

2005 Pilot-Scale Investigation of Steelhead Predation within Clifton Court Forebay



PROJECT TEAM

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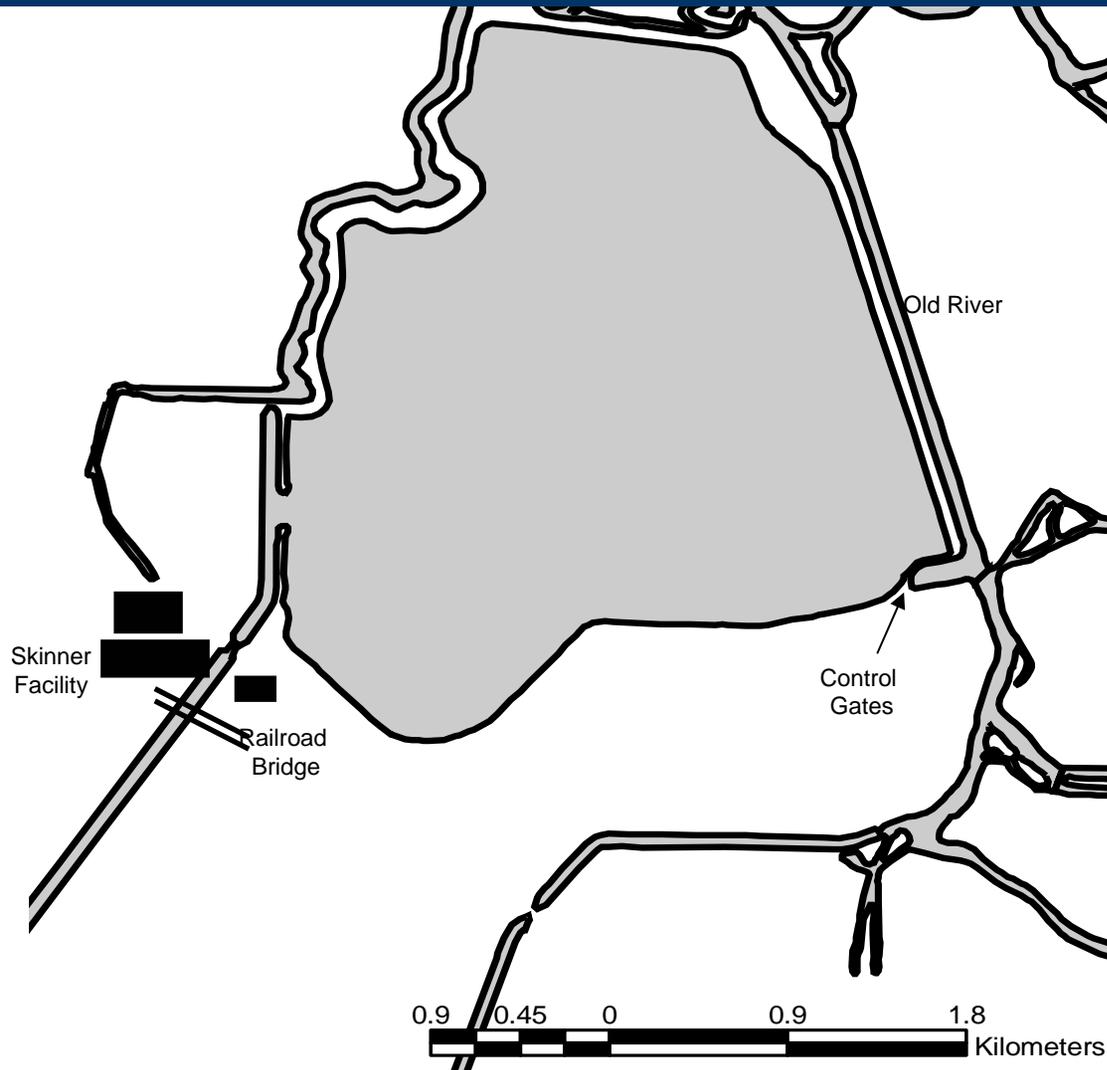
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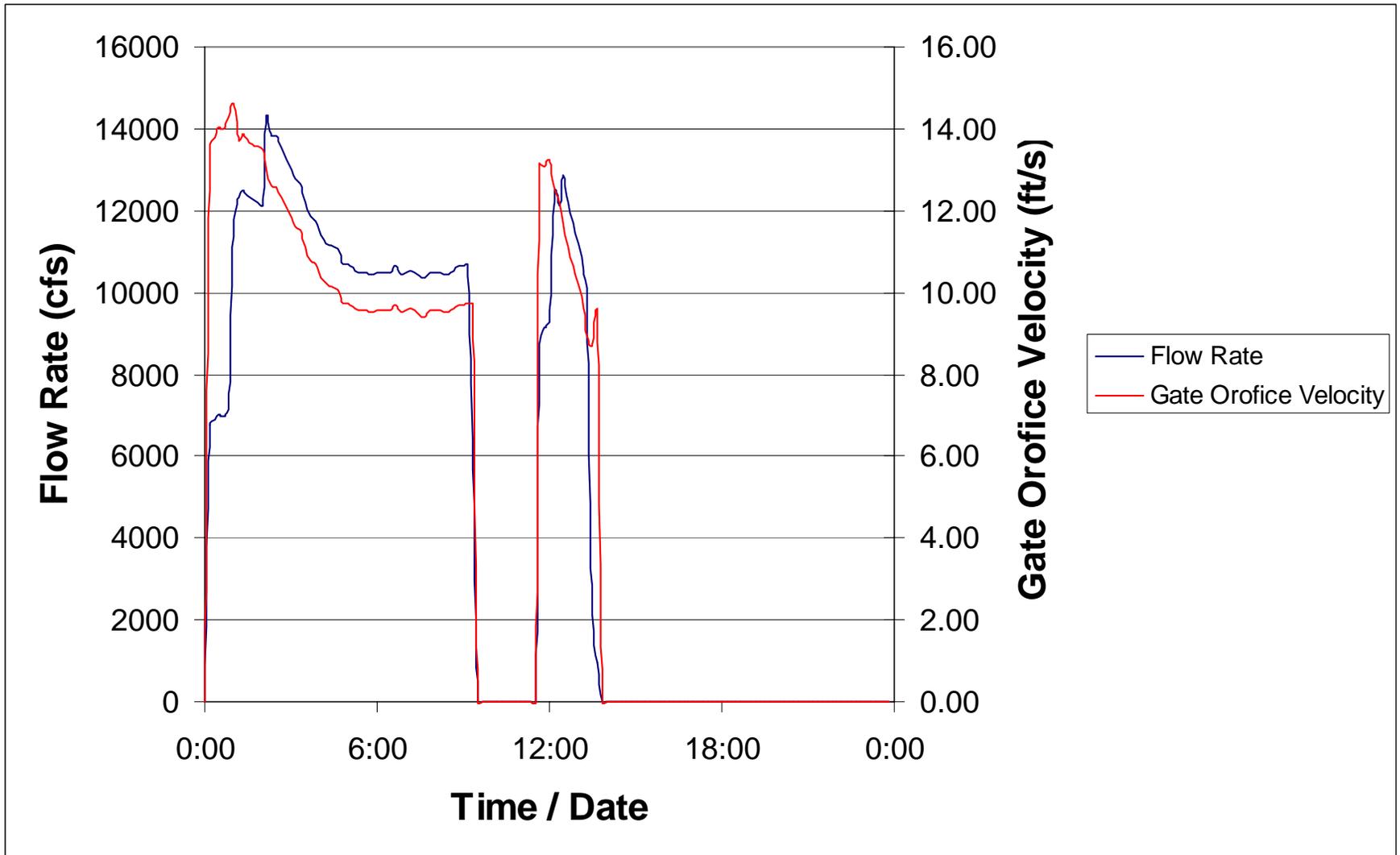
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STUDY AREA: CLIFTON COURT FOREBAY



CCF: Intake flows and velocities

24 hour period, 3/17/2005



SWP: Estimates of steelhead salvage, 2001-2005

<u>Year</u>	<u>Total Salvage</u>
2005	2041
2004	9791
2003	5766
2002	2181
2001	8104

PREVIOUS STUDIES

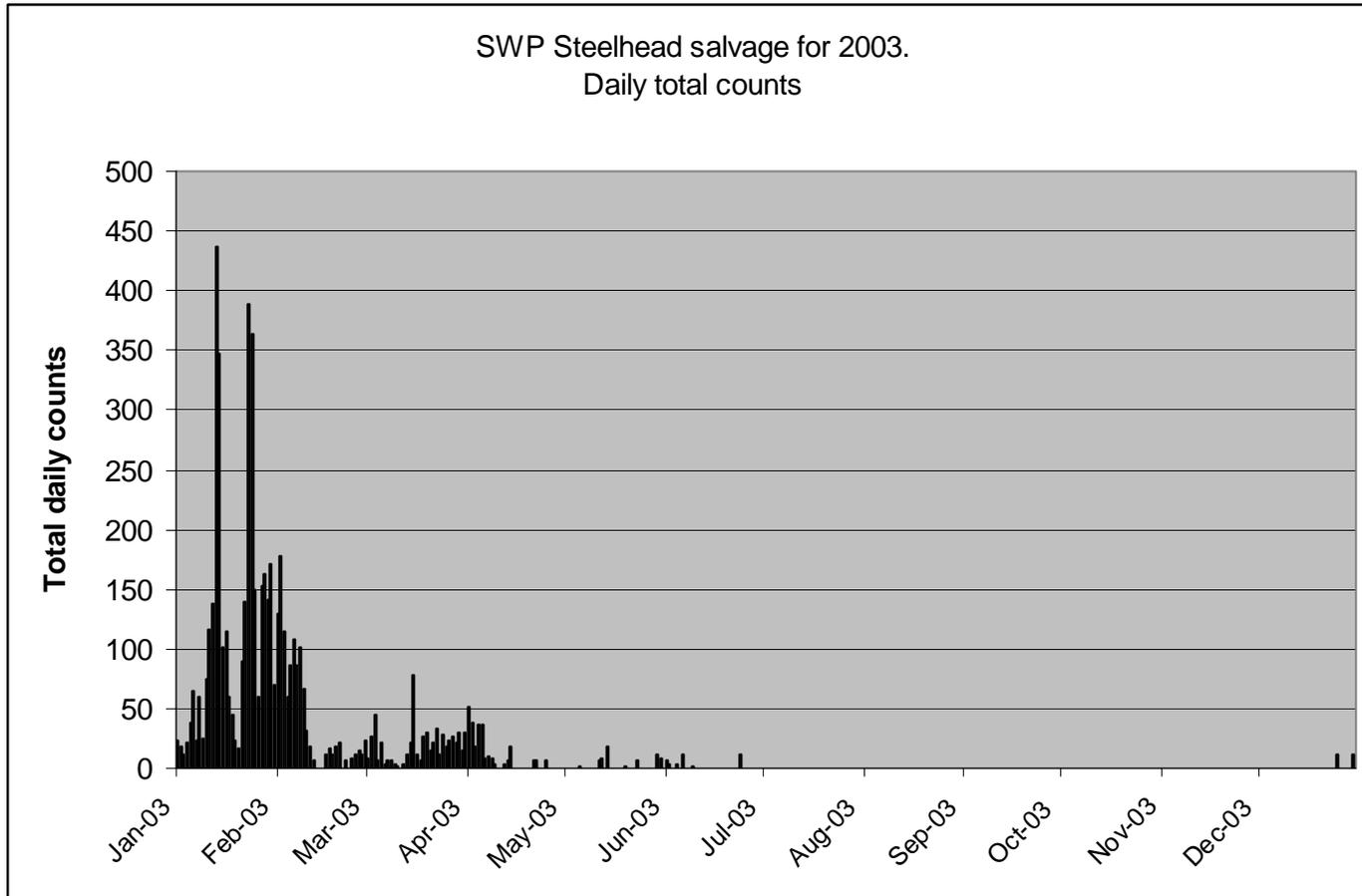
Year/Month	Species	Pre-Screen Loss (%)	Fork Length (mm)*
1976/OCT	Salmon	97	114
1978/OCT	Salmon	88	87
1984/APR	Salmon	63	79
1984/JUL	Striped Bass	94	52
1985/APR	Salmon	75	44
1986/AUG	Striped Bass	70	55
1992/MAY	Salmon	99	77
1992/DEC	Salmon	78	121
1993/APR	Salmon	95	66
1993/NOV	Salmon	99	117

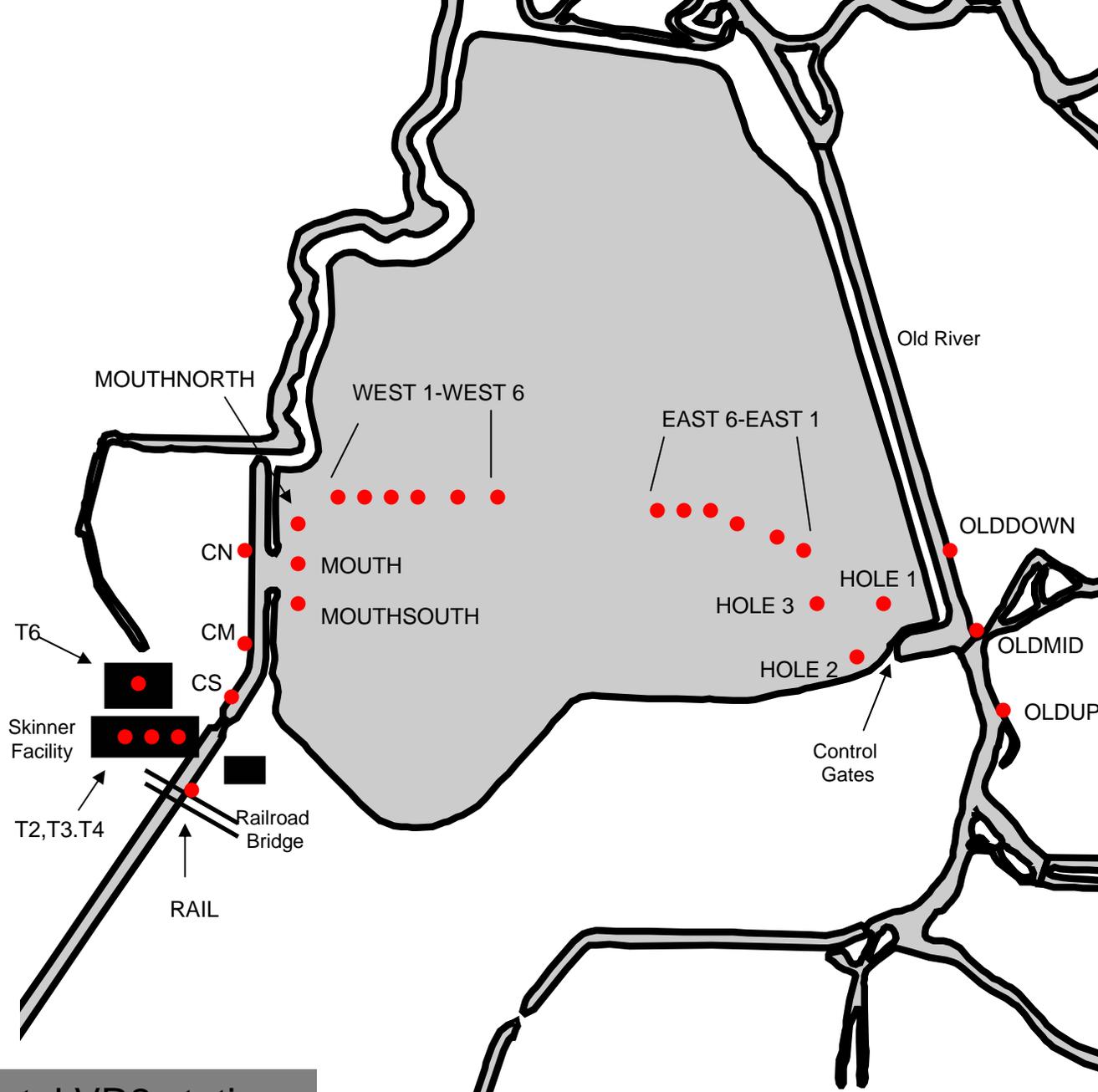
(Source: Gingras, M. 1997. Mark/recapture experiments at Clifton Court Forebay to estimate prescreening loss to juvenile fishes: 1976-1993.)

OBJECTIVES OF THE 2005 PILOT STUDY

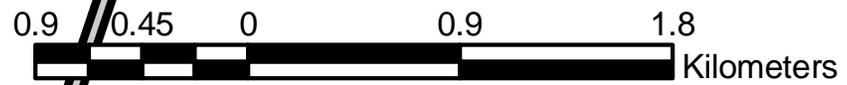
- Obtain preliminary information on the behavior and fate of tagged steelhead entrained into Clifton Court Forebay;
- Determine the suitability of mark-recapture methods to measure the loss of steelhead due to predation within the forebay (e.g. residence time within the forebay, emigration through the radial gates, etc.);
- Determine the efficacy of ultrasonic telemetry to monitor movement and fate of steelhead and striped bass; and
- Refine and validate field methods to be used in the 2006 field investigation to quantify steelhead pre-screening losses within the forebay.

Seasonal timing of steelhead



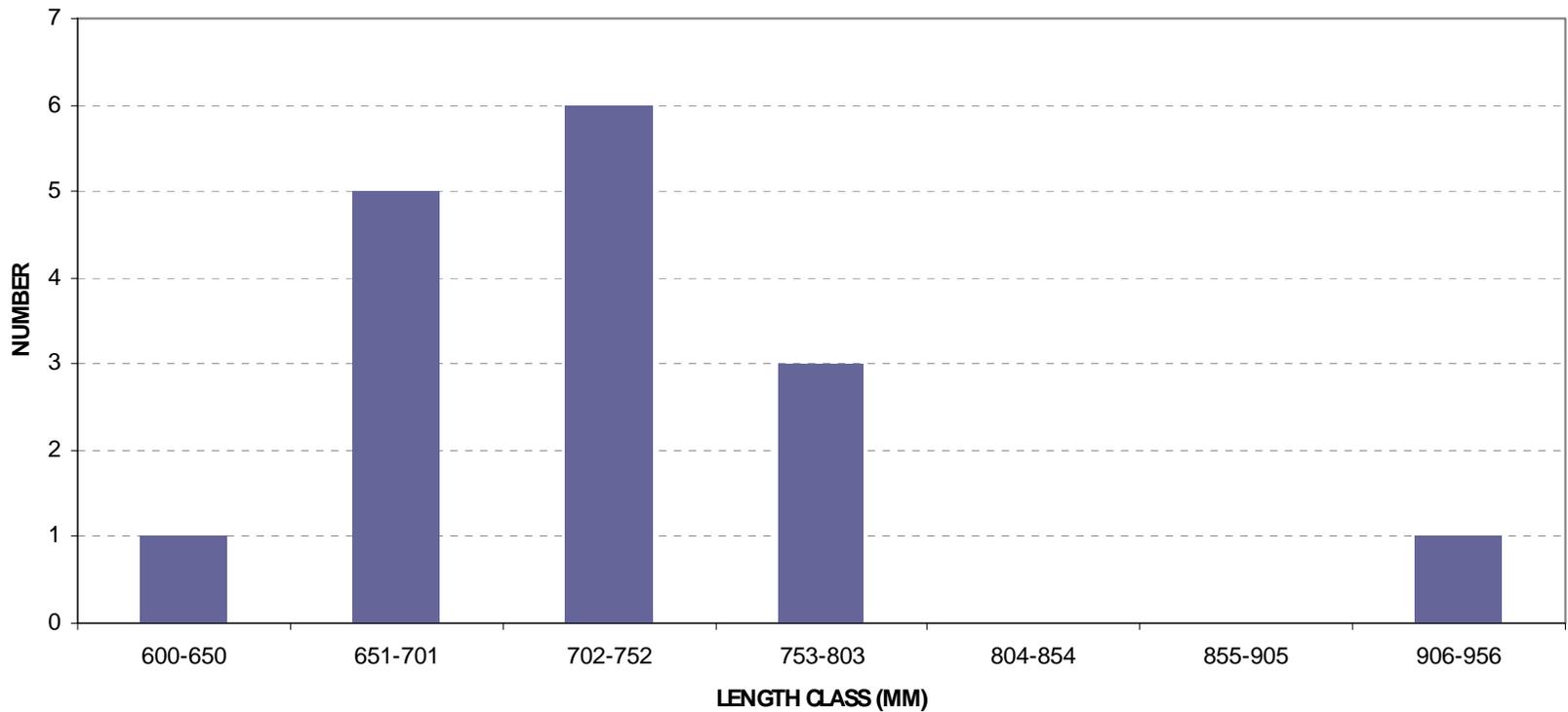


29 total VR2 stations



Striped Bass Size

LENGTH FREQUENCY OF TAGGED STRIPED BASS AT CLIFTON COURT FOREBAY
3/16/05 - 3/18/05

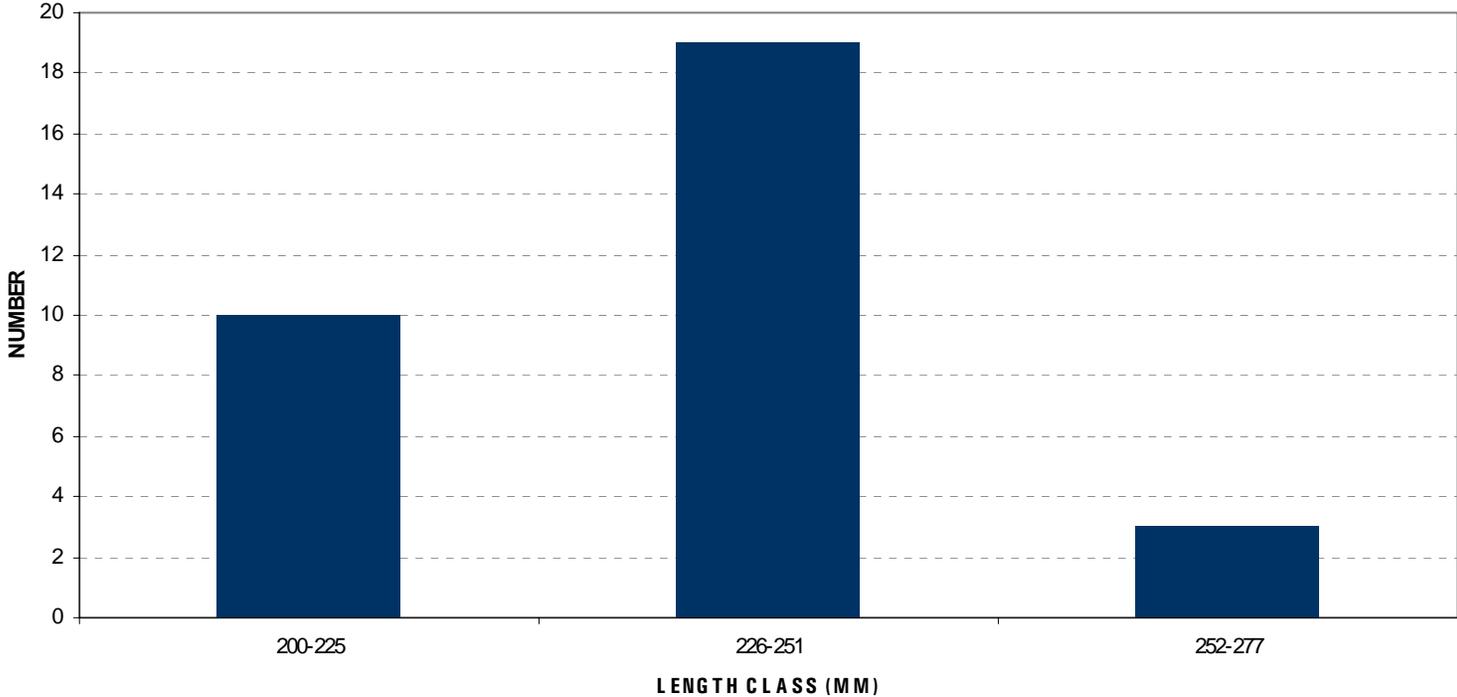


Acoustic tags externally mounted on striped bass
> 24 inches



Steelhead size

LENGTH FREQUENCY OF TAGGED STEELHEAD AT CLIFTON COURT FOREBAY
3/22/05 - 4/5/05



VEMCO TAG SUMMARY ON % BODY WEIGHT FOR STEELHEAD

TAG WEIGHT (g)	STEELHEAD WEIGHT (g)	TAG AS % BODY WEIGHT
3.3	121	2.73 %
3.3	146	2.26 %
3.3	150	2.20 %
3.3	155	2.13 %
3.3	160	2.06 %
3.3	165	2.00 %
3.3	170	1.94 %

Surgical implantation of acoustic tags

- Steelhead acclimated to holding tanks for minimum 48 hours after delivery from hatchery
- Acoustic tags surgically implanted into steelhead
- Steelhead post surgery recovery and monitoring minimum 48 hours before release



Making incision for tag implantation into stomach cavity (2.5 cm).

Incision closed with 3 to 5 sutures after tag implantation.



Post tag survival monitoring

10 control fish (untagged) and 10 tagged fish (dummy tags) held for observation for minimum 30 days to monitor for post tagging mortality.

	<u>Number</u>	<u>Observation Duration (days)</u>	<u>% Survival</u>
Control Fish	10	46	100%
Tagged Fish	10	30	100%

Steelhead releases

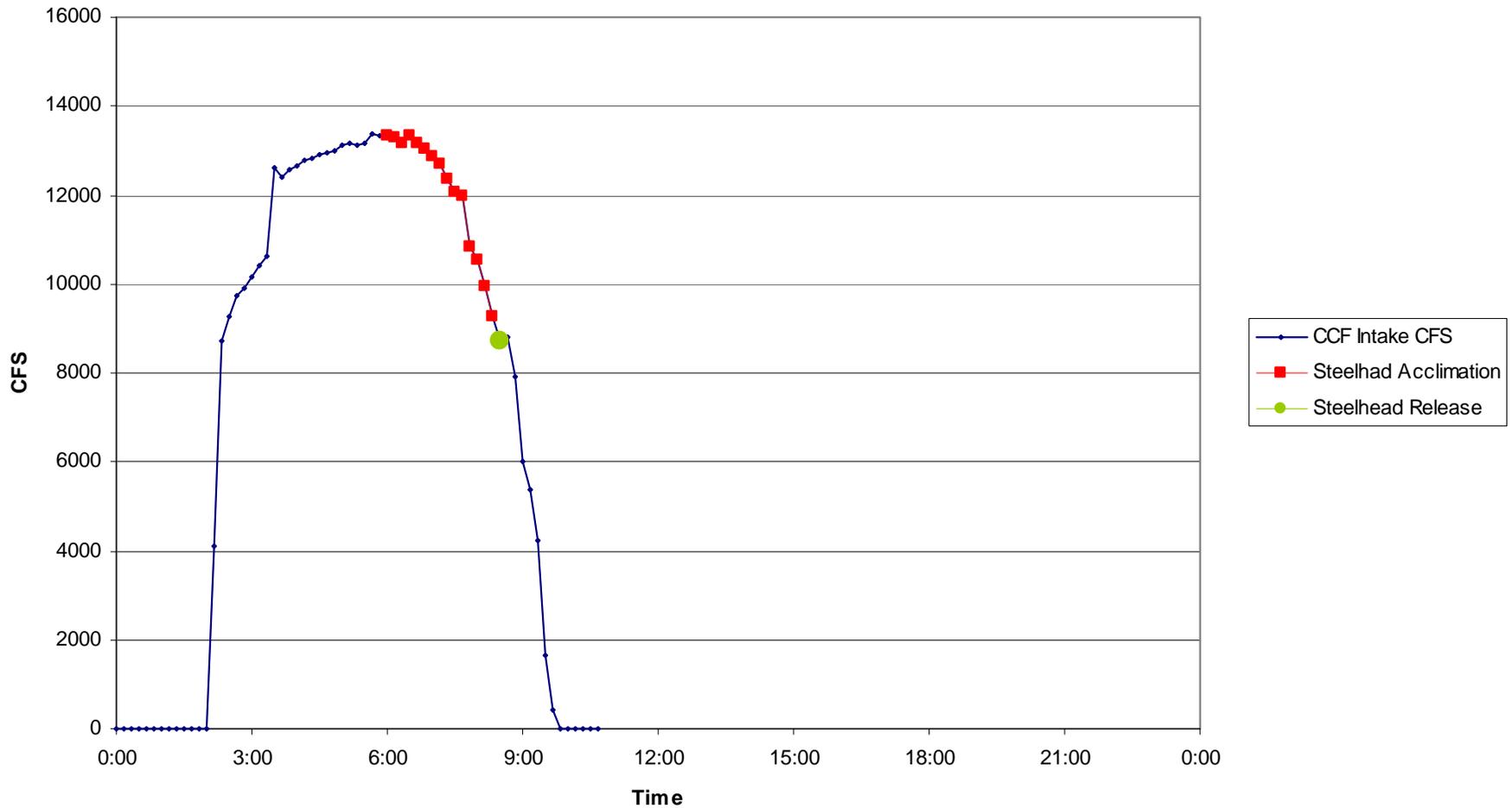
- 3 groups of steelhead released
- 1 group of 10 every 24 hours
- Groups of 10 minimize live car crowding
- Releases between 4/5/05 and 4/7/05
- Acclimated to conditions for 2 hours
- Released directly upstream of radial gates

Steelhead Releases



HYDRAULICS DURING RELEASE

4-6-05 Steelhead Release Summary



Results

- Steelhead / striped bass movement in CCF
- Transit times through CCF
- Emigration from CCF
- Bathymetry
- Problems determining steelhead predation
- Incidental observations (birds, sea lions, fishermen/radial gates/locations)

Steelhead #1962

Release- 4/5 (0830)

1 4/5 (0704-0816)

2 4/5 (0819-1213)

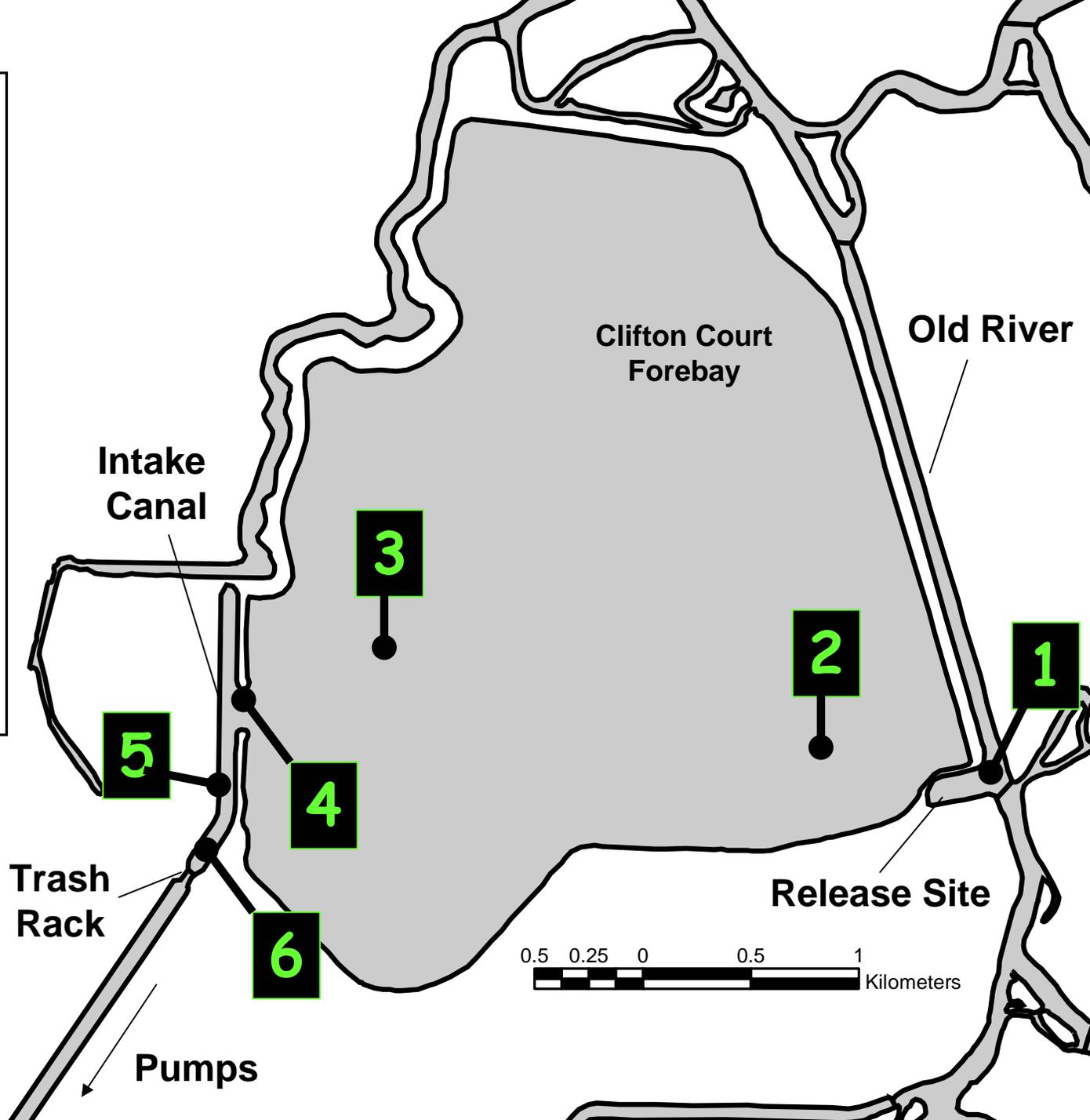
3 4/5 (1540-2012)

4 4/5 (2016)-
4/6 (0208)

5 4/6 (0209-0220)

6 4/6 (0222-02218)
4/18 (1054-2111)

7 4/19



Clifton Court Forebay

Old River

Intake Canal

3

2

1

5

4

6

Release Site

7



Salvage Tank

Trash Rack

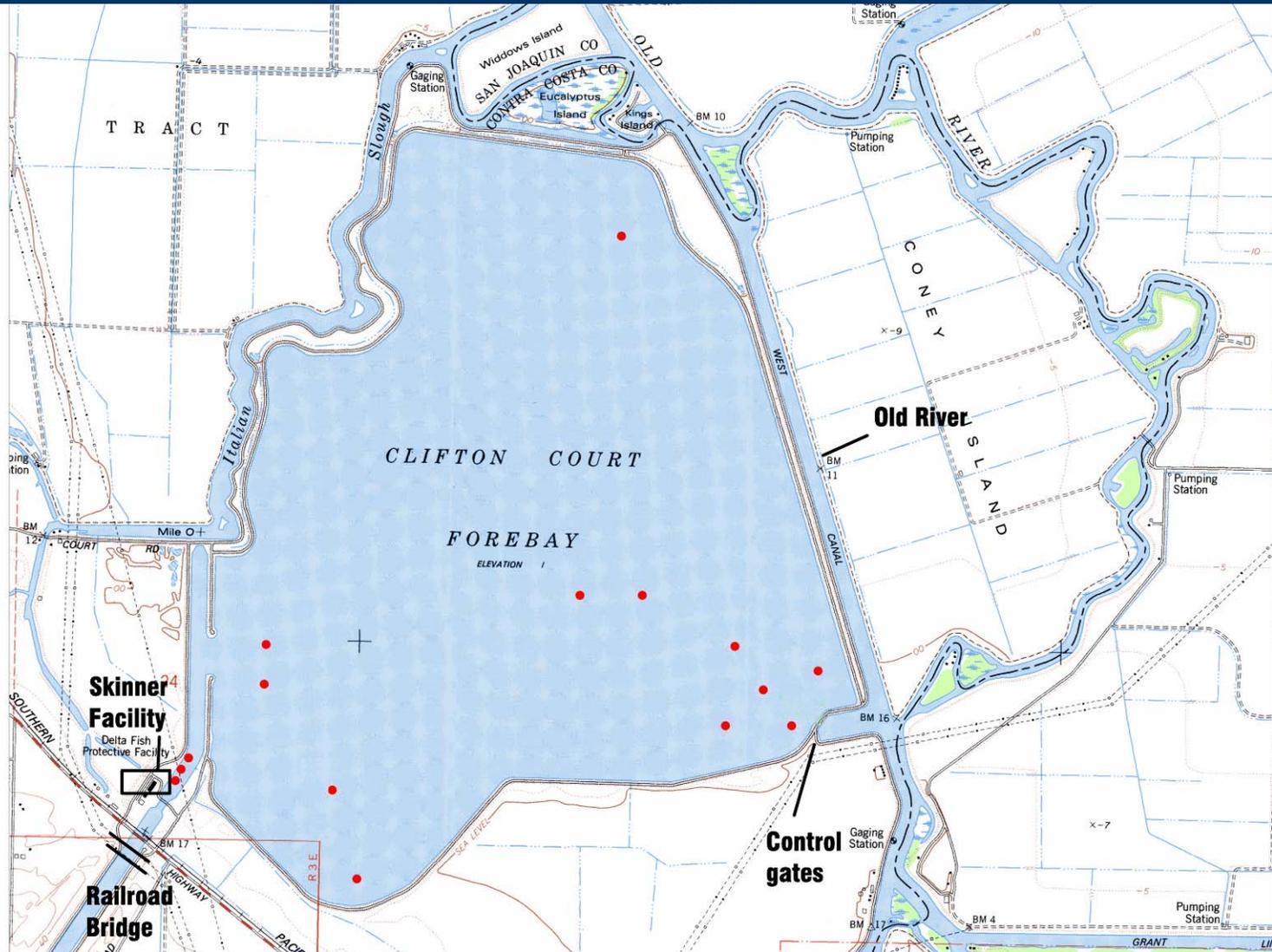
Pumps



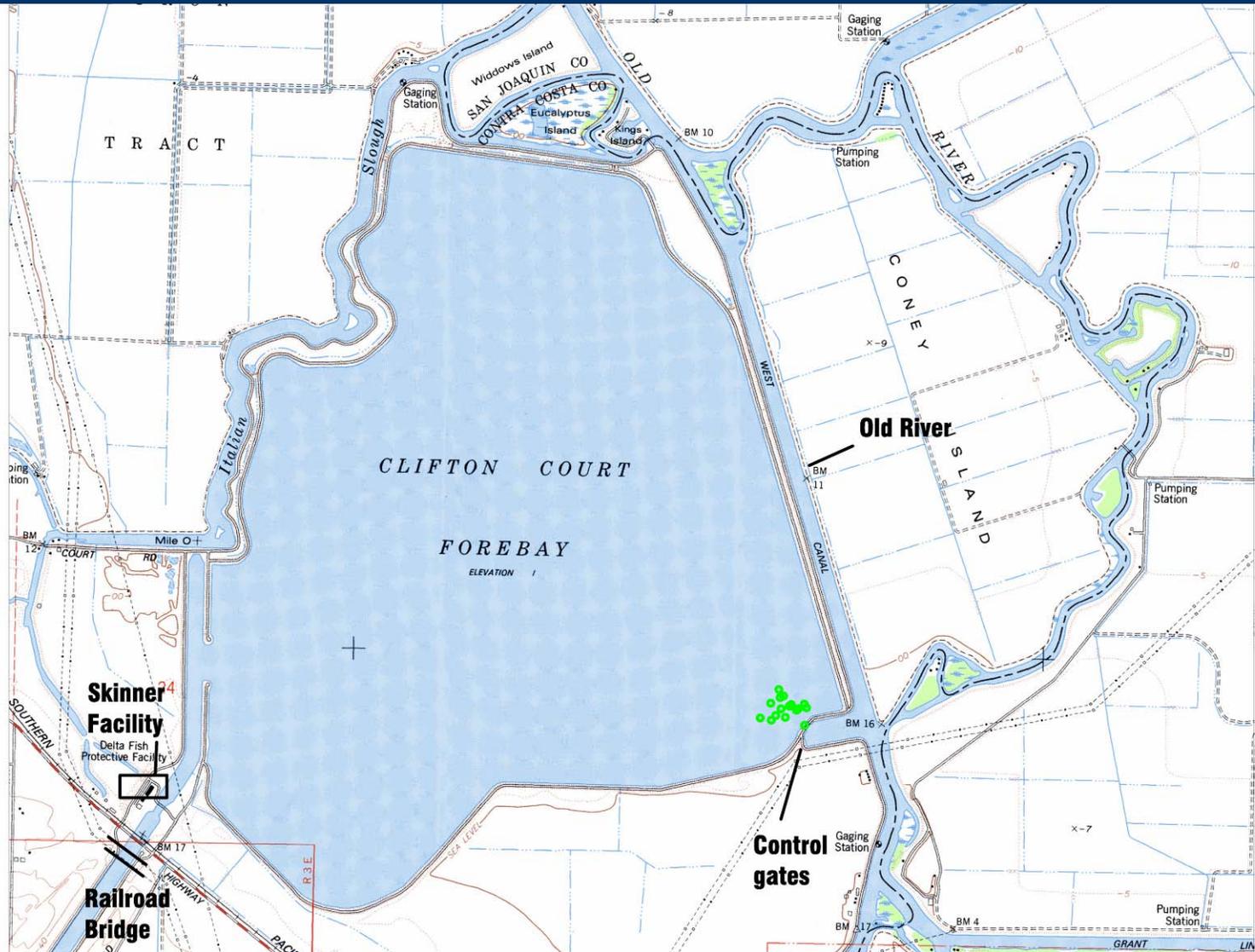
Steelhead transit times, CCF

Fish ID#	Release Date	Intake Canal (VR2: 3177) days	Trash Rack (VR2: 3204) days	Salvage Tank (VR2: 3178) days	Old River (VR2: 3186 or 3174) days
1961	5-Apr				1.29
1962	5-Apr	0.49	0.74	13.9	
1963	5-Apr	11.54	11.57		
1964	5-Apr				
1965	5-Apr	0.81	0.82		
1966	5-Apr	2.65	13.34		
1968	5-Apr	0.62	3.39		9.22
1969	5-Apr	0.6	2.31		
1970	5-Apr	0.35	0.37		
1974	5-Apr	32.31	32.33		
1975	6-Apr	0.42	0.44	10.57	
1976	6-Apr	22.48	30.75	30.77	
1977	6-Apr				
1980	6-Apr	6.53			
1981	6-Apr	3.92	8.01		22.82
1982	6-Apr	1.91		2.09	
1983	6-Apr				
1984	6-Apr				
1985	6-Apr				
1986	6-Apr	1.95			
1987	7-Apr				
1971	7-Apr	0.23	0.25		
1972	7-Apr				
1973	7-Apr				
1976	7-Apr				
1979	7-Apr				
1987	7-Apr				
1988	7-Apr				2.21
1989	7-Apr	0.24			
1990	7-Apr	0.24			
MEAN		5.15	8.69	14.33	8.89
No. fish		17/30	13/30	4/30	4/30

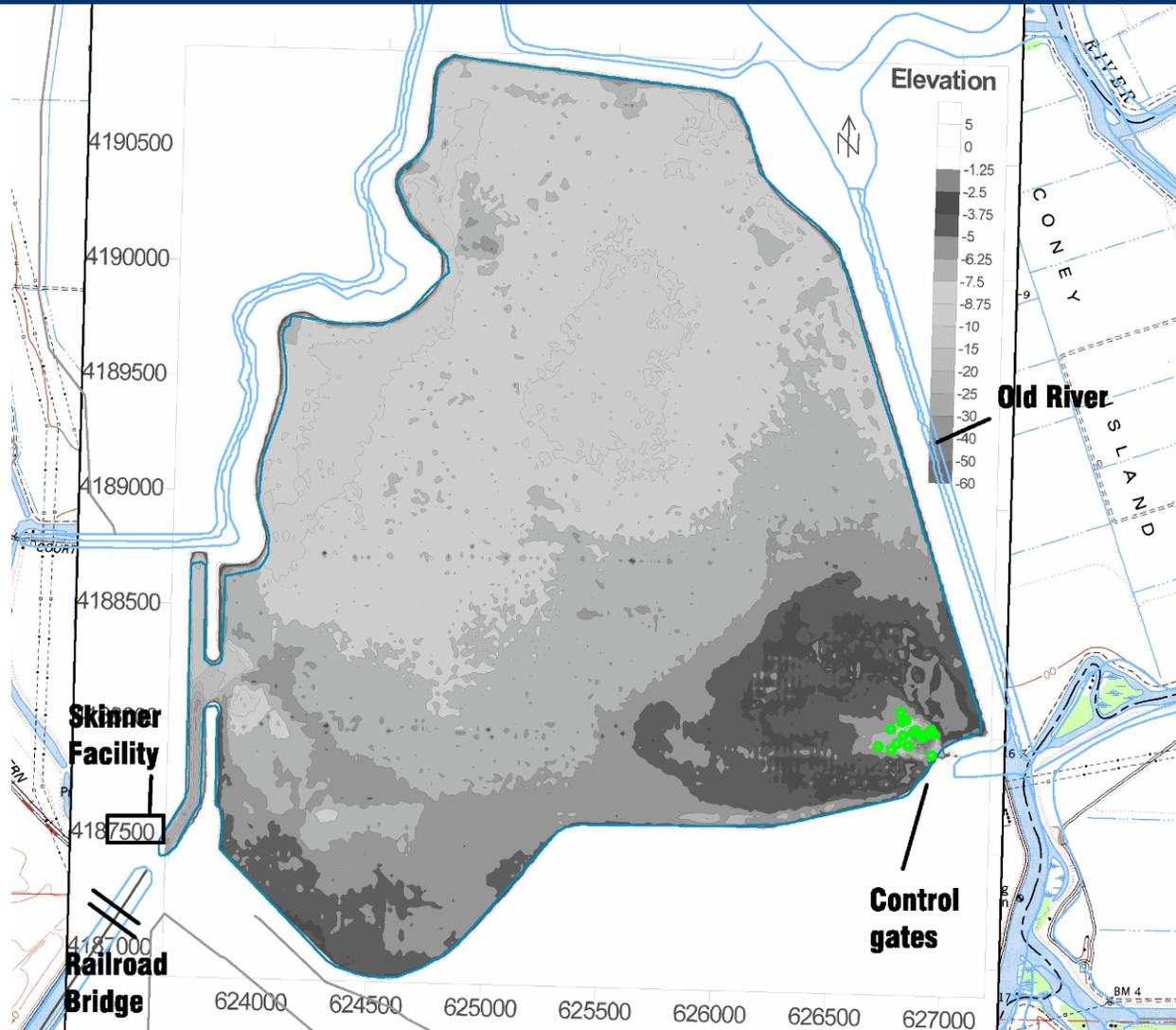
Steelhead Dispersal 4/18 – 4/25



Striped Bass Concentrations



Bathymetry – Showing Striped Bass



Striper #1398

Release- 3/17 (1316)

- Deep Hole to Canal 11 times
- Trash Rack
- Back to Deep Hole
- Out to Old River
- Back to Deep Hole
- Out to Old River-6/6 (1913)



Clifton Court Forebay

Old River

Intake Canal

Trash Rack

Pumps

Release Site



Striped bass transit times, CCF

Fish ID#	Release Date	Intake Canal (3177) days	Trash Rack (3204) days	Old River (3186 or 3174) days
1380	16-Mar	5.63	6.12	
1388	16-Mar			
1389	17-Mar	2.18	2.6	
1394	17-Mar	2.33	3.82	
1398	17-Mar	1.22	45.7	49.12
1399	17-Mar	0.29	17.26	44.76
1381	18-Mar	10.72	10.75	
1382	18-Mar	16.67		34.26
1383	18-Mar	2.32	8.47	
1384	16-Mar			
1385	18-Mar			
1387	18-Mar			
1390	18-Mar	0.84	3.59	28.15
1391	18-Mar	1.07	1.28	29.04
1395	18-Mar	0.89	3.21	34.25
1396	18-Mar			3.03
	MEAN	4.01	10.28	31.80

2006 STEELHEAD SURVIVAL INVESTIGATION

- Quantify pre-screen losses for juvenile steelhead within Clifton Court Forebay
- Late-winter/spring 2006
- Mark-recapture experimental design with multiple small release groups simulating forebay entrainment
- PIT tag and ultra sonic tags
- Document emigration from forebay
- Document salvage
- Two methods for quantitatively estimating pre-screen losses
- Experimental design available for review and comment in August 2005