SIUSLAW RIVER

[Local Sponsor: Port of Siuslaw]

Description

The **1977** Siuslaw Interim (A) ocean dredged material disposal site (ODMDS) was used exclusively until **1995**. Material removed from the federal navigation channel (FNC) by hopper dredge between **1996** and **2009** was placed in the two Siuslaw River Marine Protection, Research and Sanctuaries Act (MPRSA) Section 103 Sites B and C. In **June 2010**, the U.S. Environmental Protection Agency (EPA), Region 10 designated two new ODMDS, North Site and South Site, under its MPRSA Section 102 authority (Figure 1). EPA, Region 10's designation documents are available at:

http://www.regulations.gov/#!documentDetail;D=EPA-R10-OW-2010-0086-0007

Coordinates: Siuslaw Ocean Dredged Material Disposal Site (Interim Site A)
Corner Coordinates (NAD 27)

44° 01' 32" N, 124° 09' 37" W
44° 01' 22" N, 124° 09' 02" W
44° 01' 14" N, 124° 09' 07" W
44° 01' 24" N, 124° 09' 42" W

Dimensions: 3,000' x 900', Azimuth (long axis): 297° T, Average Depth: 70

Corner Coordinates Section 103 Site B:

44° 01' 49.94" N, 124° 09' 58.44" W
44° 01' 39.03" N, 124° 09' 20.26" W
44° 01' 20.67" N, 124° 09' 30.33" W
44° 01' 31.57" N, 124° 10' 08.51" W
(NAD 27, Corps Section 103)

Dimensions: 3,000' x 2,000', Azimuth (long axis): 297° T, Average Depth: 90

Corner Coordinates Section 103 Site C:

44° 01' 06.95" N, 124° 10' 20.04" W
44° 01' 04.67" N, 124° 09' 39.11" W
44° 00' 54.83" N, 124° 09' 40.16" W
44° 00' 57.11" N, 124° 10' 21.09" W
(NAD 27, Corps Section 103)

Dimensions: 3,000' x 1,000', Azimuth (long axis): 264° T, Average Depth: 78

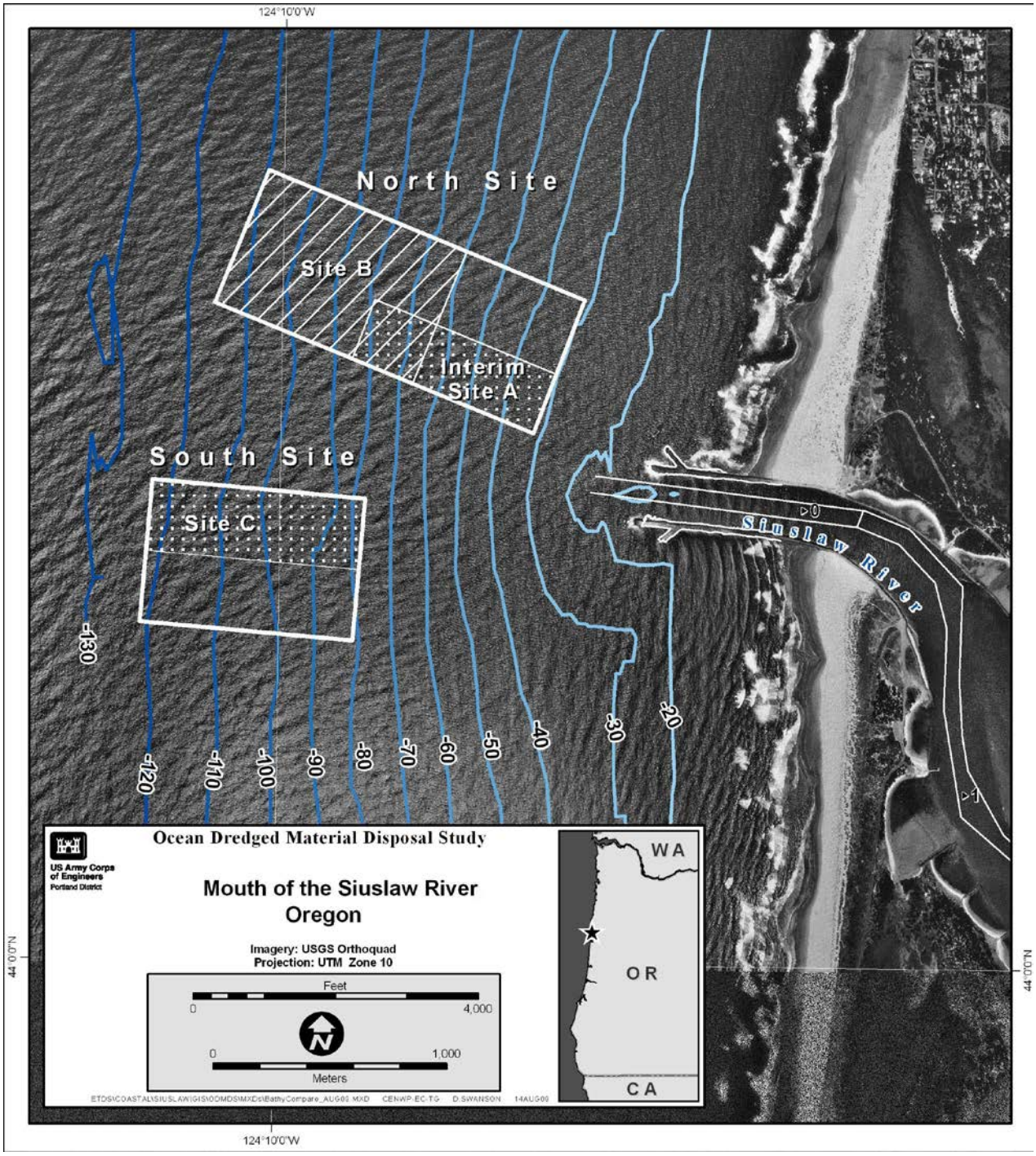


Figure 1: Siuslaw River ODMDSs.

Coordinates: EPA Section 102 North Site:

44° 01′ 31.03″ N, 124° 10′ 12.92″ W,
44° 01′ 49.39″ N, 124° 10′ 02.85″ W,
44° 01′ 31.97″ N, 124° 09′ 01.86″ W,
44° 01′ 13.45″ N, 124° 09′ 11.41″ W.

Size: Approximately 1.5 kilometers (0.81 nm) long and 0.6 kilometers (0.32 nm) wide.
Depth: Ranges from approximately 9 to 35 meters (30 to 115 feet).

Coordinates: EPA Section 102 South Site:

44° 00′ 46.72″ N, 124° 10′ 26.55″ W,
44° 01′ 06.41″ N, 124° 10′ 24.45″ W,
44° 01′ 04.12″ N, 124° 09′ 43.52″ W,
44° 00′ 44.45″ N, 124° 09′ 45.63″ W.

Size: Approximately 0.9 kilometers (0.49 nm) long and 0.6 kilometers (0.32 nm) wide.
Depth: Ranges from approximately 24 to 38 meters (79 to 125 feet).

Shoaling at the entrance to the FNC usually requires annual dredging to -20 to -22 feet (MLLW) to ensure the authorized depth of -18 feet (MLLW) between dredging operations. The entrance and south jetty shoals build during late winter and spring. The inside range and south turn shoals are affected more by river flood stages than by tidal action. A small hopper dredge removes material from the entrance shoals between April and October. In 2010, the turning basin at river mile (RM) 5 above the 101 Highway Bridge was dredged using a clamshell and barge operation.

Dredged Material Description

The sediment at the entrance of the FNC is sand, with an average in-place density of 2,000 grams/liter. Sediment from the Siuslaw River near RM 1.0 is sand, with an average in-place density of 1,850 grams/liter. Sediments collected in **1991** showed the material to be poorly graded sand with an average of 99.9% sand, 0.1% fines, and 1.1% volatile solids. Mean grain size was 0.32 mm. Sediments within the FNC are tested periodically, generally every five years, to ensure they are suitable for ocean disposal. Generally, testing of material from the estuary is limited to physical analyses since the material meets exclusion criteria found in the MPRSA regulations. Sediments above the Hwy 101 Bridge (RM 5) have been physically and chemically tested and found suitable for unconfined in-water placement.

Sediment Evaluations – Navigation Channel

1987. Sediment samples from FNC were analyzed by the U.S. Army Corps of Engineers – Portland District (Corps). Only physical analyses were conducted.

1991. Sediment samples from the FNC were analyzed by the Corps. As in 1987,

testing was limited to physical analyses except for one sample (S-1) which was subjected to chemical analyses. Siuslaw River FNC sediments are 99.9% poorly graded sand with a low volatile solids content (1.1%). The mean median grain size (0.32 mm) was that of medium sand. The results of the chemical analysis of sample S-1, taken from the turning basin at RM 5.0 near the town of Florence, had metals concentrations below established levels of concern. No pesticides, polychlorinated biphenyls (PCBs), polynuclear aromatic hydrocarbons (PAHs), or phenols were detected.

1996. Ten (10) samples were collected using a ponar grab sampler which takes a sample approximately 9 cm thick that represents the surface sediments. These samples were subjected to physical tests including density, void ratio, volatile solids, specific gravity, particle size classification (ASTM D2487) and particle roundness. Siuslaw River FNC sediments range from 100% to 92.7% (mean 98.6%) poorly graded sand with volatile solids content ranging from 1.4% to 0.3% (mean 0.8 %). The mean grain size is that of medium sand (0.294 mm). The material meets the exclusionary criteria of the Clean Water Act (CWA) and therefore does not require any further testing prior to in-water disposal.

2001 April. Eight (8) surface grab sediment samples were collected from the Siuslaw River FNC. All samples were submitted for physical analyses (mean 0.29mm, with an average of 99.15 % sand and 0.81% fines), with 2 samples analyzed for metals (9 inorganic), total organic carbon (TOC), pesticides, PCBs, phenols, phthalates, miscellaneous extractables, PAHs and organotin (TBT) pore water analysis. Sediment represented by samples meet the Tier II guidelines established in the Dredged Material Evaluation Framework (DMEF) for unconfined in-water placement without further characterization.

2006 August. Seven (7) surface grab samples were collected in the Siuslaw River FNC from the entrance to RM 6. All samples were submitted for physical analyses, with grain-size ranging from 98.5% to 95.4% (mean 97.1%) poorly graded sand, with volatile solids content ranging from 0.69% to 2.24% (mean 1.14 %). One sample (BC-07) was selected for chemical analyzes to include: metals, TOC, pesticides, PCBs, phenols, phthalates, miscellaneous extractables, PAHs and two samples (BC-06, BC-07) were submitted for organotin (TBT) (total) analysis. Sample BC-06 was collected in the turning basin, adjacent to the marina. Sample BC-07 was collected in the FNC by the fuel dock. Pore-water TBT was not run due to insufficient pore-water in the samples, a result of the high sand content.

Sediment represented by samples collected meet the Tier II guidelines established in the DMEF and Sediment Evaluation Framework (SEF) for unconfined in-water placement without further characterization.

2011 September. Seven (7) surface grab samples were collected in the Siuslaw River FNC from the entrance to RM 5. Sediments collected for analysis are considered representatives of the material to be dredged including any advanced maintenance or overdepth material. All samples were submitted for physical analyses, with grain-size ranging from 98.5% to 96.6% poorly graded sand (mean 97.4%), with TOC (BC-06, BC-07) content ranging from 0.142% to 0.152% (mean 0.147 %). Two samples (BC-06, BC-07) were selected for chemical analyses: metals, TOC, pesticides/ PCBs, chlorinated hydrocarbons, phenols, phthalates, miscellaneous extractables, PAHs, and organotin (TBT). Sample BC-06 was collected adjacent to the bridge;

sample BC-07 was collected off the Port of Siuslaw facilities. Pore-water TBT was not analyzed due to insufficient pore-water volume in the samples, a result of the high sand content.

Sediment represented by samples collected during this sampling event meet the Tier II guidelines established in the SEF for unconfined in-water placement without further characterization.

ODMDS HISTORY

Designation

1977, the Siuslaw River ODMDS A received interim designation from the EPA.

On **July 9, 1995**, the Corps under its MPRSA Section 103 authority selected two alternate sites [Site B and C, north and south of the entrance respectively] for dredged material ocean disposal. These Sites were recommended for final site designation in the Corps's **1992** site evaluation study.

The EPA, in a **February 14, 1995** letter, concurred with the Corps' Section 103 selection of the two new ODMDSs at Siuslaw. Site use began in **1996** for Site C and in **1999** for Site B. Site use expired for Site C in **2001** and for Site B in **2004**.

A letter, dated **April 12, 2004**, was sent to EPA requesting an additional five year site use allowed by Water Resources Development Act (WRDA) 92. The EPA, in their **July 27, 2004** letter, concurred with the additional five year use of the two Sites under the Section 103 authority. The Section 103 site use for Site B and Site C expired at the end of the **2009** dredging season.

Benthic infauna surveys, fish trawls, sediment chemistry, and sediment physical analyses studies were conducted in **2008** and EPA's the site designation Environmental Assessment (EA) was prepared. The Proposed Rule for site designation was published on **February 4, 2010**. The EPA published the Final Rule for site designation of the North Site and South Site on **April 29, 2010**, which became effective on **June 1, 2010**.

Evaluation Studies for Designation

During **August and September 1984**, site-specific geologic information and geophysical investigations by sidescan sonar and sub-bottom acoustic reflection profiling was performed. In addition, existing geologic and oceanographic data pertinent to the Siuslaw River Zone of Siting Feasibility (ZSF) was compiled.

1984, 1985, 1986, and **1988**, field sampling was conducted to evaluate aquatic resources and characterize sediment of the Siuslaw River ZSF.

An **October 1988**, report presents data on seabed drifter and dye field studies conducted in **1986** and **1987** to evaluate sediment transport and currents.

In **March 1992**, the Siuslaw Ocean Dredged Material Disposal Site Evaluation, Final Report was published by the Corps.

In August and September **2008,** benthic infauna surveys, fish trawls, sediment chemistry, and sediment physical analyses were conducted at 10 stations (Figure 2) to supplement earlier benthic invertebrate data and provide more recent information on fish and epibenthic species present in the proposed North and South ODMDSs. The data is summarized in Appendix A of the 2009 EA prepared by EPA for final designation of the Sites and in the 2009 Marine Taxonomic Services (MTS) report.

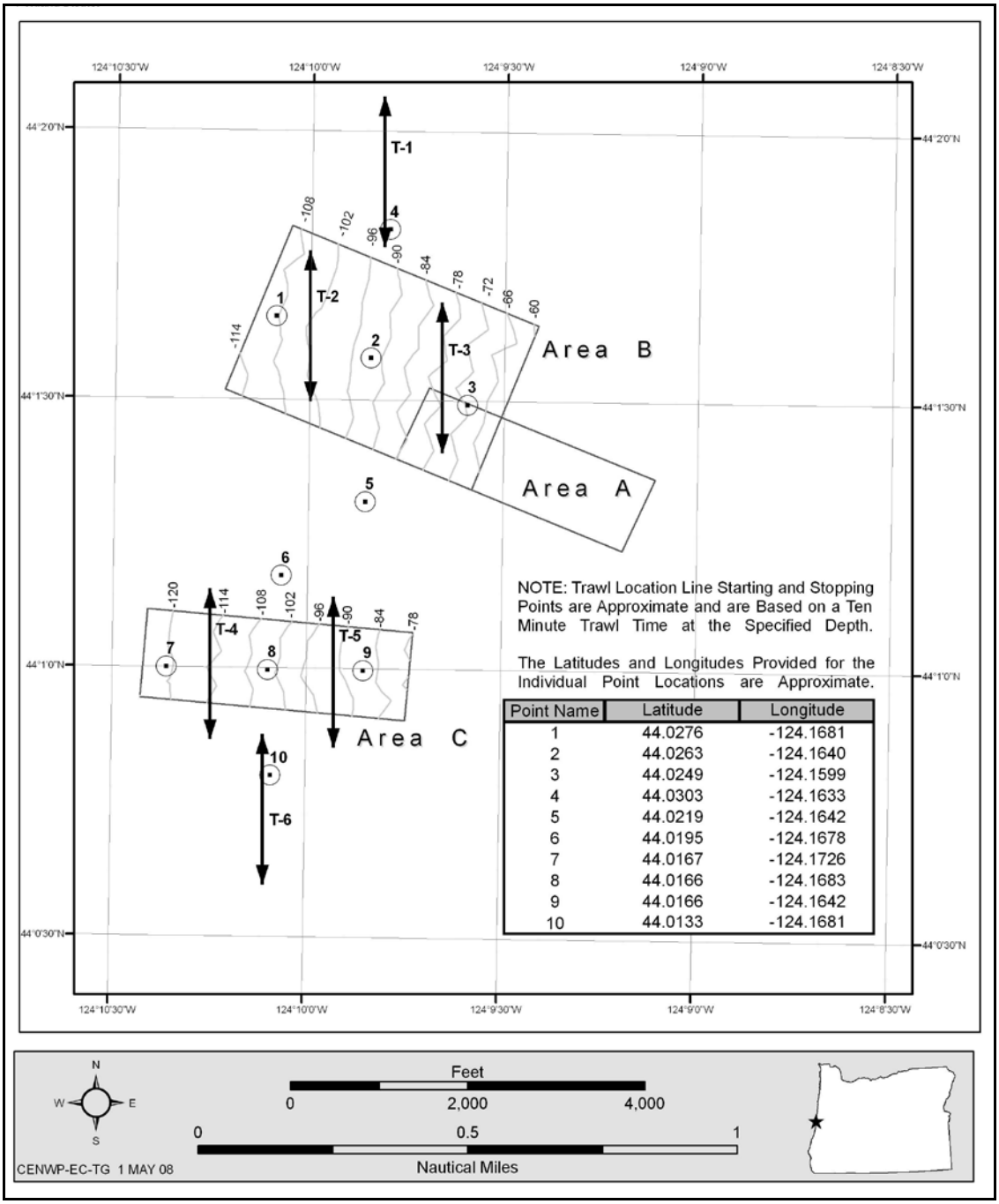


Figure 2: Siuslaw ODMDS Sediment Sampling Stations and Trawl Sites, 2008

MANAGEMENT/MONITORING

A Siuslaw River **site management/monitoring plan (SMMP)** was completed and coordinated for public review in **April 1997**. A new SMMP was prepared as part of EPA's **2010** site designation documents. The SMMP for the Sites called for conducting bathymetric surveys annually as a routine site monitoring activity.

Bathymetric surveys were conducted at the Interim (Site A) and Site B in **September 1981**, **August 1990**, **August 1992**, **April 1994**, **May 1995**, **June 1996**, **September 1996**, **June 1997**, **September 1997**, **May 1998**, **June 1999**, **April 2001**, **June 2002**, **July 2003**, **September 2004**, **August 2005**, **July 2007**, **July 2008**, and **May 2009**. Incomplete surveys in **May 1993** were made at the Interim Site (Site A). The southern adjusted Site C was surveyed in **September 1981**, **August 1990**, **August 1992**, **September 1997**, **May 1998**, **June 1999**, **April 2001**, **June 2002**, **July 2003**, **September 2004**, **August 2005, July 2007**, **July 2008**, and **May 2009**. No dredged material was placed at Site C prior to **1997** so no surveys were conducted from **1993** through **1996**. For material quantities placed see Table 1 at the end of the report. Bathymetric surveys were conducted at the EPA Section 102 North and South Sites in **May 2010**, **May 2011, May 2012, May 2013, and June 2015**. Copies of the most recent bathymetry and bathymetry difference plots for the Siuslaw River ODMDSs are attached to the end of the report.

Management/Monitoring Actions and Recommendations

Beginning in **1992**, the Corps was notified of requirements for annual bathymetric surveys of all ODMDSs as a Tier I monitoring requirement.

Interim (Site A): The **September 1981** bathymetric survey indicated mounding along the southern boundary of the Interim ODMDS nearest the Siuslaw River FNC entrance. By **August 1992** the mound, which had exceeded the depth of -42 feet (MLLW), had decreased by 12 feet. However, the outer third of the disposal site showed 10 feet of accumulation. By **April 1994** accumulation reached 12 feet, by **September 1996** 14 feet. Water depths over this portion of the mound are between -60 and -84 feet MLLW. Action was taken in **1994** to restrict dredged material placement to the deeper, outer third of the Interim ODMDS. No material has been placed in the area of Site A since **1996**. The **May 1998** survey indicated material in the Interim Site is being eroded and moved out of the Site. The **June 1999** survey shows further erosion of material from Site A. The 11-foot mound height in the outer third of the site in **1998** was reduced to 9 feet by **June 1999** and remained at 8 feet as of **June 2002**. The area of the Interim Site (A) was incorporated into the **2010** EPA Section 102 North Site. No mounding remains in the location of the former Interim Site A, within the Section 102 North Site.

Site B: In **September 1995** the Corps under its Section 103 authority selected the two alternate sites (Site B and C) recommended for final site designation in its **1992** site evaluation study. This eliminated further mounding of the Interim Site (A). No material was placed in the northern 103 site (B) prior to **1999** and the southern 103 site (C) received all material dredged in **1997** and **1998**. Material was placed only in the Section 103 Site B in **1999** and **2003** through **2009**. The SE corner of Site B is overlapping with Interim Site (A) and disposal

was restricted through **2007** to allow this area to erode further. While it is important to avoid overloading the SE corner of Site B, placement was not restricted after **2008**. The area of the Corps' Section 103 Site B was incorporated into the **2010** EPA Section 102 North Site. Since designation, the North Site has been used annually in its entirety. As of June **2015**, the bottom elevation of the former Site B remains 1 to 8 feet above the **1999** baseline elevation. The new portion of the North Site as well as the former Interim Site (A) have bottom elevations up to 4 feet lower than the 1999 baseline.

Site C: The **September 1997** survey shows dredged material mounded to a maximum of 4 feet. The **May 1998** survey also shows the maximum mound height to be 4 feet but the footprint of the mound increased. The material placed at the site was concentrated in the shallower half of the Site closer to the FNC project. The **June 1999** survey of Site C showed 4-foot of accumulation and the **2001** and **2002** surveys show a maximum 7-foot and 9-foot of accumulation, respectively, over the shoreward third of the Site. Minimum water depth at the site was -80 feet (MLLW). Because of the mounding, disposal operations after **2001** were primarily shifted to Site B. In **2004**, 9,000 cubic yards (CY) of material was placed at Site C. The area of the Corps' Section 103 Site C was incorporated into the **2010** EPA Section 102 South Site. The South Site has not been used since its designation, but in the **2015** survey, the bottom surface elevation appears to be up to 7 feet higher than the 1981 baseline survey. To further evaluate what appeared to be accumulation of material in the South Site, the **2014** bathymetric approach survey was compared against the **2012** approach survey (attached). The approach survey shows that an overall trend of accretion of sediment outside the 60' contour, to the north and south of the project and not a result of dredged material placement.

During analyses of the **August 1992-September 1981** ODMDS bathymetric difference plots, it was noted that there appeared to be significant shoaling of material in-shore and to the south of Site A. Maximum accumulation was 24 feet. The **August 1990-September 1981** bathymetric plot indicated 16 feet of accumulation in the same area. This area is directly off the mouth of the Siuslaw River and indicates significant changes to the ebb delta. It is obvious from the monitoring efforts of the Siuslaw River ODMDSs, specifically the bathymetric difference plots, that this buildup is not related to Corps' dredge material disposal operations. Movement of depth contours seaward appears to have moderated as is evident when comparing the **September 1996** through **June 2002** surveys.

Benthic infauna surveying following EPA, Region 10's Site designation was conducted in **June** and **December 2010** along with fish/invertebrate trawls. A total of 14 stations were sampled for benthic infauna and sediment physical parameters. Seven trawls were originally planned however due to weather conditions some were dropped in December and one was dropped totally. Samples were collected in the area of the new North Site and South Site as well as areas as far as 5 miles north and south of the mouth of the Siuslaw River.

Computer modeling of disposal operations to determine the optimum spacing of discharge points and long-term and short-term sediment fate is now possible and recommended. Special studies such as sidescan sonar surveys or benthic infauna and sediment characterization should be conducted as needed.

In **2012**, a generic dump plan (Figure 3) was developed for the Siuslaw North ODMDS. Previous to the generic dump plans, directions were given to evenly distribute material evenly over the Site or to restrict certain areas of the Site due to mounding. Dump plans are adjusted according to annual bathymetric monitoring, and the development of a generic dump plan formalized this process.

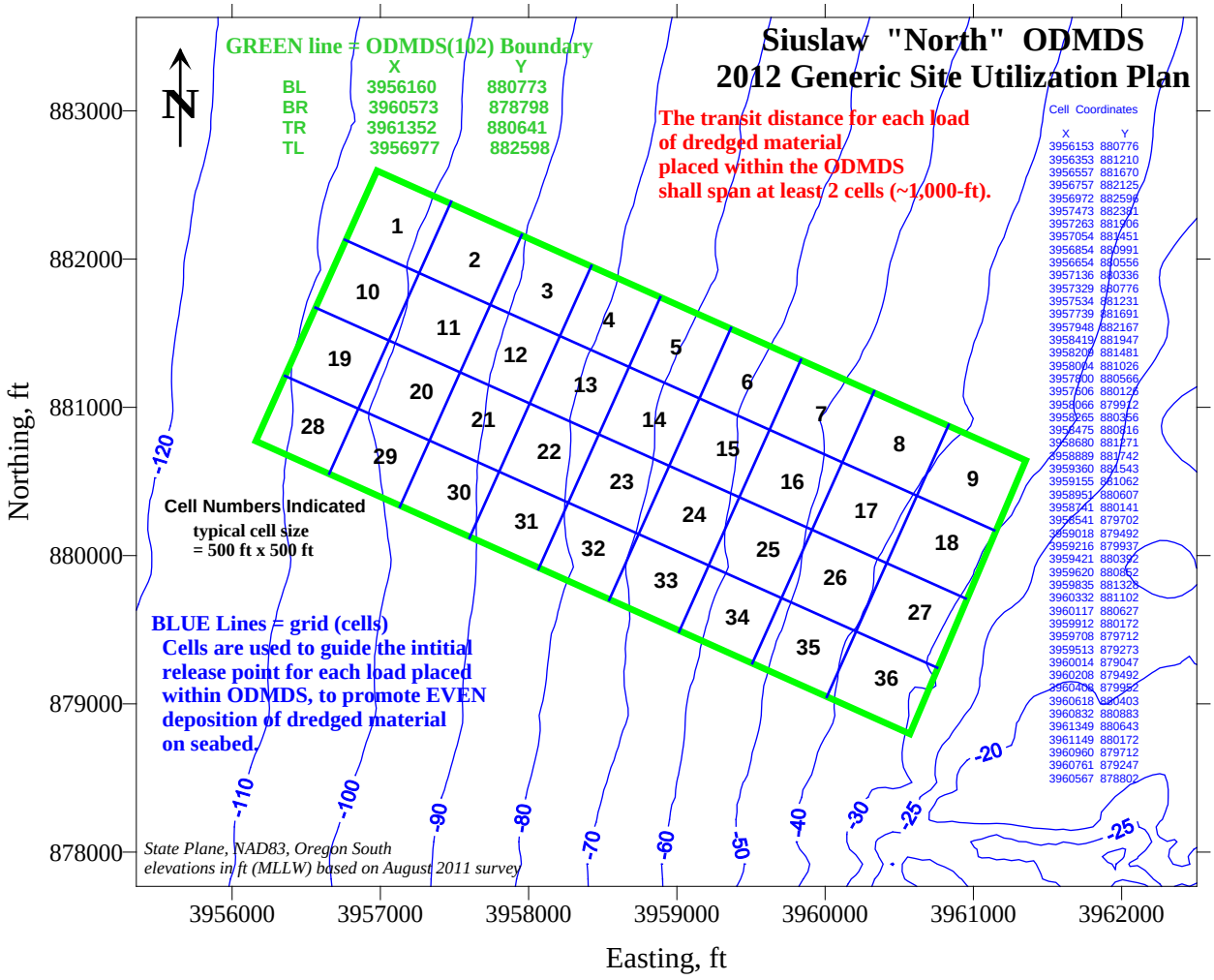


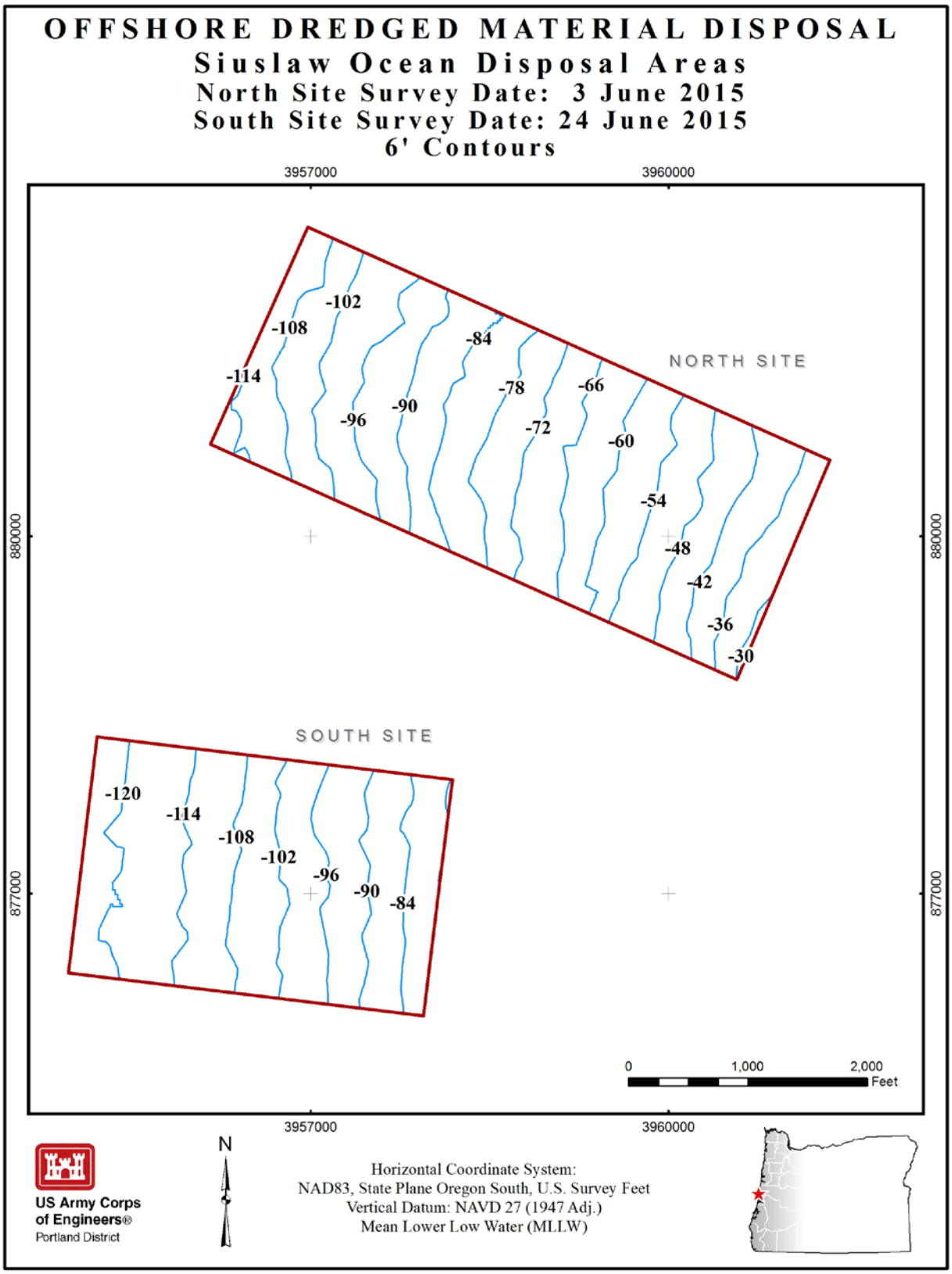
Figure 3. Siuslaw "North" ODMDS generic dump plan (2012).

The shallow, nearshore portions of the North Site are expected to have greater potential to provide a positive benefit as dispersion of sediments is inshore, toward the beaches as well as along bathymetric contours. This dispersion of material is shown on the bathymetric difference plots at the end of this report. The comparison of the **1999** baseline survey to the **2015** survey shows a loss of up to four feet in bottom elevation shoreward of the 60 foot contour of the North Site. Dredged material is preferentially placed in the North Site, in the nearshore area if capacity is available. The South Site has not been used since receiving final designation. No adjustment in management of the Siuslaw River EPA Section 102 Ocean Dredged Material Disposal Sites is necessary at this time.

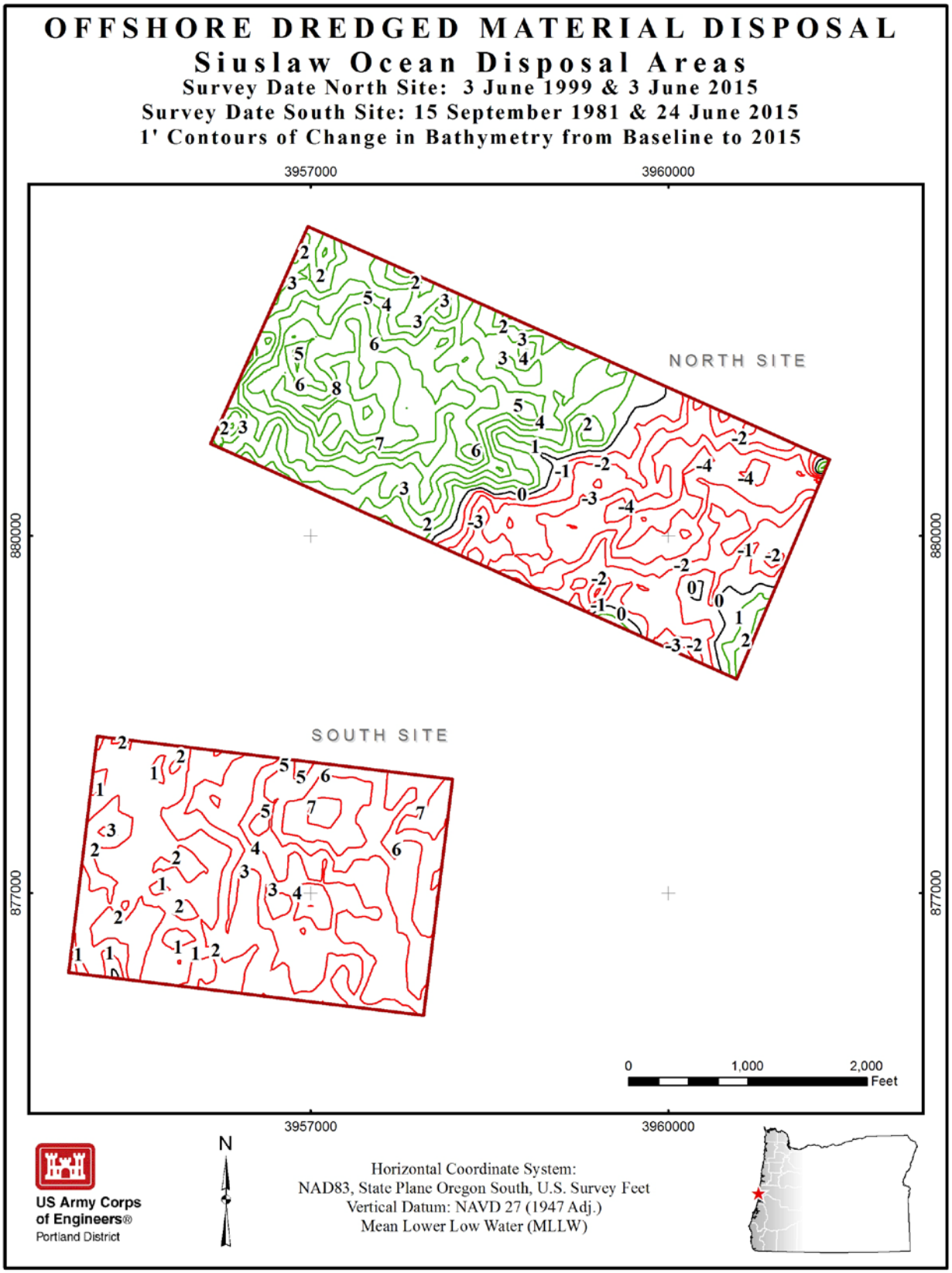
Table 1
Volumes Dredged and Disposed at the ODMDSs

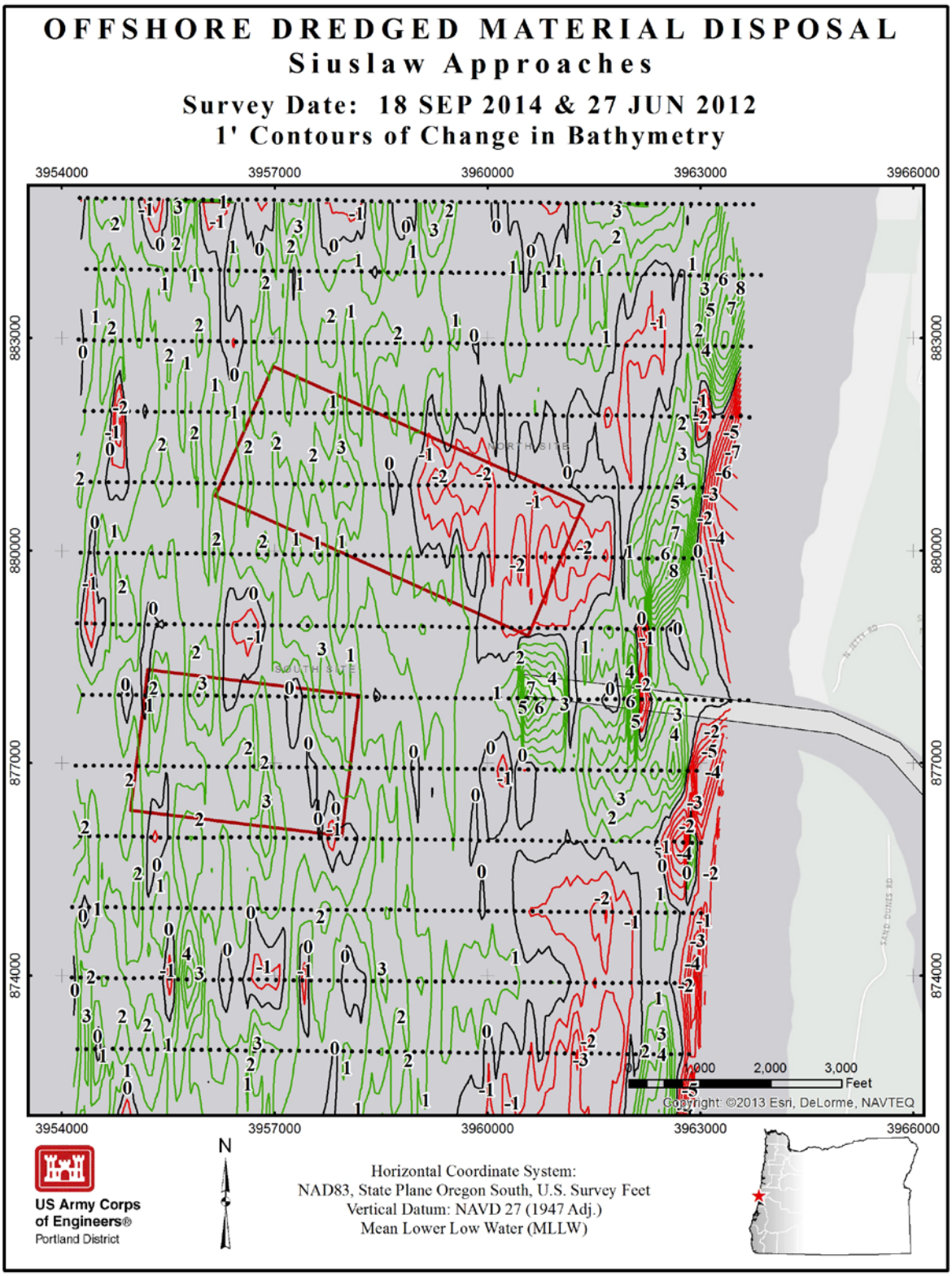
Siuslaw River, Total Project
[in thousands of cy]

Fiscal Year	Hopper Dredge (Site Letter)
1986	218.8
1987	215.8
1988	114.5
1989	116.8
1990	99.0
1991	65.9
1992	194.2
1993	239.6
1994	223.3
1995	121.6
1996	84.8
1997	40.0 (C)
1998	69.6 (C)
1999	43.5 (B)
2000	55.1 (C)
2001	101.2 (C)
2002	117.3 (B)
2003	55.0 (B)
2004	14.1 (B)
2004	9.0 (C)
2005	33.4 (B)
2006	22.3 (B)
2007	76.0 (B)
2008	69.9 (B)
2009	91.7 (B)
2010	178.8 (N)
2011	84.3 (N)
2012	76.0 (N)
2013	39.4 (N)
2014	74.7 (N)


OFFSHORE DREDGED MATERIAL DISPOSAL
Siuslaw Ocean Disposal Areas
North Site Survey Date: 3 June 2015
South Site Survey Date: 24 June 2015
6' Contours
3957000
3960000
880000
877000
NORTH SITE
-102
-108
-84
-114
-78
-66
-90
-96
-72
-60
-54
-48
-42
-36
-30
SOUTH SITE
-120
-114
-108
-102
-96
-90
-84
0
1,000
2,000
Feet
US Army Corps
of Engineers®
Portland District
N
Horizontal Coordinate System:
NAD83, State Plane Oregon South, U.S. Survey Feet
Vertical Datum: NAVD 27 (1947 Adj.)
Mean Lower Low Water (MLLW)


OFFSHORE DREDGED MATERIAL DISPOSAL
Siuslaw Ocean Disposal Areas
Survey Date North Site: 9 May 2013 & 3 June 2015
Survey Date South Site: 9 May 2013 & 24 June 2015
1' Contours of Change in Bathymetry from 2013 to 2015
3957000
3960000
880000
877000
NORTH SITE
SOUTH SITE
0
1,000
2,000
Feet
US Army Corps
of Engineers®
Portland District
N
Horizontal Coordinate System:
NAD83, State Plane Oregon South, U.S. Survey Feet
Vertical Datum: NAVD 27 (1947 Adj.)
Mean Lower Low Water (MLLW)


OFFSHORE DREDGED MATERIAL DISPOSAL
Siuslaw Ocean Disposal Areas
Survey Date North Site: 3 June 1999 & 3 June 2015
Survey Date South Site: 15 September 1981 & 24 June 2015
1' Contours of Change in Bathymetry from Baseline to 2015
3957000
3960000
880000
877000
NORTH SITE
SOUTH SITE
0
1,000
2,000
Feet
US Army Corps
of Engineers®
Portland District
N
Horizontal Coordinate System:
NAD83, State Plane Oregon South, U.S. Survey Feet
Vertical Datum: NAVD 27 (1947 Adj.)
Mean Lower Low Water (MLLW)


OFFSHORE DREDGED MATERIAL DISPOSAL
Siuslaw Approaches
Survey Date: 18 SEP 2014 & 27 JUN 2012
1' Contours of Change in Bathymetry
3954000
3957000
3960000
3963000
3966000
883000
880000
877000
874000
NORTH SITE
SOUTH SITE
2,000
3,000
Feet
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Portland District
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Horizontal Coordinate System:
NAD83, State Plane Oregon South, U.S. Survey Feet
Vertical Datum: NAVD 27 (1947 Adj.)
Mean Lower Low Water (MLLW)