MEMORANDUM FOR RECORD

SUBJECT: DETERMINATION ON THE SUITABILITY OF PROPOSED DREDGED MATERIAL TESTED FOR THE FEDERAL SWINOMISH CHANNEL NAVIGATION DREDGING PROJECT (NWS-OD-TS-32) EVALUATED UNDER SECTION 404 OF THE CLEAN WATER ACT FOR EITHER OPEN-WATER DISPOSAL AT THE ROSARIO STRAIT DISPERSIVE DISPOSAL SITE, OR AN APPROPRIATE BENEFICIAL USE SITE.

1. The following summary reflects the consensus suitability determination of the Agencies that comprise the regional Dredged Material Management Program (DMMP) for the State of Washington on testing conducted for the dredging of the U.S. Army Corps of Engineers Federal Swinomish Channel Navigation Project. The project is located within the Port of Skagit County and Port of Anacortes, services Swinomish Tribal facilities, and provides a protected passage for vessel access to facilities on Swinomish Channel and between north and south Puget Sound . The DMMP agencies include the Corps of Engineers, Department of Ecology, Department of Natural Resources, and the Environmental Protection Agency. These agencies are charged with determining the suitability of the proposed maintenance dredging of up to 152,000 cy of proposed dredged material from the Federal authorized navigation channel for either open-water disposal at the Rosario Strait dispersive disposal site, or placement at an appropriate beneficial use site.

2. **Table 1** documents the regulatory tracking information and dates for the DMMP testing conducted.

Table 1. Regulatory Tracking Information and Dates

Initial SAP submittal date:	September 11, 2009
SAP approval letter date	September 16, 2009
Sampling date: USACE M/V Shoalhunter	September 23, 2009
Characterization Report submittal:	December 10, 2009
Volume Tested (# DMMUs), Sampling Method:	152,000 cy; (3 DMMUs); Van-Veen Grab
DAIS Tracking Number:	SWINC-1-A-F-280
Recency Determination Date: **Low** = 7 **years**	September 2016 (**Low**)

Background:

3. The Swinomish Channel underwent PSDDA/DMMP characterizations in 1988, 1994, and 2002, and all material was found suitable for dispersive site disposal at Rosario Strait, and appropriate beneficial uses projects. The project consists of shallow-draft navigation project, which is maintained to its authorized depth of -12 feet MLLW (mean lower low water) + 2 feet of allowable overdepth (**Figure 1**).

4. The project was ranked **Low** for DMMP characterization. The initial SAP was submitted on September 11, 2009, and approved by the DMMP agencies on September 16, 2009 (See **Table 1**).

Sampling:

5. **Figure 1** depicts the site vicinity and **Figures 2-10** depict the locations for the 22 sampling stations occupied for the 2009 characterization effort. The three DMMUs were comprised of composited samples from 8 stations/samples respectively in DMMUs 1 and 2, and 6 stations/samples in DMMU-3 (see **Table 2**). Sampling from the USACE Motor Vessel (M/V) Shoalhunter on September 23, 2009, consisted of collecting surface samples with a Van-Veen grab sampler at all 22 stations. The Data Characterization Report was submitted to the DMMP agencies for review on December 10, 2009, and included full data validation on the dioxin testing results. The DMMP agencies concluded, after reviewing the data validation report, that the data was acceptable for decision-making using best professional judgment

Table 2. Actual Sediment Sampling Locations (Swinomish Channel O&M)

Location	DMMU	Latitude	Longitude	Depth (feet below MLLW)
1	1	48 21.7386 N	122 33.0964 W	10.5
2	1	48 21.8061 N	122 32.7815 W	9.3
3	1	48 21.8243 N	122 32.6983 W	8.1
4	1	48 21.8389 N	122 32.6297 W	7.7
5	1	48 21.8543 N	122 32.5590 W	7.7
6	1	48 21.8690 N	122 32.4887 W	9.8
7	1	48 21.8810 N	122 32.4212 W	11.9
8	1	48 21.9031 N	122 32.3186 W	11.8
9	2	48 22.2940 N	122 30.6088 W	9.5
10	2	48 22.2852 N	122 30.5455 W	7.5
11	2	48 22.6584 N	122 30.4894 W	10.9
12	2	48 23.0984 N	122 30.3352 W	11.5
13	2	48 24.0056 N	122 29.8140 W	12.2
14	2	48 26.1778 N	122 30.0503 W	10.5
15	2	48 26.2975 N	122 30.1249 W	10.6
16	2	48 27.2423 N	122 30.8667 W	7.1
17	3	48 27.6376 N	122 30.9729 W	10.2
18	3	48 27.6652 N	122 31.0034 W	10.7
19	3	48 27.7196 N	122 31.0645 W	11.4
20	3	48 28.1167 N	122 31.3726 W	10.8
21	3	48 28.6948 N	122 31.8325 W	11.6
22	3	48 29.0216 N	122 32.0812 W	11.9

Chemical Testing Results:

6. The conventional and DMMP chemical analyses results are summarized in **Table 3,** and the comparative SMS evaluation summary is provided in **Table 3**. It demonstrates that for chemicals of concern including dioxin/furan, no chemicals exceeded DMMP screening level

guidelines, or bioaccumulation triggers. Evaluation of these data relative to SMS guidelines, indicate that there were no Sediment Quality Standard (SQS) exceedances within any of the three DMMUs.

7. **Table 4** provides a summary of the validated dioxin/furan congener specific testing results for the three DMMUs, which also included a duplicate analysis of DMMU-2. Quantitated toxicity equivalence concentrations (TEQ ½ DL) were low, ranging from a low of 0.162 pptr (DMMU-1) to a high of 0.169 pptr (DMMU-3) for the dioxin testing results.

8. The DMMP agencies are currently using an interim process for interpreting dioxin data (http://www.nws.usace.army.mil/PublicMenu/Menu.cfm?sitename=DMMO&pagename=Dioxin_Guidelines) pending the development of a programmatic regulatory framework, expected in late 2009. All three DMMUs were quantitated below the Samish Reference Bay Interim Dioxin/Furan Guideline of **2.44-pptr-TEQ,** which is applicable for disposal at the Rosario Strait dispersive site.

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Suitability Determination:

9. The results of these analyses in summary (all DMMP COC and dioxins/furans) indicate that all 152,000 cy of proposed dredged material are suitable for unconfined open-water disposal at the Rosario Strait dispersive site based on these testing results using best professional judgment (BPJ).

10. The results of these analyses compared to SMS guidelines, indicate that all 152,000 cy of proposed dredged material are suitable for an appropriate beneficial use project.

11. This memorandum documents the suitability of material proposed for dredging from the Swinomish Channel Federal maintenance dredging project in Skagit County, Washington, for either open-water disposal at the Rosario Strait dispersive disposal site, or at an appropriate beneficial use site. However, this suitability determination does not constitute final agency approval of the project. A dredging plan for this project must be completed as part of the final project approval process. A final decision will be made after full consideration of agency input, and after an alternatives analysis is done under Section 404(b)(1) of the Clean Water Act.

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Concur:

12/16/2009
Date

David Kendall, Ph.D., Seattle District Corps of Engineers

12/15/2009
Date

Laura Inouye, Ph.D., Washington Department of Ecology

12/16/09
Date

Justine Barton, Environmental Protection Agency, Region 10

12/11/2009
Date

Dave Vagt, Washington Department of Natural Resources

Hiram Arden, Corps Navigation Project Manager
Laura Inouye, Ph.D., Ecology
Justine Barton, EPA
Dave Vagt, DNR
DMMO File

Table 3. Chemical Testing and DMMP Outcome Summary for Swinomish Channel O Project

DMMU-ID (Sample ID)				DMMU-C1 (SC09-D01-S)				DMMU-C2 (SC09-D02-S)				DMMU-C3 (SC09-D03-S)			
Collection Date	**SL**	**BT**	**ML**	**09/23/2009**	**LQ**	**VQ**	**SMS**	**09/23/2009**	**LQ**	**VQ**	**SMS**	**09/23/2009**	**LQ**	**VQ**	**SMS**
Conventionals				**DMMP (dry wgt)**			**ug/kg-oc-norm**	**DMMP (dry wgt)**			**ug/kg-oc-norm**	**DMMP (dry wgt)**			**ug/kg-oc-norm**
Ammonia (mg N/kg DW)				0.13	U			0.12	U			0.9			
Total Volatile Solids (% WW)				0.84				0.87				1.33			
Total Organic Carbon (% WW)				0.112				0.095				0.273			
Sulfide (mg/kg DW)				1.37	U			1.36	U			1.9			
Total Solids (% DW)				73.8				76.3				71.4			
Grain Size (%)															
Gravel, %				**<0.1**				**0.9**				**<0.1**			
Sand, %				**97.3**				**97.2**				**90.4**			
Silt, %				**0.9**				**0.3**				**7.1**			
Clay, %				**1.7**				**1.7**				**2.6**			
Fines, %				**2.6**				**2**				**9.7**			
Metals (mg/kg)															
Antimony	150	---	200	6	U	UJ		6	U	UJ		7	U	UJ	
Arsenic	57	507.1	700	6	U			6	U			7	U		
Cadmium	5.1	11.3	14	0.3	U			0.3	U			0.3	U		
Chromium	---	267	---	21				21.8				18.4			
Copper	390	1027	1300	10.6				8.2				6			
Lead	450	975	1200	3	U			3	U			3	U		
Mercury	0.41	1.5	2.3	0.02	U			0.03	U			0.03	U		
Nickel	140	370	370	26				20				18			
Selenium	---	3	---	0.6	U			0.6	U			0.6	U		
Silver	6.1	6.1	8.4	0.4	U			0.4	U			0.4	U		
Zinc	410	2783	3800	27				27				28			
Low-Molecular PAHs (ug/kg)															
Naphthalene	2100	---	2400	20	U		17.9	20	U		21.1	20	U		7.3
Acenaphthylene	560	---	1300	20	U		17.9	20	U		21.1	20	U		7.3
Acenaphthene	500	---	2000	20	U		17.9	20	U		21.1	20	U		7.3
Fluorene	540	---	3600	20	U		17.9	20	U		21.1	20	U		7.3
Phenanthrene	1500	---	21000	20	U		17.9	20	U		21.1	20	U		7.3
Anthracene	960	---	13000	20	U		17.9	20	U		21.1	20	U		7.3
2-Methylnaphthalene	670	---	1900	20	U		17.9	20	U		21.1	20	U		7.3
Total LPAHs	5200	---	29000	20	U		17.9	20	U		21.1	20	U		7.3
High-Molecular PAHs (ug/kg)															
Fluoranthene	1700	4600	30000	20	U		17.9	20	U		21.1	20	U		7.3
Pyrene	2600	11980	16000	20	U		17.9	20	U		21.1	20	U		7.3
Benz(a)anthracene	1300	---	5100	20	U		17.9	20	U		21.1	20	U		7.3
Chrysene	1400	---	21000	20	U		17.9	20	U		21.1	20	U		7.3
Benzofluoranthene	3200	---	9900	20	U		17.9	20	U		21.1	20	U		7.3
Benzo(a)pyrene	1600	---	3600	20	U		17.9	20	U		21.1	20	U		7.3
Indeno(1,2,3-cd)pyrene	600	---	4400	20	U		17.9	20	U		21.1	20	U		7.3
Dibenzo(a,h)anthracene	230	---	1900	20	U		17.9	20	U		21.1	20	U		7.3
Benzo(g,h,i)perylene	670	---	3200	20	U		17.9	20	U		21.1	20	U		7.3
Total HPAHs	12000	---	69000	20	U		17.9	20	U		21.1	20	U		7.3
Chlorinated Hydrocarbons (ug/kg)															
1,3-Dichlorobenzene	170	---	---	1	U		0.9	1	U		1.1	0.9	U		0.3
1,4-Dichlorobenzene	110	---	120	1	U		0.9	1	U		1.1	0.9	U		0.3
1,2-Dichlorobenzene	35	---	110	1	U		0.9	1	U		1.1	0.9	U		0.3
1,2,4-Trichlorobenzene	31	---	64	6	U		5.4	6	U		6.3	6	U		2.2
Hexachlorobenzene	22	168	230	6	U		5.4	6	U		6.3	6	U		2.2
Phthalates (ug/kg)															
Dimethyl phthalate	71	---	1400	20	U		17.9	20	U		21.1	20	U		7.3
Diethyl phthalate	200	---	1200	20	U		17.9	20	U		21.1	20	U		7.3
Dibutyl phthalate	1400	---	5100	20	U		17.9	20	U		21.1	20	U		7.3
Butyl benzyl phthalate	63	---	970	20	U		17.9	20	U		21.1	20	U		7.3
Bis(2-Ethylhexyl) Phthalate	1300	---	8300	20	U		17.9	20	U		21.1	**12**	**J**		4.4
Di-N-Octyl Phthalate	6200	---	6200	20	U		17.9	20	U		21.1	20	U		7.3
Phenols (ug/kg)															
Phenol	420	---	1200	20	U			20	U			20	U		

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DMMU-ID (Sample ID)				DMMU-C1 (SC09-D01-S)				DMMU-C2 (SC09-D02-S)				DMMU-C3 (SC09-D03-S)			
Collection Date	**SL**	**BT**	**ML**	**09/23/2009**	**LQ**	**VQ**	**SMS**	**09/23/2009**	**LQ**	**VQ**	**SMS**	**09/23/2009**	**LQ**	**VQ**	**SMS**
2-Methylphenol	63	---	77	6	U			6	U			6	U		
4-Methylphenol	670	---	3600	20	U			20	U			20	U		
2,4-Dimethylphenol	29	---	210	6	U			6	U			6	U		
Pentachlorophenol	400	504	690	30	U			30	U			30	U		
Miscellaneous Extractables (ug/kg)															
Benzyl Alcohol	57	---	870	20	U			20	U			20	U		
Benzoic Acid	650	---	760	200	U			200	U			200	U		
Dibenzofuran	540	---	1700	20	U			20	U			20	U		
Hexachloroethane	1400	---	14000	20	U			20	U			20	U		
Hexachlorobutadiene	29	---	270	6	U			6	U			6	U		
N-Nitrosodiphenylamine	28	---	130	6	U			6	U			6	U		
Volatile Organics (ug/kg)															
Trichloroethene	160	---	1600	1	U			1	U			0.9	U		
Tetrachloroethene	57	---	210	1	U			1	U			0.9	U		
Ethylbenzene	10	---	50	1	U			1	U			0.9	U		
Total Xylenes	40	---	160	1	U			1	U			0.9	U		
Pesticides (ug/kg)															
4,4'-DDE	---	---	---	2	U			1.9	U			2	U		
4,4'-DDD	---	---	---	2	U			1.9	U			2	U		
4,4'-DDT	---	---	---	2	U			1.9	U			2	U		
Total DDT	6.9	50	69	2	U			1.9	U			2	U		
Aldrin	10	---	---	0.98	U			0.96	U			0.99	U		
alpha-Chlordane				0.98	U			0.96	U			0.99	U		
gamma-Chlordane				0.98	U			0.96	U			0.99	U		
Total Chlordane	10	37		0.98	U			0.96	U			0.99	U		
Dieldrin	10	---	---	2	U			1.9	U			2	U		
Heptachlor	10	---	---	0.98	U			0.96	U			0.99	U		
Lindane	10	---	---	0.98	U			0.96	U			0.99	U		
Organotins															
Tributyltin ion (ug/kg) - bulk sediment	73	73		3.5	U			3.5	U			3.6	U		
PCB Aroclors (ug/kg)															
PCB-aroclor 1016	---	---	---	9.8	U			9.7	U			9.9	U		
PCB-aroclor 1221	---	---	---	9.8	U			9.7	U			9.9	U		
PCB-aroclor 1232	---	---	---	9.8	U			9.7	U			9.9	U		
PCB-aroclor 1242	---	---	---	9.8	U			9.7	U			9.9	U		
PCB-aroclor 1248	---	---	---	9.8	U			9.7	U			9.9	U		
PCB-aroclor 1254	---	---	---	9.8	U			9.7	U			9.9	U		
PCB-aroclor 1260	---	---	---	9.8	U			9.7	U			9.9	U		
Total PCBs	130	---	3100	9.8	U		8.8	9.7	U		10.2	9.9	U		3.6
Total PCBs (mg/kg TOC)	---	38*	---	8.8	U			10.2	U			3.6	U		
Dioxin, pptr-TEQ (DL = 1/2) see Table 4				0.162				0.166				0.169			
Dioxin, pptr-TEQ (DL = 0) see Table 4				0.0024				0.00432				0.00808			
Toxicity Testing Conducted: (yes/no)				No				No				No			
BTs exceeded: (yes/no)				No				No				No			
Bioaccumulation Conducted: (yes/no)				No				No				No			
ML Rule ExceededDMMP Determination (yes/no)				No				No				No			
Mean Grab sampling depth, ft				0.3				0.3				0.3			
Maximum sampling depth (mudline) (with Z-sample)				NA				NA				NA			
Number of Stations Composited / DMMU				8				8				6			
DMMU Volume (cubic yards):				62,000				39,500				50,500			
DMMP Determination: (Suitable / Unsuitable UCOWD):				**Suitable (UCOWD)**			**Suitable (BU)**	**Suitable (UCOWD)**			**Suitable (BU)**	**Suitable (UCOWD)**			**Suitable (BU)**
				DMMU-C1 (SC09-D01-S)				**DMMU-C2 (SC09-D02-S)**				**DMMU-C3 (SC09-D03-S)**			

UCOWD = Unconfined-open-water disposal (Rosario Strait Dispersive site); BU = Beneficial Uses

U = Undetetected; J = Estimated value

Table 4. Dioxin Testing Summary for Swinomish Channel O Project

DMMU ID (Sample ID)		DMMU-C1 (SC09-D01-S)			DMMU-C2 (SC09-D02-S)			DMMU-C3 (SC09-D03-S)			DMMU-C2 dup (SC09-D02-D)		
Dioxin/Furan Congeners (ng/kg-dw)	**TEF**	**ng/kg-dw**	**LQ**	**TEQ**	**ng/kg-dw**	**LQ**	**TEQ**	**ng/kg-dw**	**LQ**	**TEQ**	**ng/kg-dw**	**LQ**	**TEQ**
2,3,7,8-TCDD	1	0.0467	U	0.023	0.0496	U	0.0248	0.0481	U	0.02405	0.0503	U	0.02515
1,2,3,7,8-PeCDD	1	0.13	U	0.065	0.13	U	0.065	0.13	U	0.065	0.13	U	0.065
1,2,3,4,7,8-HxCDD	0.1	0.19	U	0.0095	0.19	U	0.0095	0.19	U	0.0095	0.19	U	0.0095
1,2,3,6,7,8-HxCDD	0.1	0.19	U	0.0095	0.19	U	0.0095	0.19	U	0.0095	0.19	U	0.0095
1,2,3,7,8,9-HxCDD	0.1	0.19	U	0.0095	0.19	U	0.0095	0.19	U	0.0095	0.19	U	0.0095
1,2,3,4,6,7,8-HpCDD	0.01	**0.213**	J	**0.00213**	**0.379**	J	**0.00379**	**0.679**	J	**0.00679**	**0.321**	J	**0.00321**
OCDD	0.0003	**0.886**	J	**0.000266**	**1.76**	J	**0.000528**	**4.29**	J	**0.001287**	**1.72**	J	**0.000516**
2,3,7,8-TCDF	0.1	0.0465	U	0.002325	0.0496	U	0.00248	0.0481	U	0.002405	0.0492	U	0.00246
1,2,3,7,8-PeCDF	0.03	0.096	U	0.00144	0.096	U	0.00144	0.096	U	0.00144	0.096	U	0.00144
2,3,4,7,8-PeCDF	0.3	0.096	U	0.0144	0.096	U	0.0144	0.096	U	0.0144	0.096	U	0.0144
1,2,3,4,7,8-HxCDF	0.1	0.12	U	0.006	0.12	U	0.006	0.12	U	0.006	0.12	U	0.006
1,2,3,6,7,8-HxCDF	0.1	0.12	U	0.006	0.12	U	0.006	0.12	U	0.006	0.12	U	0.006
2,3,4,6,7,8-HxCDF	0.1	0.12	U	0.006	0.12	U	0.006	0.12	U	0.006	0.12	U	0.006
1,2,3,7,8,9-HxCDF	0.1	0.12	U	0.006	0.12	U	0.006	0.12	U	0.006	0.12	U	0.006
1,2,3,4,6,7,8-HpCDF	0.01	0.099	U	0.000495	0.099	U	0.000495	**0.133**	K J	0.000665	0.099	U	0.000495
1,2,3,4,7,8,9-HpCDF	0.01	0.099	U	0.000495	0.099	U	0.000495	0.099	U	0.000495	0.099	U	0.000495
OCDF	0.0003	0.28	U	0.000042	0.28	U	0.000042	0.28	U	0.000042	0.28	U	0.000042
WHO-2005 TEQ (ND=0)				**0.0024**			**0.0043**			**0.0081**			**0.0037**
WHO-2005 TEQ (ND=½)				**0.162**			**0.166**			**0.169**			**0.166**

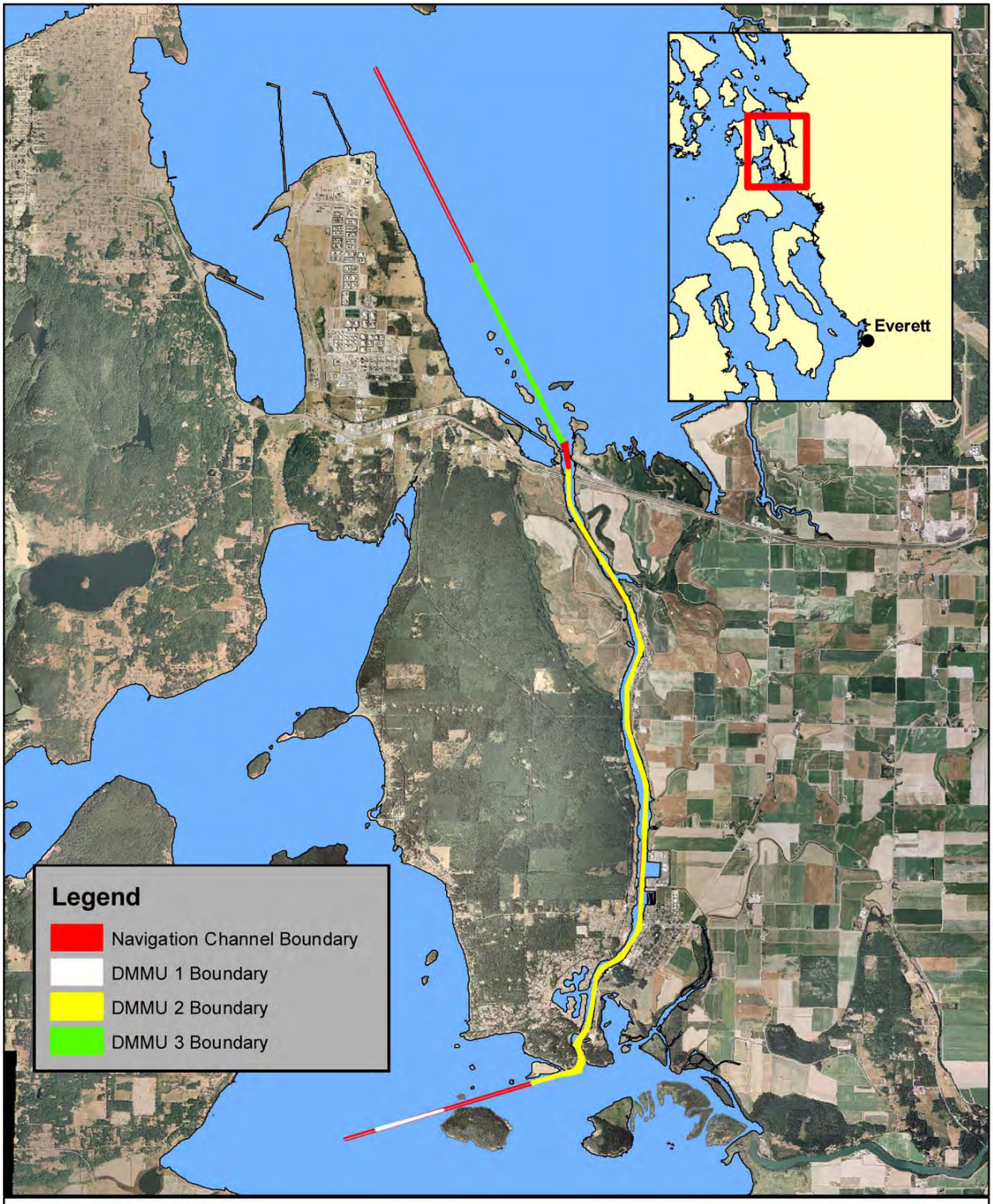

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Figure 1. Overview of Swinomish Channel Federal Navigation Channel

0 1 2 4 Miles

SAIC
From Science to Solutions

J. Nuwer SAIC

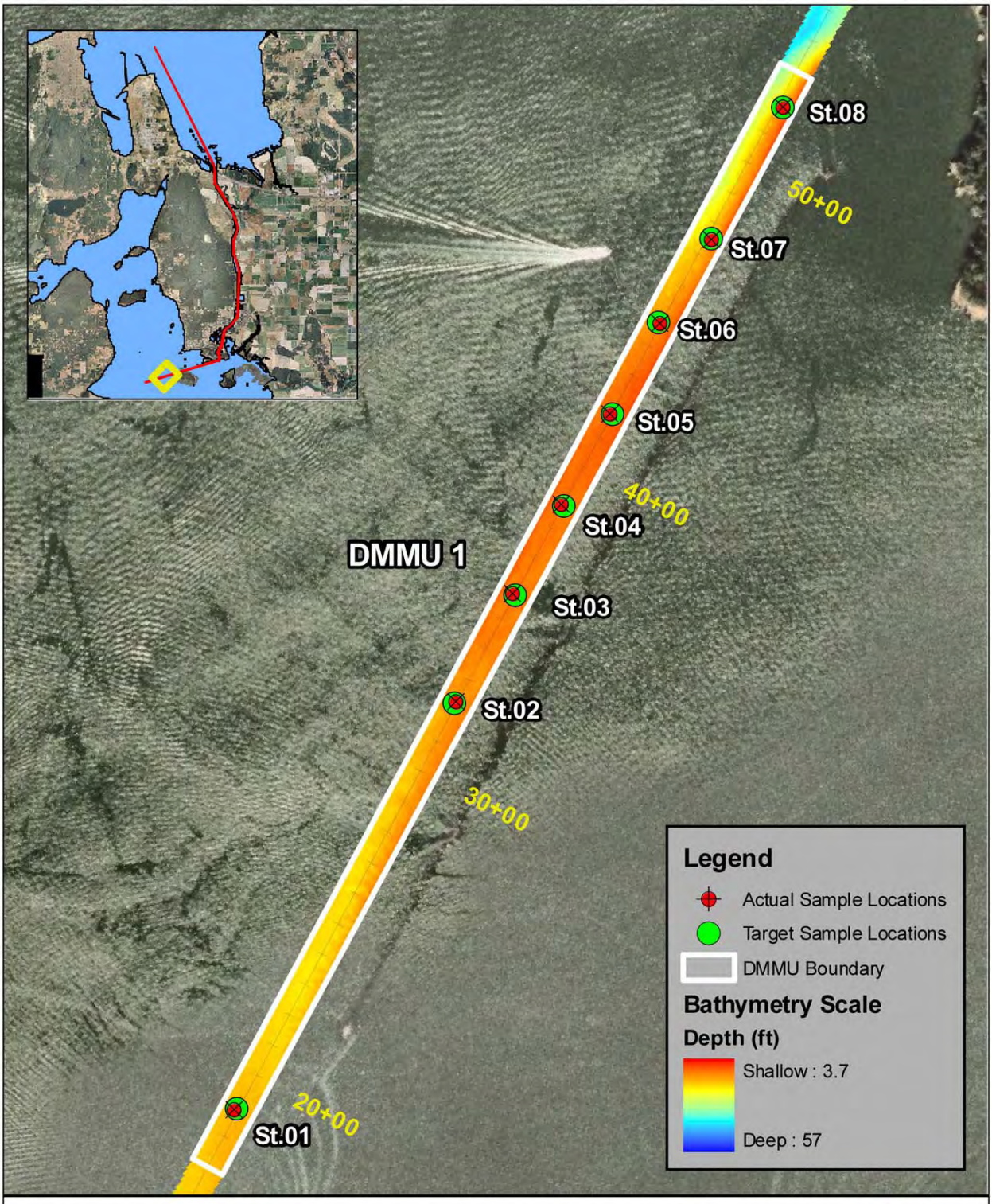

Figure 2. Target and Actual Sampling Locations within DMMU 1

0 250 500 1,000 Feet

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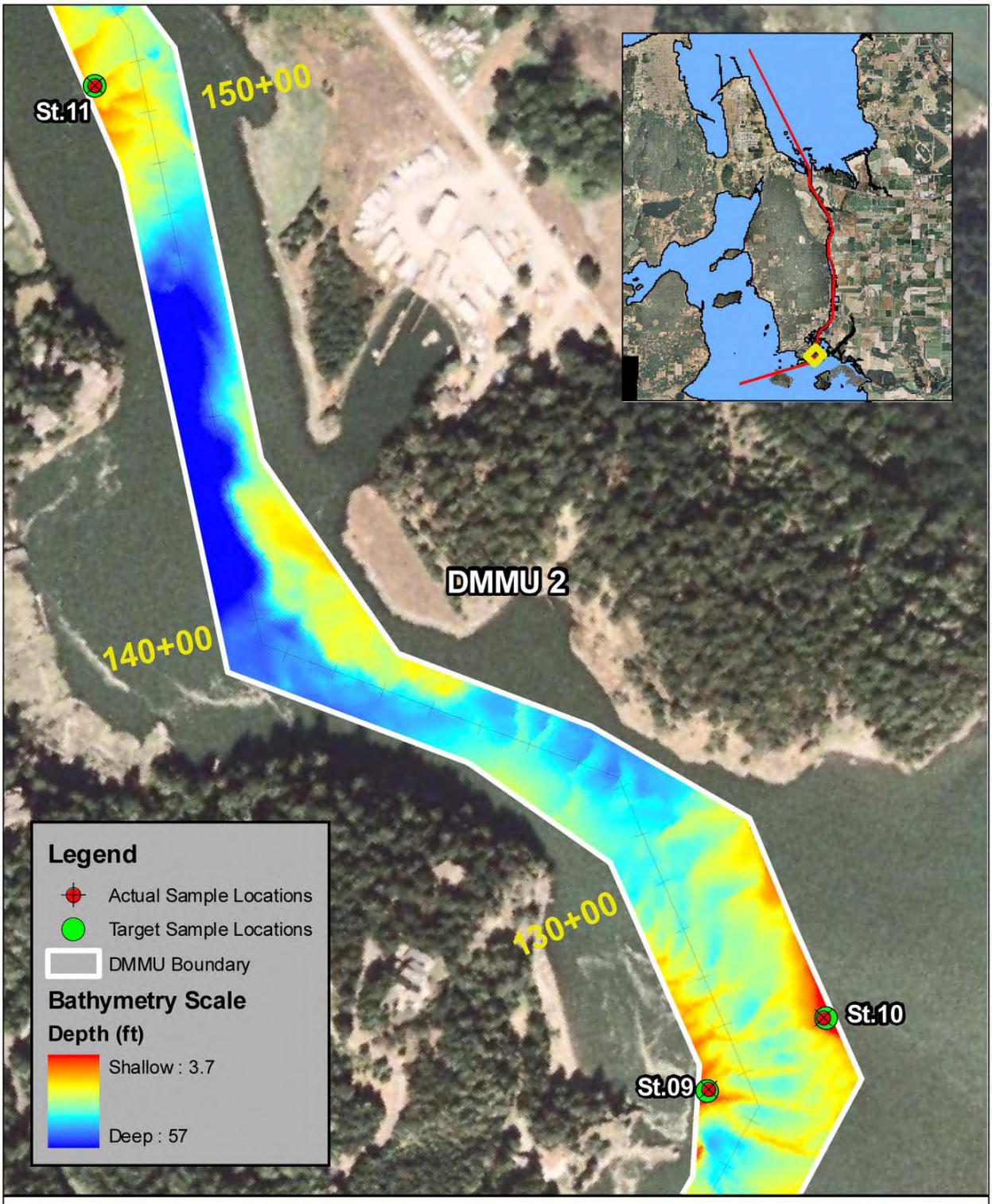

Figure 3. Target and Actual Sampling Locations within Southern DMMU 2

0 180 360 720 Feet

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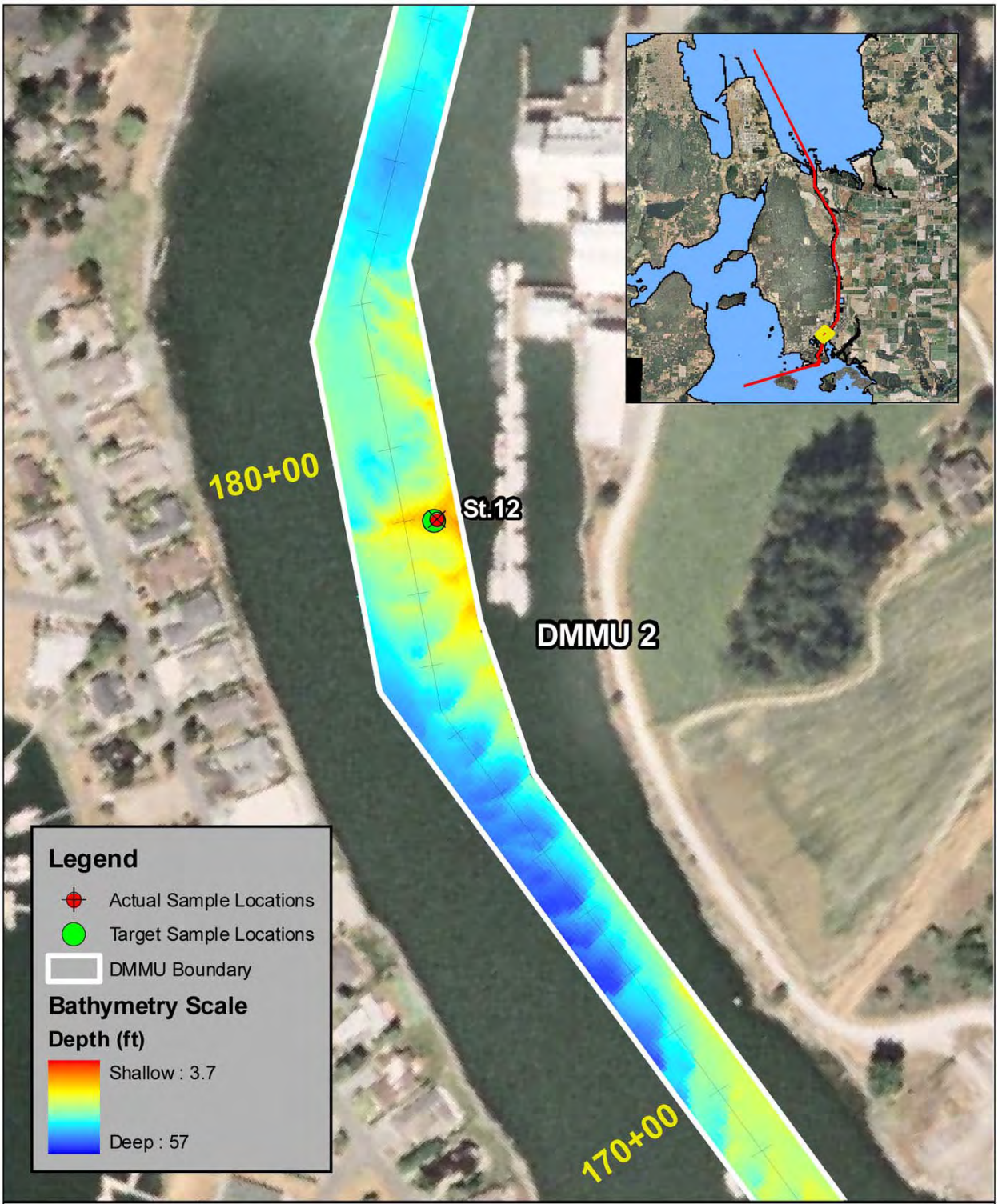

Figure 4. Target and Actual Sampling Locations within South-Central DMMU 2

0 130 260 520 Feet

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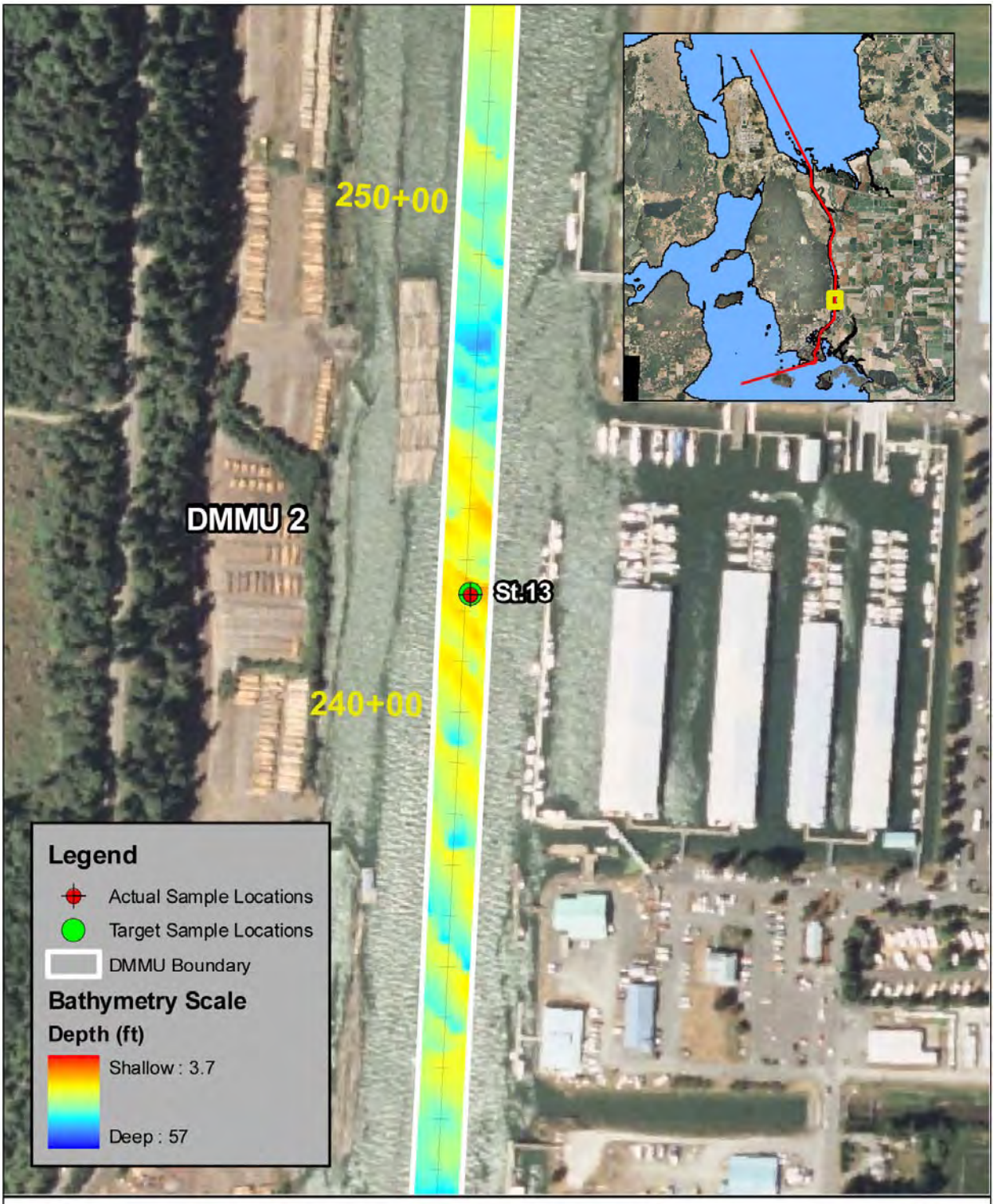

N

Figure 5. Target and Actual Sampling Locations within Central DMMU 2

0 187.5 375 750 Feet

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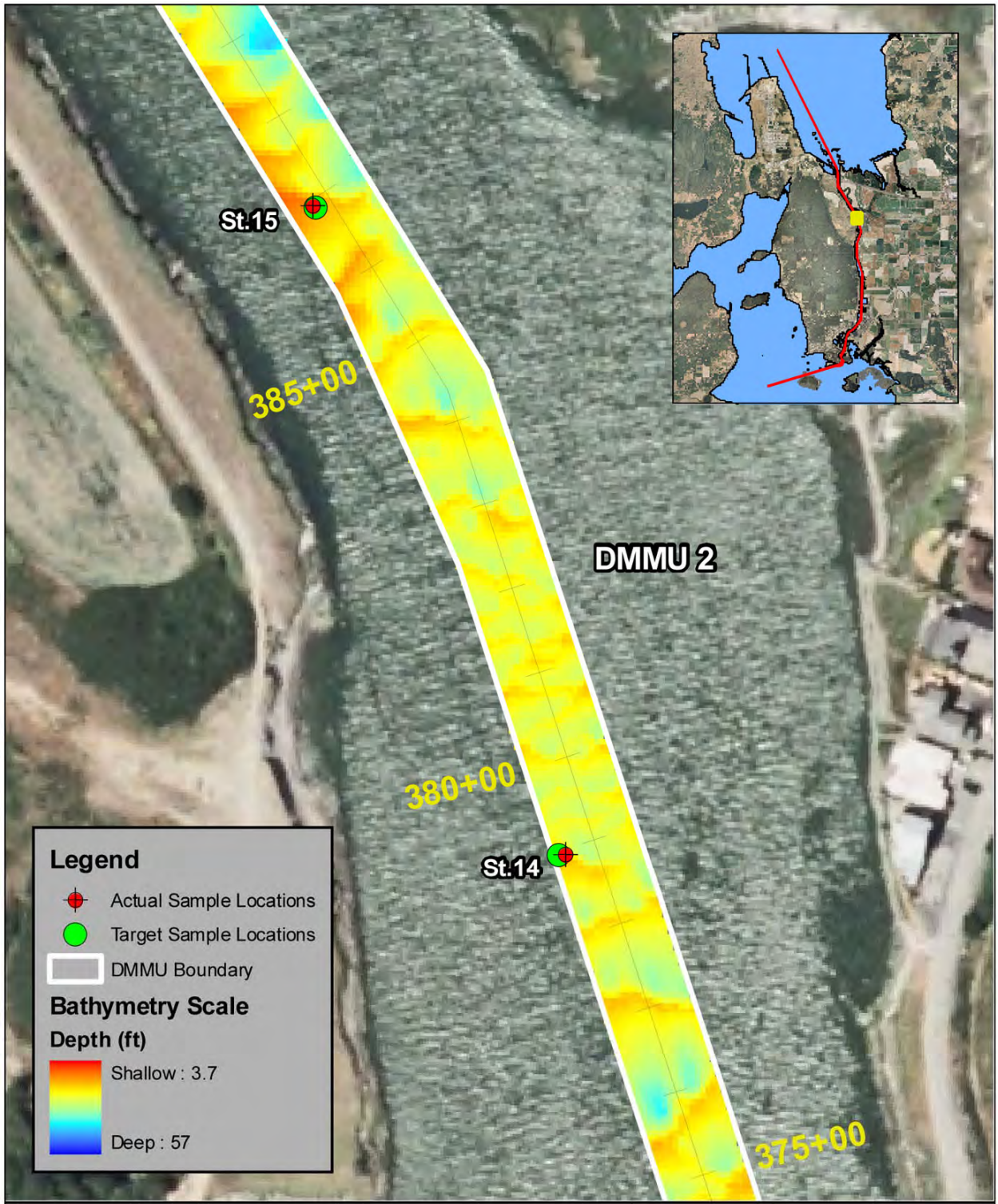

N

Figure 6. Target and Actual Sampling Locations within North-Central DMMU 2

0 110 220 440 Feet

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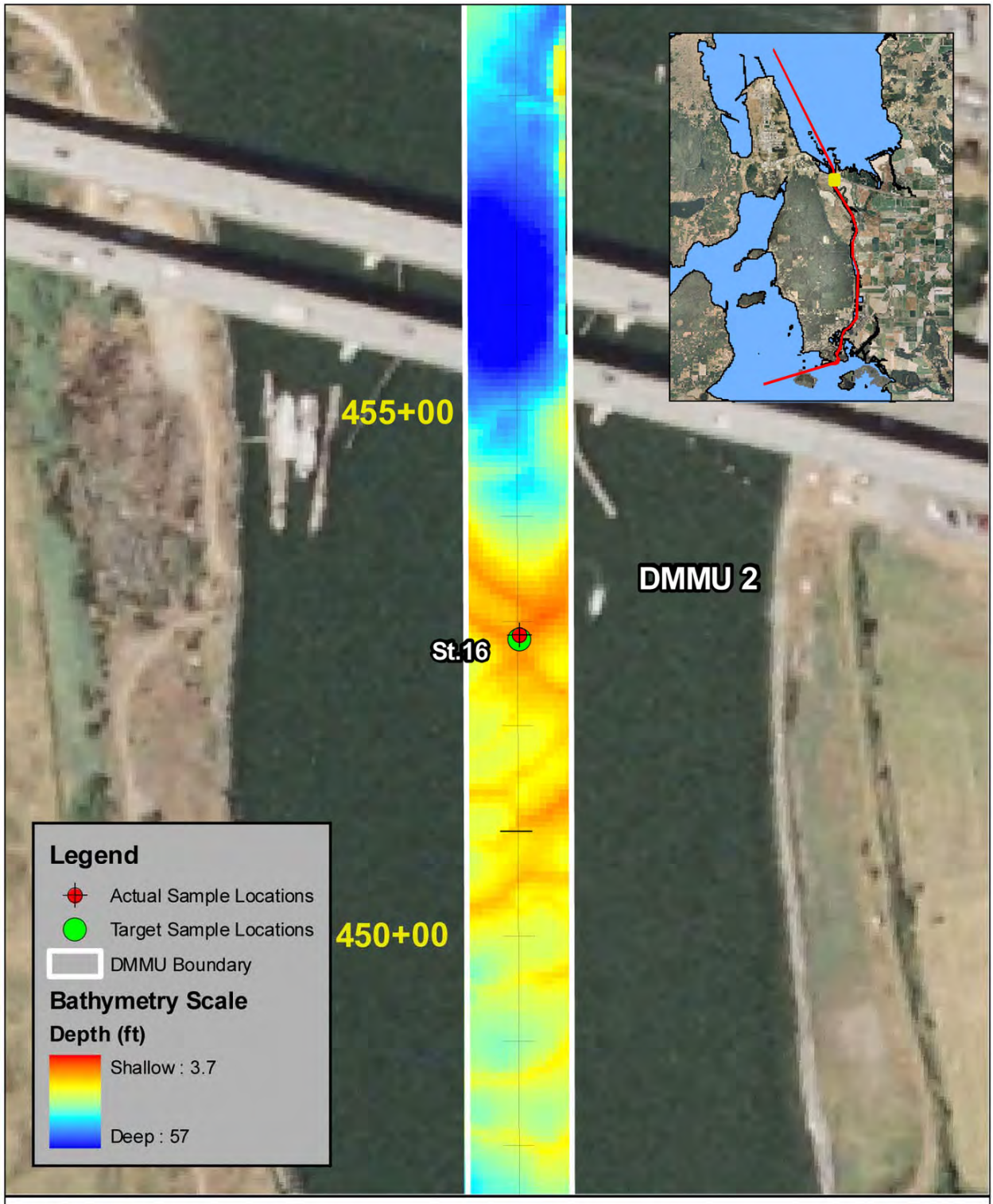

N

Figure 7. Target and Actual Sampling Locations within Northern DMMU 2

0 95 190 380 Feet

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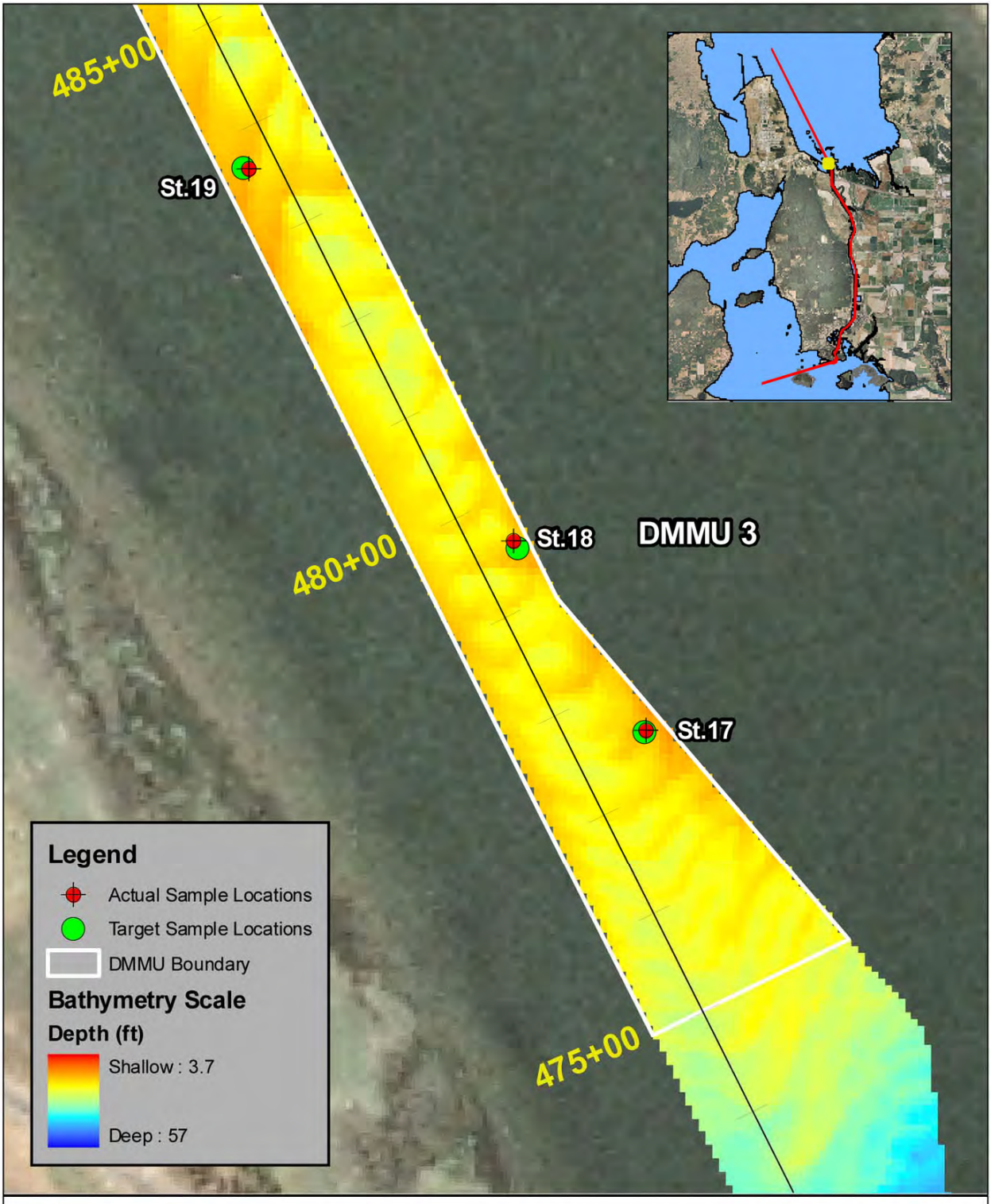

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Figure 8. Target and Actual Sampling Locations within Southern DMMU 3

0 85 170 340 Feet

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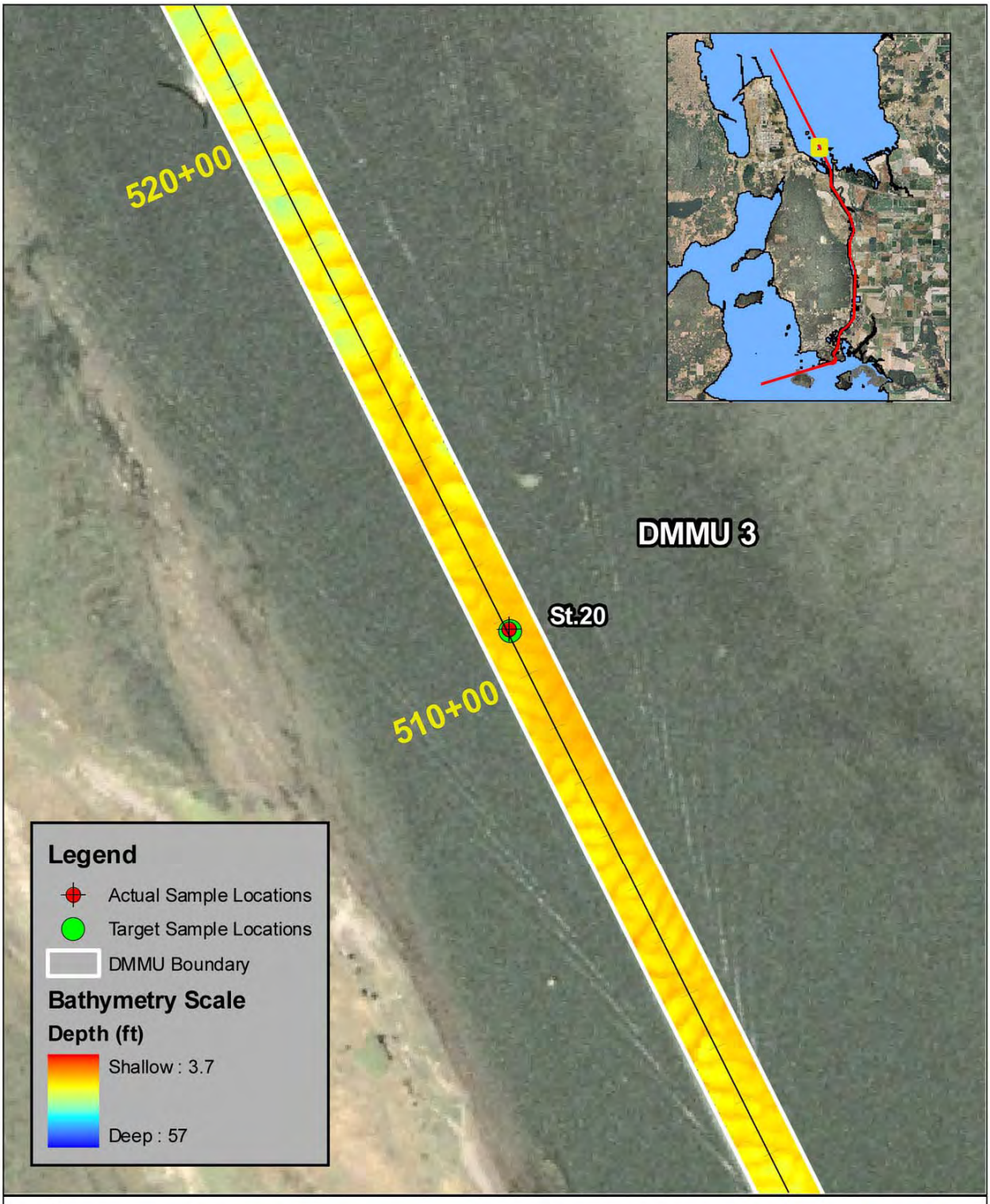
J. Nuwer SAIC



N

Figure 9. Target and Actual Sampling Locations within Central DMMU 3

0 160 320 640 Feet

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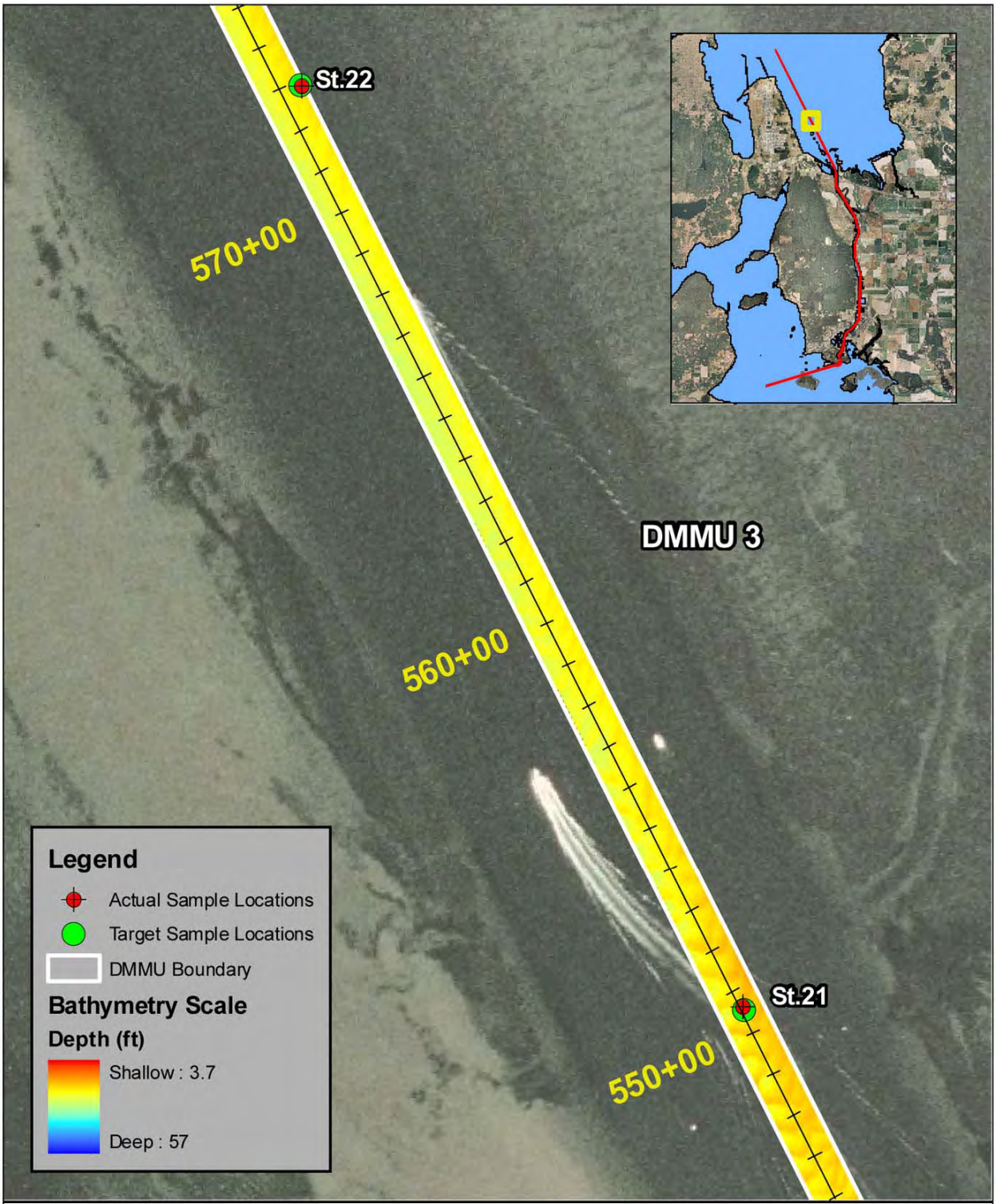

N

Figure 10. Target and Actual Sampling Locations within Northern DMMU 3

0 212.5 425 850 Feet

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