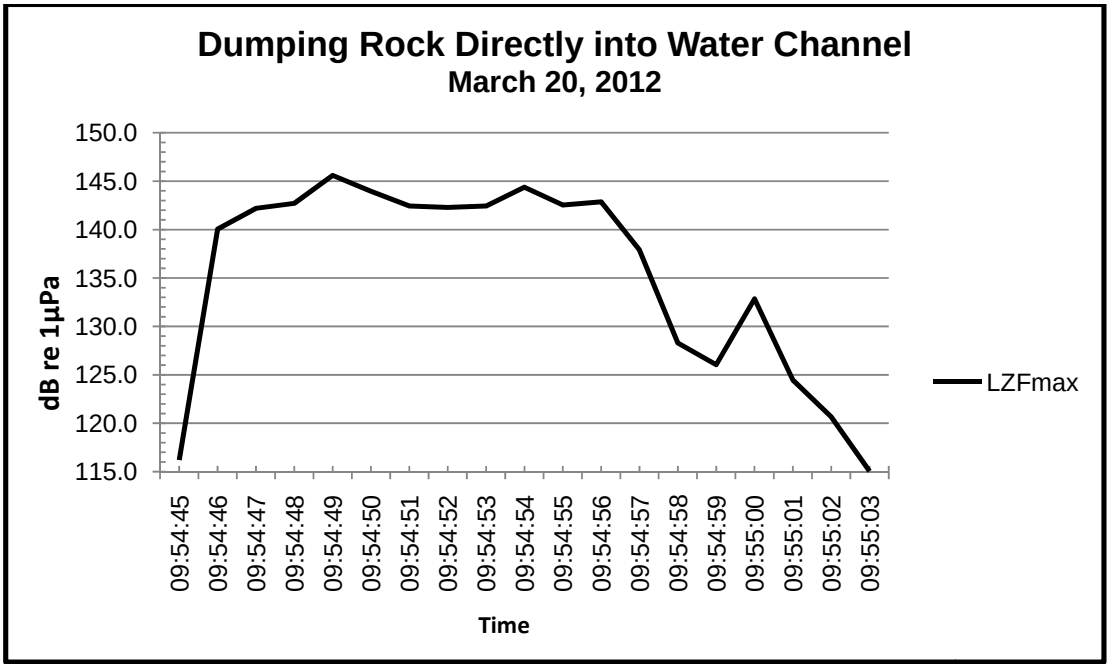
Construction practices changed on March 26, a clam bucket was used as the barrier moved further into the water channel from the formed boat launch pad. Rock was transported by truck and stockpiled on the boat launch pad. Clam bucket work activities were similar to the Head of Old River clam bucket activities described above. There were full bucket drops, broadcasting of full bucket drops, full bucket freefall drop followed by bucket drop broadcast over the barrier and full bucket freefall drop, broadcast, removal of some rock followed by another drop. These methods were repeated throughout each day as the temporary rock barrier construction continued into the water channel and varied in duration. The results are summarized below and complete data sheets are included in the Appendix C:

- Ambient noise level: 113-114 dB LZFmax
- Stockpiling rock, no rock entering the water: 115-119 dB LZFmax

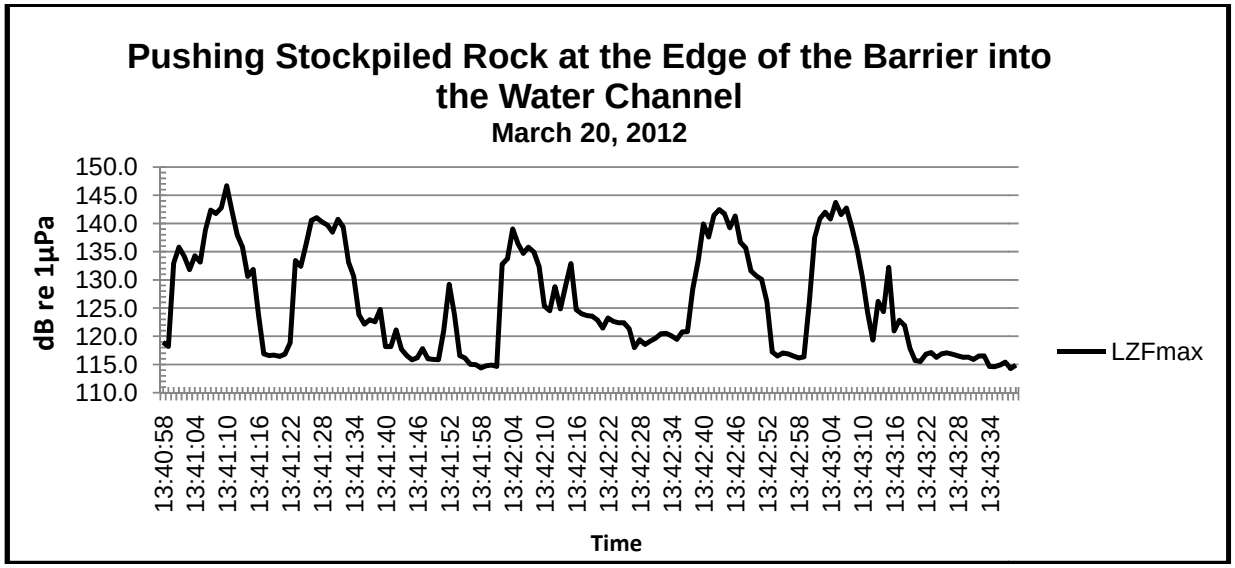
- Dumping rock at edge of barrier with some rocks entering water: 120-133 dB LZFmax- A graphical representation of typical underwater noise levels due to dumping rock at the edge of the temporary rock barrier is shown below.



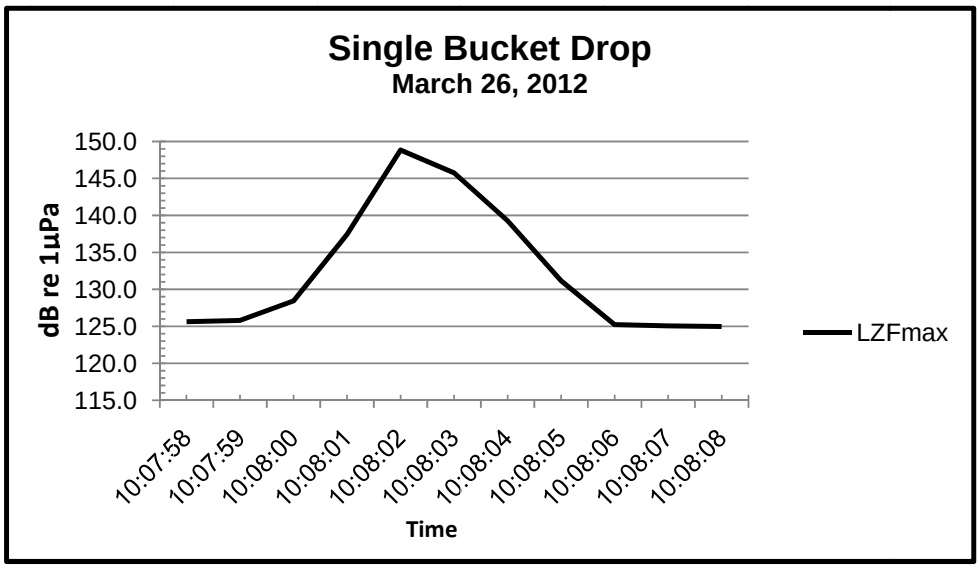
- Dumping rock directly into water channel: 125-147 dB LZFmax - A graphical representation of typical underwater noise levels due to dumping rock directly into the water channel is shown below.



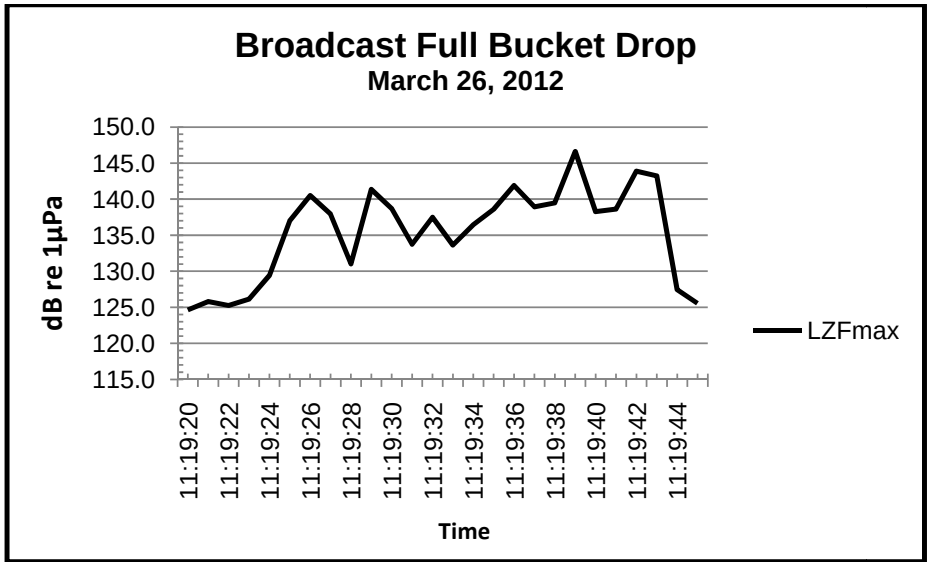
- Pushing stockpiled rock at edge of barrier into the water channel: 129-147 dB LZFmax - A graphical representation of typical underwater noise levels due to pushing stockpiled rock at the edge of the barrier into the water channel is shown below.



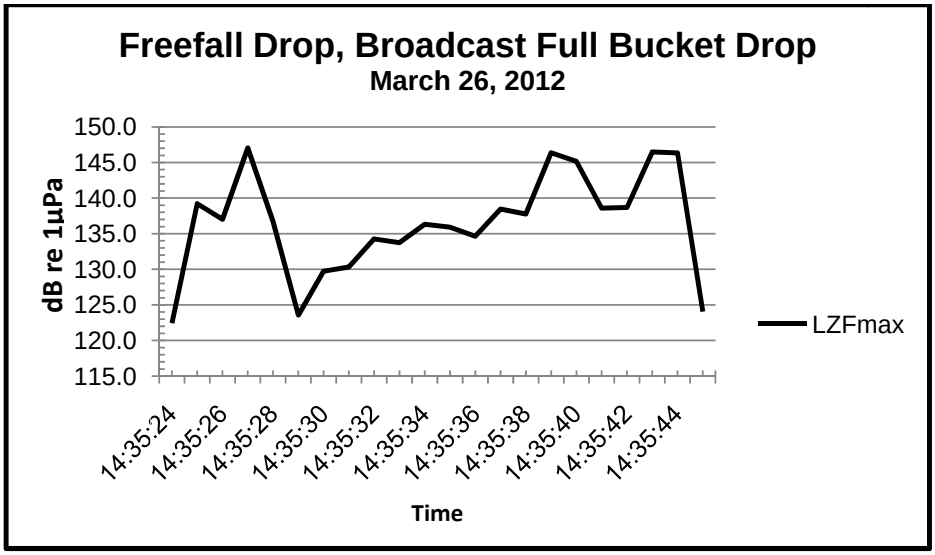
- Single bucket drop: 140-149 dB LZFmax - A graphical representation of typical underwater noise levels due to a single bucket drop on the temporary rock barrier is shown below.



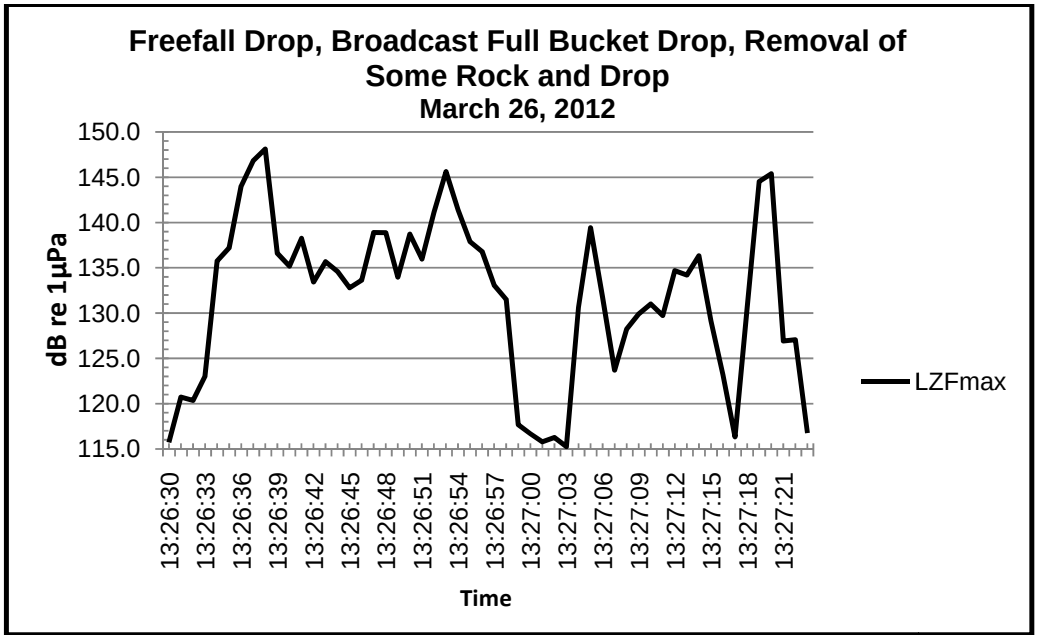
- Broadcast full bucket drop: 141-147 dB LZFmax - A graphical representation of typical underwater noise levels due to a broadcast bucket drop on the temporary rock barrier is shown below.



- Freefall drop, broadcast full bucket drop: 142-147 dB LZFmax - A graphical representation of typical underwater noise levels due to a freefall drop, broadcast full bucket drop on the temporary rock barrier is shown below.



- Freefall drop, broadcast full bucket drop, removal of some rock and drop: 138-147 dB LZFmax - A graphical representation of typical underwater noise levels due to a freefall drop, broadcast full bucket drop, removal of some rock and drop on the temporary rock barrier is shown below.



CONCLUSION

The monitoring conducted at Middle River, Head of Old, and Old River near Tracy properly characterizes the underwater noise level trends attributable to temporary rock barrier construction at each site. Based on the underwater noise levels measured and observed during the monitoring, the ecological surrogate threshold was not exceeded and it was determined that monitoring was no longer warranted.

Appendix 8: MMRP Table

CALIFORNIA DEPARTMENT OF FISH AND GAME
MITIGATION MONITORING AND REPORTING PROGRAM (MMRP)
CALIFORNIA ENDANGERED SPECIES ACT

Incidental Take Permit No. 2081-2011-019-03

PERMITTEE: **California Department of Water Resources (DWR)**

PROJECT: **2012 South Delta Temporary Barriers Project**

PURPOSE OF THE MMRP

The purpose of the MMRP is to ensure that the impact minimization and mitigation measures required by the Department of Fish and Game (DFG) for the above-referenced Project are properly implemented, and thereby to ensure compliance with section 2081(b) of the Fish and Game Code and section 21081.6 of the Public Resources Code. A table summarizing the mitigation measures required by DFG is attached. This table is a tool for use in monitoring and reporting on implementation of mitigation measures, but the descriptions in the table do not supersede the mitigation measures set forth in the California Incidental Take Permit (ITP) and in attachments to the ITP, and the omission of a permit requirement from the attached table does not relieve the Permittee of the obligation to ensure the requirement is performed.

OBLIGATIONS OF PERMITTEE

Mitigation measures must be implemented within the time periods indicated in the table that appears below. Permittee has the primary responsibility for monitoring compliance of all mitigation measures and for reporting to DFG on the progress in implementing those measures. These monitoring and reporting requirements are set forth in the ITP itself and are summarized at the front of the attached table.

VERIFICATION OF COMPLIANCE, EFFECTIVENESS

DFG may, at its sole discretion, verify compliance with any mitigation measure or independently assess the effectiveness of any mitigation measure.

TABLE OF MITIGATION MEASURES

The following items are identified for each mitigation measure: Mitigation Measure, Source, Implementation Schedule, Responsible Party, and Status/Date/Initials. The Mitigation Measure column summarizes the mitigation requirements of the ITP. The Source column identifies the ITP condition that sets forth the mitigation measure. The Implementation Schedule column shows the date or phase when each mitigation measure will be implemented. The Responsible Party column identifies the person or agency that is primarily responsible for implementing the mitigation measure. The Status/Date/Initials column shall be completed by the Permittee during preparation of each Status Report and the Final Mitigation Report, and must identify the implementation status of each mitigation measure, the date that status was determined, and the initials of the person determining the status.

	Mitigation Measure	Source	Implementation Schedule	Responsible Party	Status / Date / Initials
BEFORE DISTURBING SOIL OR VEGETATION					
1	Before initiating ground- or vegetation-disturbing Project activities, Permittee shall designate a representative (Designated Representative) responsible for communications with DFG and overseeing compliance with the ITP. The Permittee shall notify DFG in writing prior to commencement of ground- or vegetation-disturbing activities of the Designated Representative's name, business address, and contact information, and shall notify DFG in writing if a substitute Designated Representative is selected or identified at any time during the term of the ITP.	ITP Condition # 6.1	Before commencing ground- or vegetation-disturbing activities/ Entire Project	Permittee	Complied Designated Representative: Mike Abiouli
2	At least 30 days before initiating in-water, ground- or vegetation-disturbing activities, Permittee shall submit to DFG in writing the name, qualifications, business address, and contact information for a biological monitor (Designated Biologist). The Designated Biologist shall be knowledgeable and experienced in the biology and natural history of the Covered Species. The Designated Biologist shall be responsible for monitoring Project activities and/or in-water, ground- or vegetation-disturbing activities in areas of Covered Species' habitat to help minimize or avoid the incidental take of individual Covered Species and to minimize disturbance of Covered Species' habitat. Permittee shall obtain DFG approval of the Designated Biologist prior to the commencement of Project-related activities that may result in the incidental take of the Covered Species.	ITP Condition # 6.2	Before commencing ground- or vegetation-disturbing activities/ Entire Project	Permittee	Complied 3/11/12 Designated biologist: Mike Cane
3	Permittee shall conduct an education program for all persons employed or otherwise working on the Project site prior to performing any work on-site. The program shall consist of a presentation from the Designated Biologist that includes a discussion of the biology and general behavior of the Covered Species, information about the distribution and habitat needs of the Covered Species, sensitivity of the Covered Species to human activities, its status under CESA including legal protection, recovery efforts, penalties for violations and Project-specific protective measures described in the ITP. Interpretation shall be provided for non-English speaking workers, and the same instruction shall be provided for any new workers prior to their performing work on-site. Copies of the ITP shall be maintained at the worksite. Permittee shall prepare and distribute wallet-sized cards or a fact sheet handout containing this information for workers to carry on-site. Upon completion of the program, employees shall sign a form stating they attended the program and understand all protection measures. These forms shall be filed at the worksite offices and be available to DFG upon request.	ITP Condition # 6.4	Before commencing ground- or vegetation-disturbing activities / Entire Project	Permittee	Completed 3/12/2012 Mike Cane
4	Permittee shall initiate a trash abatement program prior to initiation of Project activities and shall continue the program throughout the duration of the Project. Trash and food items shall be contained in closed (animal proof) containers and removed regularly (at least once a week) to avoid attracting opportunistic predators such as ravens, coyotes, and feral dogs.	ITP Condition # 6.6	Before commencing ground- or vegetation-disturbing activities / Entire Project	Permittee	Complied Dumpster at ORT site dumped weekly Trash cans at MR and GLC transported to dumpster daily Division of Engineering Constructio Inspector (DOE) / Construction Contractor (Cal Neva)

	Mitigation Measure	Source	Implementation Schedule	Responsible Party	Status / Date / Initials
5	Permittee shall implement dust control measures during Project activities to facilitate visibility for monitoring of the Covered Species by the Designated Biologist.	ITP Condition # 6.7	Before commencing ground- or vegetation-disturbing activities/ Entire Project	Permittee	Complied Water truck was used for dust control. On several days, dust was noted as an issue, however, the dust never inhibited visibility of the Designated Biologist. DOE / Cal Neva
6	Prior to initiating ground- or vegetation-disturbing Project activities, Permittee shall clearly delineate property boundaries of the Project site with fencing, stakes or flags and shall similarly delineate the limits of Project activities. Permittee shall restrict all project activities to within the fenced, staked or flagged Project boundaries. Permittee shall maintain all fencing, stakes and flags until the completion of Project activities.	ITP Condition # 6.9	Before commencing ground- or vegetation-disturbing activities / Entire Project	Permittee	Complied All project activities were conducted within the delineate project boundaries as described in the project description. Areas were not staked or flagged as the project area includes miles of haul roads and this would be infeasible. DOE / Cal Neva
7	Permittee shall clearly delineate habitat of the Covered Species on the Project site with posted signs, posting stakes, flags, and/or rope or cord, and place fencing as necessary to minimize the disturbance of Covered Species' habitat.	ITP Condition # 6.10	Before commencing ground- or vegetation-disturbing activities / Entire Project	Permittee	Complied Construction personnel were instructed on parking restriction areas and complete restriction areas for each project site by the Designated Biologist. Mike Cane, DOE and Cal Neva
8	Permittee shall notify DFG 3 calendar days before initiating in-water, ground- or vegetation-disturbing activities and shall document compliance with all pre-Project Conditions of Approval before initiating in-water, ground- or vegetation-disturbing activities.	ITP Condition # 7.1	Before commencing ground- or vegetation-disturbing activities/ Entire Project	Permittee	Complied Mike Abiouli
9	The Designated Biologist shall survey all potential Swainson's hawks nest trees within ½ mile of the project sites, all staging and storage areas, transportation routes, work areas, and soil stockpile areas five (5) days prior to construction. A second monitoring shall be conducted 72 hours prior to construction. Results of each survey/monitoring effort shall be documented and submitted to DFG.	ITP Condition # 8.48	Before commencing ground- or vegetation-disturbing activities	Permittee	Completed Surveys Initiated 4/8/2011 DFG notified of results 5/11, 5/27 and 6/9 Surveys and monitoring continued until 7/14/2011 after the completion of all barriers and the fledging of all SWHA chicks near the construction sites. Mike Bradbury

	Mitigation Measure	Source	Implementation Schedule	Responsible Party	Status / Date / Initials
10	DWR shall prepare a spill prevention and control plan prior to the start of construction to minimize the potential for hazardous, toxic, or petroleum substance release into the project area during construction and project operation.	ITP Condition # 8.1	Before commencing ground- or vegetation-disturbing activities/ Entire Project	Permittee	Complied Spill kits at every site while equipment is present DOE / Cal Neva
DURING CONSTRUCTION					
11	The Designated Biologist shall be on-site daily while Project activities including all in-water or surface-disturbing activities are taking place to: (1) minimize incidental take of the Covered Species; (2) check for compliance with all mitigation and avoidance measures; (3) check all exclusion zones; and (4) ensure that signs, stakes, and fencing are intact, and that human activities are restricted outside of these protective zones. The Designated Representative or Designated Biologist shall prepare daily written observation and inspection records summarizing: oversight activities and compliance inspections, observations of Covered Species and their sign, survey results, and monitoring activities required by the ITP.	ITP Condition # 7.3	Entire Project	Permittee	Completed 3/12/12 to 11/8/12 Mike Cane
12	Permittee shall provide DFG with an Annual Status Report (ASR) no later than January 31 of every year beginning with issuance of this ITP and continuing until DFG accepts the Final Mitigation Report identified below. Each ASR shall include, at a minimum: (1) a general description of the status of the Project Area and Covered Activities, including actual or projected completion dates, if known; 2) a copy of the table in the MMRP with notes showing the current implementation status of each mitigation measure; (3) an assessment of the effectiveness of each completed or partially completed mitigation measure in avoiding, minimizing and mitigating Project impacts; (4) all available information about Project-related incidental take of the Covered Species; and (5) information about other Project impacts on the Covered Species.	ITP Condition # 7.4	Entire Project	Permittee	Complied Mike Cane
13	Permittee shall immediately notify DFG in writing if it determines that it is not in compliance with any condition of approval of the ITP, including but not limited to any actual or anticipated failure to implement mitigation measures within the time periods indicated in the ITP and/or this MMRP. Permittee shall report any non-compliance with the ITP during Project activities to DFG within 24 hours.	ITP Condition # 7.2	Entire Project	Permittee	None noted Mike Cane
14	Permittee shall prohibit use of erosion control materials potentially harmful to Covered Species, such as mono-filament netting (erosion control matting) or similar material, in potential Covered Species' habitat.	ITP Condition # 6.8	Entire Project	Permittee	None used Mike Cane
15	Project-related personnel shall access the Project site during Project activities using existing routes and shall not cross Covered Species' habitat outside of or in route to the Project site. Project-related vehicle traffic shall be restricted to established roads, staging, and parking areas. Vehicle speeds shall not exceed 20 mph in order to avoid Covered Species on or traversing the roads. If Permittee determines construction of off-site routes for travel are necessary, Permittee shall contact DFG prior to carrying out such an activity. DFG may require an amendment to the ITP if additional take of Covered Species may result from Project modification.	ITP Condition # 6.11	Entire Project	Permittee	Complied Mike Cane

	Mitigation Measure	Source	Implementation Schedule	Responsible Party	Status / Date / Initials
16	Permittee shall confine all Project-related parking, storage areas, laydown sites, equipment storage, and any other surface-disturbing activities to the Project site using, to the extent possible, previously disturbed areas. Additionally, Permittee shall not use or cross Covered Species' habitat outside of the marked Project boundaries unless specifically provided for in Condition 6.10 of the ITP.	ITP Condition # 6.12	Entire Project	Permittee	Complied Mike Cane
17	Permittee shall immediately stop/repair and clean up any fuel or hazardous waste leaks or spills on the Project site during Project activities at the time of occurrence. Permittee shall exclude the storage and handling of hazardous materials from construction zones and shall properly contain and dispose of any unused or leftover hazardous products off-site.	ITP Condition # 6.13	Entire Project	Permittee	Complied Mike Cane
18	Permittee shall provide DFG staff with reasonable access to the Project site and mitigation lands under Permittee control, and shall otherwise fully cooperate with DFG efforts to verify compliance with or effectiveness of mitigation measures set forth in the ITP.	ITP Condition # 6.14	Entire Project	Permittee	Complied Mike Cane
19	The Designated Biologist shall maintain a construction monitoring notebook on-site throughout the construction period which shall include a copy of the ITP with attachments and a list of signatures of all personnel who have successfully completed the education program. Permittee shall ensure a copy of the construction monitoring notebook is available for review at the Project site upon request by DFG.	ITP Condition # 6.5	Entire Project	Permittee	Complied Mike Cane
20	The Designated Biologist shall submit all observations of Covered Species to DFG's California Natural Diversity Database (CNDDB) and the Designated Biologist shall include copies of the submitted forms with the next Annual Status Report.	ITP Condition # 7.5	Entire Project	Permittee	Not complete Mike Bradbury
21	DWR shall conduct all pile driving using a vibratory hammer to minimize the extent possible the noise generated from pile-driving activities. Compared to the standard impact driving method, vibratory driving substantially reduces the distance that noise exceeds NMFS thresholds, thereby substantially reducing or avoiding the potential to cause take of listed species. The steel piles shall be less than 16 inches in diameter. The accumulated sound exposure level (SEL) shall not exceed 187 decibels (dB) for all listed fish, except those that are two grams or less. SEL for fish two grams or less shall not exceed 183 dB.	ITP Condition # 8.2	Entire Project	Permittee	N/A No pile driving activities were conducted in 2012 Simon Kwan
22	DWR shall monitor turbidity levels in the San Joaquin River, Old River, Middle River, and Grant Line Canal during ground-disturbing activities, including pile-driving. Monitoring will be conducted by measuring upstream and downstream of the disturbance area to determine if the change exceeds 20%, a threshold derived from the Sacramento and San Joaquin Rivers Basins Plan (Central Valley Regional Water Quality Control Board 1998). If so, DWR contractors will adjust work to ensure that turbidity levels do not exceed the 20% threshold.	ITP Condition # 8.3	Entire Project	Permittee	Complied Water quality monitoring was conducted as specified in our 401 WQ Certification. Water quality data were sent to RWQCB bi-weekly in 2012. Mike Abiouli

	Mitigation Measure	Source	Implementation Schedule	Responsible Party	Status / Date / Initials
23	DFG shall review California Data Exchange Center (CDEC) data to determine impacts to dissolved oxygen (DO) levels upstream of the temporary barriers. DFG will review Regional Water Quality Control Board (RWQCB) required standards for dissolved oxygen levels in the area of the temporary barriers. If the dissolved oxygen levels are shown to fall below RWQCB required levels, DFG shall require water circulation to increase through modifying barrier operations by implementing one of the following measures: creating a notch, lowering weir height, or tying open flap gates to increase circulation until DO levels are above the RWQCB required levels for three consecutive days.	ITP Condition # 8.4	Entire Project	DFG	Ongoing Boertien
24	All equipment used in or near the stream zone shall be free of leaks. Equipment shall be checked and maintained daily to prevent leaks of materials that, if introduced to water, could be deleterious to aquatic life, wildlife, or riparian habitat. Staging/storage areas for equipment, materials, fuels, and lubricants, will be located outside of the stream's normal high water area. Stationary equipment such as motors, pumps, generators, compressors, and welders, located within the dry portion of the stream channel or adjacent to the stream will be positioned over drip pans. Equipment parked for the night shall have drip pans placed under the engine.	ITP Condition # 8.6	Entire Project	Permittee	Complied Mike Cane
25	Barrier installation shall begin no earlier than March 1 of each year at Middle River Barrier and April 1 at Old River at Tracy, Grant Line Canal, and Head of Old River barriers.	ITP Conditions # 8.10, 8.18, 8.26, 8.41(1)	Entire Project	Permittee	Complied Mike Cane
26	Barrier removal shall be completed no later than 14 days after November 20 at Middle River barrier, no later than 14 days after October 31 if Head of Old River Barrier has not been installed and no later than 14 days after November 20 if Head of Old River Barrier has been installed for Grant Line Canal barrier, no later than 14 days after October 31 if Head of Old River Barrier has been installed and no later than 14 days after November 20 if Head of Old River Barrier has been installed for Old River at Tracy barrier, and November 30 at Head of Old River Barrier.	ITP Condition # 8.16, 8.35, 8.36, 8.23, 8.24, 8.41(2)	Entire Project	Permittee	Complied All Ag-Barriers were removed by November 8, 2012 Spring HORB was removed on June 22, 2012, and no Fall HORB Kwan
27	Non-Physical Barrier: The Permittee shall fund, plan, and conduct a study to find out if the presence of the non-physical barrier creates predatory fish habitat and to analyze the effects of the non-physical barrier on the predation of salmon and steelhead smolts. The study shall address predator accumulation at the non-physical barrier when the non-physical barrier is installed and operating during the term of this ITP. The study plan shall be developed and provided by February 1, 2012 to DFG for review and approval. Yearly non-physical barrier predatory reports are due by February 1 of the year following the installation and operation of the non-physical barrier occurs.	ITP Condition # 8.8	Entire Project	Permittee	N/A The NPB was not installed in 2012, but predatory fish studies with the rock barrier were conducted. Kwan
28	Construction shall be limited to the greatest extent possible between March 1 and August 31 where Swainson's hawk nest sites exist within ½ mile of proposed construction activities.	ITP Condition # 8.47	Entire Project	Permittee	Complied Mike Cane

	Mitigation Measure	Source	Implementation Schedule	Responsible Party	Status / Date / Initials
29	Construction activities within ¼ mile of an active Swainson's hawk nest should be limited to the greatest extent possible from egg-laying to post-hatching; and, if construction must occur in that time frame, to the greatest extent possible initiate construction prior to egg-laying.	ITP Condition # 8.49	Entire Project	Permittee	Complied Mike Bradbury
30	Where construction can not be sufficiently limited to avoid disturbance to Swainson's hawks while nesting, a "sliding scale" of monitoring shall be implemented as detailed in the ITP.	ITP Condition #8.50, 8.50.1-6	Entire Project	Permittee	Complied Mike Bradbury
31	Physical contact with an active Swainson's hawk nest tree shall be prohibited from the time of egg-laying to fledging. Construction personnel outside vehicles shall be restricted to greater than 200 meters from the nest tree unless construction activities require them to be closer.	ITP Condition # 8.51	Entire Project	Permittee	Complied Mike Bradbury
32	If personnel must approach closer than 25 meters to an active Swainson's hawk nest tree for more than 15 minutes while adults are brooding, the nesting adults shall be monitored for stressed behavior. If stressed behavior is identified, personnel shall be removed until behavior normalizes. If personnel must approach closer than 50 meters greater than 1 hour, the same applies.	ITP Condition # 8.51.1	Entire Project	Permittee	Did not occur Mike Bradbury
33	All personnel shall be out of the line of sight of the Swainson's hawk nest during breaks.	ITP Condition # 8.51.2	Entire Project	Permittee	Complied Mike Bradbury
34	If the Permittee cannot complete all barrier construction within ¼ mile of an active Swainson's hawk nest site by April 1 or after June 1, the Permittee shall also implement the following measures to minimize the impacts of late construction: For the Grant Line Canal (GLC) site: a) All equipment and vehicles driven and/or operated shall be limited to the north levee road. Staging areas for equipment, materials, and work personnel lunch time shall be at a site 0.5 mile away. These areas shall be flagged and identified to all work personnel during employee orientation. b) During construction, the height of the crane arm during the placement of rock or culverts shall be limited to the extent possible above the water surface. Furthermore, if eggs are present in the nest prior to construction of the barrier, the Permittee shall construct the barrier beginning at the north end and proceed to the south.	ITP Condition # 8.52, 8.52.1	Entire Project	Permittee	Complied Mike Bradbury

	Mitigation Measure	Source	Implementation Schedule	Responsible Party	Status / Date / Initials
35	For all barrier sites: a) The Permittee shall not disturb or remove any tree. If trees cannot be avoided, compensation for permanent losses is required and shall be at the rate of 3:1. To protect trees adjacent to the project, all trees (4" or greater DBH) from the water edge to the crown of the levee shall be flagged prior to any work. b) If construction occurs within 328 feet (100 meters) of a Swainson's hawk nest, no construction shall occur prior to 0800 (8:00 AM), and shall be discontinued by 1700 (5:00 PM) each day. c) There shall be a biologist at the site at all times during the project construction work. d) If there is abandonment of a nest with eggs or young fledglings (take of the species) during barrier construction, the Permittee shall notify DFG and initiate action to salvage any abandoned eggs and return the young to the wild. If the young have already hatched, they shall be retrieved and returned to the wild using methods acceptable to DFG. Persons handling eggs and/or young birds shall have in their possession the appropriate scientific collecting permits from DFG.	ITP Condition # 8.52.2	Entire Project	Permittee	a) No trees or woody vegetation was removed during this project. b) Complied c) A designated Biologist conducted daily checks to ensure permit compliance. d) No "take" was identified. Complied: Mike Cane Mike Bradbury
36	If a Covered Species is killed by a Project-related activity, or if a Covered Species is otherwise found dead within the Project boundary, Permittee shall immediately notify the Designated Biologist. The Designated Biologist or Designated Representative shall provide initial notification to DFG by calling the Regional Office at (707)944-5500. The initial notification to DFG shall include information regarding the location, species, number of animals injured or killed, and the ITP Number. Following initial notification, Permittee shall send DFG a written report within 2 calendar days. The report shall include the date and time of the finding or incident, location of the carcass, and if possible provide a photograph, explanation as to cause of death, and any other pertinent information.	ITP Condition # 7.7	Entire Project	Permittee	No covered species were killed and no "take" was identified. Complied: Mike Cane
37	To ensure compliance with the Conditions of Approval of the ITP, the Designated Biologist shall have authority to immediately stop any activity that is not in compliance with the ITP, and/or to order any reasonable measure to avoid the unauthorized take of an individual of the Covered Species or fully protected species. Neither the Designated Biologist nor DFG shall be liable for any costs incurred in complying with the Conditions of Approval, including cease-work orders issued by DFG.	ITP Condition # 6.3	Entire Project	Permittee	No work stoppages were required Mike Cane
38	Swainson's hawk: If a nest is abandoned and nestlings are still alive, DWR shall fund the recovery and hacking (controlled release) of the nestlings. If a nest is abandoned and the nestlings do not survive, DWR shall develop 1 acre of riparian forest and provide for permanent protection and management over that riparian forest and over 50 acres of suitable Swainson's hawk foraging habitat in a location and in a form acceptable to DFG. The site shall be identified and protected within 12 months after nest abandonment.	ITP Condition # 9.1	Entire Project	Permittee	No abandonment Mike Bradbury

	Mitigation Measure	Source	Implementation Schedule	Responsible Party	Status / Date / Initials
39	Swainson's Hawk: To offset the potential impact of reduced productivity due to construction activities, the Permittee shall provide $10,000 per construction year to the Swainson's Hawk Technical Advisory Committee (TAC) in each year that an active Swainson's hawk nest is within a ½ mile of an active barrier construction site or active storage/staging site. The funds shall be utilized to enhance habitat or for research to improve management opportunities of the species. Use of this fund will be overseen by DFG in consultation with the TAC.	ITP Condition # 9.2	Entire Project	Permittee	Mike Bradbury
40	No live trees with trunks in excess of four (4) inches in Diameter at Breast Height (DBH) shall be removed. To protect trees adjacent to the project, all trees (4" or greater DBH) from the water edge to the crown of the levee shall be flagged prior to any work. If these trees can not be avoided, compensation for permanent losses is required and shall be at the ratio of 3:1. Location of tree replacements shall be approved by DFG. The Permittee shall maintain an 80% survival rate of each species by the third year after replacement. The Permittee is responsible for replacement planting to achieve these requirements.	ITP Condition # 9.3	Entire Project	Permittee	No trees were removed Mike Cane
41	To mitigate for the impacts of project related construction to Swainson's Hawks during the breeding season of March 1 to August 31, 2011 – 2016, the Permittee shall protect in perpetuity 1 acre of riparian forest at a site approved by DFG.	ITP Condition # 10.1	During Project	Permittee	Mitigation land was purchased from Westervelt LLC on May 4, 2012 Simon Kwan
42	To mitigate for the impact associated with the construction of the temporary barriers on Delta smelt and longfin smelt, the Permittee shall create, protect and provide for the long-term management of a total of 6 acres of subtidal or intertidal habitat.	ITP Condition # 10.2	During Project	Permittee	4.75 acres of mitigation land was purchased from Wildlands Inc. on July 20, 2012. The remaining 1.25 acres was credited from DWR's Kimball Island account. Simon Kwan
43	No later than 18 months from the issuance of this ITP, the Permittee shall complete the actions identified in 10.1 and 10.2.	ITP Condition # 10.3	During Project	Permittee	Please see 41, and 42 above Simon Kwan
44	The Security, in the form of a letter from the Chief of the Bay-Delta Office from the Permittee to the Regional Manager of the Bay Delta Region, shall state the Permittee's commitment and assurance that the conditions outlined in Condition 10 shall be completed within the time frame outlined in Condition 10.3.	ITP Condition # 11.1	During Project	Permittee	An assurance letter was sent to DFG on 6/16/2011 Simon Kwan
45	The Security shall be provided to DFG no later than one month after the issuance of this permit. The Security shall be in the form described in 11.1.	ITP Condition # 11.2	During Project	Permittee	An assurance letter was sent to DFG on 6/16/2011 Simon Kwan
46	The Security (or any portion of the Security then remaining) shall be released to the Permittee after all secured requirements have been met as evidenced by: • Documentation that habitat has been created, protected and long-term management is assured; and • An on-site inspection by DFG	ITP Condition # 11.3	During Project	Permittee	Complied Simon Kwan
POST-CONSTRUCTION					

	Mitigation Measure	Source	Implementation Schedule	Responsible Party	Status / Date / Initials
47	Upon completion of Project activities, Permittee shall remove from the Project site and properly dispose of all construction refuse, including, but not limited to, broken equipment parts, wrapping material, cords, cables, wire, rope, strapping, twine, buckets, metal or plastic containers, and boxes.	ITP Condition # 6.15	Post-construction	Permittee	Complied Mike Cane
48	A final report for the non-physical barrier predatory fish study shall summarize the previous studies conducted during the life of this ITP and will be due on February 1, 2017.	ITP Condition # 8.8	Post-construction	Permittee	The final report is due after the expiration of the ITP and the SSA permits in 2016
49	Final Mitigation Report: No later than 45 days after completion of the Project, including completion of all mitigation measures, Permittee shall provide DFG with a Final Mitigation Report. The Final Mitigation Report shall be prepared by the Designated Biologist and shall include, at a minimum: 1) a summary of all Monthly/Quarterly Compliance Reports and all ASRs, 2) a copy of this table with notes showing when each of the mitigation measures was implemented; 3) all available information about Project-related incidental take of the Covered Species; 4) information about other Project impacts on the Covered Species; 5) dates of Project activities; 6) an assessment of the effectiveness of the ITP's Conditions of Approval in minimizing and fully mitigating Project impacts of the taking on Covered Species; 7) recommendations on how mitigation measures might be changed to more effectively minimize take and mitigate the impacts of future projects on the Covered Species; and 8) any other pertinent information.	ITP Condition # 7.6	Post-construction and after completion of mitigation	Permittee	The final report is due after the expiration of the ITP and the SSA permits in 2016

Appendix 9: Mitigation Purchase Receipts

WILDLANDS

TRANSMITTAL

TO: Brian Bustos	FROM: Julie Maddox
COMPANY: Department of Water Resources	VIA: U.S. Mail
ADDRESS: 1416 Ninth Street Sacramento, CA 95814	PROJECT: South Delta Temporary Barriers Project Contract No. 4600009737
RE: Conservation Credit Purchase (Liberty Island Conservation Bank)	DATE: July 20, 2012

☐ URGENT ☐ FOR REVIEW ☒ FOR YOUR USE ☐ PLEASE REPLY ☐ ACTION REQUIRED

Enclosed for your records please find the original executed Bill of Sale and Payment Receipt for DWR's purchase of 4.75 Conservation Credits from the Liberty Island Conservation Bank.

A notification of this transaction will also be provided to the U.S. Fish and Wildlife Service, National Marine Fisheries Service, and California Department of Fish and Game for their records.

Thank you for your business; it has been a pleasure serving you. Please let me know if there are any questions, or if there is anything else you need.

Thank you,

Julie Maddox
WILDLANDS

Enclosure

cc: Mr. Jacob McQuirk, DWR (via Electronic Mail)

RECEIVED
DWR PCO
2012 JUL 25 PM 1:56
HEADQUARTERS

WILDLANDS ◆ 3855 Atherton Road ◆ Rocklin, CA 95765 ◆ p: 916.435.3555 ◆ f: 916.435.3578

BILL OF SALE

Contract # LICB-12-15

CDFG ITP No. 2081-2011-019-03

In consideration of $593,750.00, receipt of which is hereby acknowledged, LIBERTY ISLAND HOLDINGS I, LLC (Bank Owner) does hereby bargain, sell and transfer to CALIFORNIA DEPARTMENT OF WATER RESOURCES 4.75 Salmonid/Smelt Restoration Conservation Credits in the Liberty Island Conservation Bank in Yolo County, California, developed, and approved by the National Marine Fisheries Service, the U.S. Fish and Wildlife Service, and the California Department of Fish and Game.

Bank Owner represents and warrants that it has good title to the credits, has good right to sell the same, and that they are free and clear of all claims, liens, or encumbrances.

Bank Owner covenants and agrees with the buyer to warrant and defend the sale of the credits hereinbefore described against all and every person and persons whomsoever lawfully claiming or to claim the same.

DATED: 7-20-2012

LIBERTY ISLAND HOLDINGS I, LLC

By: _____

Name: **Wildlands, Manager**

Its: **Mark Heintz, Manager**

LIBERTY ISLAND CONSERVATION BANK
CONSERVATION CREDITS: PAYMENT RECEIPT

PARTICIPANT INFORMATION

Name: CALIFORNIA DEPARTMENT OF WATER RESOURCES

Address: Bay-Delta Office
1416 Ninth Street
Sacramento, CA 95814

Telephone: (916) 653-9883

Contact: Jacob McQuirk

PROJECT INFORMATION

Project Description:	South Delta Temporary Barriers Project
CDFG File Number:	2081-2011-019-03
Species/Habitat Affected:	Delta smelt and longfin smelt
Credits to be Purchased:	4.75
Payment Amount:	$593,750
Project Location:	South Delta

PAYMENT INFORMATION

Payee: LIBERTY ISLAND HOLDINGS I, LLC

Payer: CALIFORNIA DEPARTMENT OF WATER RESOURCES

Amount: Five Hundred Ninety-Three Thousand Seven Hundred Fifty and No/100ths Dollars ($593,750.00)

Method of payment: Cash Check No. 09-146523 Money Order No.

Received by: _____ Date: 7-20-2012
Name: Wildlands, Manager
Title: Mark Heintz, Manager

M:\Sales Agreements-Docs\saleLICB_DWR
Revised: 04/11/2012

Exhibit "B"

BILL OF SALE

In consideration of **$75,000**, receipt of which is hereby acknowledged, *Cosumnes Floodplain Mitigation Bank* Sponsor does hereby bargain, sell and transfer to the CALIFORNIA DEPARTMENT OF WATER RESOURCES, **1.00 Floodplain Riparian Habitat credit** in the *Cosumnes Floodplain Mitigation Bank* in Sacramento County, California, developed, and approved by the U.S. Army Corps of Engineers, U.S. Environmental Protection Agency, and California Department of Fish and Game.

Westervelt Ecological Services represents and warrants that it has good title to the credits, has good right to sell the same, and that they are free and clear of all claims, liens, or encumbrances.

Westervelt Ecological Services covenants and agrees with the buyer to warrant and defend the sale of the credits hereinbefore described against all and every person and persons whomsoever lawfully claiming or to claim the same.

DATED: 5/4/2012

Cosumnes Floodplain Mitigation Bank Sponsor

By: _____

Exhibit "C"

Cosumnes Floodplain Mitigation Bank
FLOODPLAIN RIPARIAN HABITAT CREDIT: PAYMENT RECEIPT

PARTICIPANT INFORMATION

Name: California Department of Water Resources

Address: 1416 Ninth Street
Sacramento, CA 95814

Telephone: (916) 653-9883

Contact: Jacob McQuirk

PROJECT INFORMATION

Project Description: South Delta Temporary Barriers Project

Permit File Number: 2081-2011-019-03

Species/Habitat Affected: Swainson's Hawk

Credits to be Purchased: **1.00 Floodplain Riparian Habitat**

Payment Amount: $75,000

Project Location: San Joaquin County

County/Address: San Joaquin County

PAYMENT INFORMATION

Payee: Westervelt Ecological Services, LLC

Payer: California Department of Water Resources

Amount: Sixty Five Thousand ($75,000)

Method of payment: Cash Check No. Money Order No.

Received by: _____ Date: 5/4/2012
(Signature)

Name: Travis Hemmen Title: Project Manager