



Fishman Environmental Services

*Consultants in ecology and
natural resource management*

STUDIES OF DREDGED MATERIAL REHANDLING SITES; CHANNEL DEEPENING FEASIBILITY STUDY - FISH SAMPLING REPORT



Order Hydroids



Submitted to:

**Port of Portland, Engineering Services
700 Northeast Multnomah, 15th Floor
Portland, Oregon 97323**

and

**U.S. Army Corps of Engineers, Portland District
P.O. Box 2946
Portland, Oregon 97208-2946**

Prepared by:

**Steve Johnson, Aquatic Ecologist
Paul Fishman, Senior Ecologist**

September, 1996

FES 95046

**STUDIES OF DREDGED MATERIAL
REHANDLING SITES; CHANNEL DEEPENING
FEASIBILITY STUDY - FISH SAMPLING
REPORT**



**STUDIES OF DREDGED MATERIAL REHANDLING SITES
CHANNEL DEEPENING FEASIBILITY STUDY**

Port of Portland Contract Number S1529

Project Number 51773/210

FISH SAMPLING REPORT

Prepared for:

**Port of Portland
Engineering Services
700 Northeast Multnomah, 15th Floor
Portland, Oregon 97232**

and

**U.S. Army Corps of Engineers, Portland District
P.O. Box 2946
Portland, OR 97208-2946**

Prepared by:

**Fishman Environmental Services
Consultants in Ecology and Natural Resource Management
434 NW 6th Avenue, Suite 304
Portland, OR 97209**

September 1996

FES Project 95046

TABLE OF CONTENTS

INTRODUCTION	1
METHODS	1
Study Areas	1
Sampling	1
Data Analyses	12
RESULTS	12
Catch Composition	12
Cruise 95-1, Beaver Depot	12
Cruise 95-1, Hayden Island	12
Cruise 95-2, Beaver Depot	16
Cruise 95-2, Hayden Island	16
Sturgeon Catch	16
Miscellaneous Species	20
DISCUSSION	21
Characterization of Fish Samples	21
Sturgeon	21
REFERENCES	22

LIST OF FIGURES

FIGURE 1. SITE LOCATIONS	2
FIGURE 2. 95-1 BEAVER DEPOT BEAM TRAWLS	4
FIGURE 3. 95-1 BEAVER DEPOT OTTER TRAWLS	5
FIGURE 4. 95-1 HAYDEN ISLAND BEAM TRAWLS	6
FIGURE 5. 95-1 HAYDEN ISLAND OTTER TRAWLS	7
FIGURE 6. 95-2 BEAVER DEPOT OTTER TRAWLS	10
FIGURE 7. 95-2 HAYDEN ISLAND OTTER TRAWLS	11
FIGURE 8. 95-1 WHITE STURGEON LENGTH FREQUENCY	18
FIGURE 9. 95-2 WHITE STURGEON LENGTH FREQUENCY	19

LIST OF TABLES

TABLE 1. 95-1 HAUL LOCATIONS	8
TABLE 2. 95-2 HAUL LOCATIONS	9
TABLE 3. FISH TAXA LIST	13
TABLE 4. 95-1 CATCH SUMMARY	14
TABLE 5. 95-2 CATCH SUMMARY	15
TABLE 6. WHITE STURGEON CATCH SUMMARY	17

INTRODUCTION

The Studies of Dredged Material Rehandling Sites (DMRS) are a component of the Columbia River Channel Deepening Feasibility Study. The U.S. Army Corps of Engineers (COE), Portland District has primary responsibility for dredging and disposal of bottom sediments in the Lower Columbia River. The Port of Portland (POP) is the primary sponsor for this study representing the ports in the region. This report concentrates on characteristics of fish resources present in two potential rehandling sites under consideration for temporary or permanent placement of dredged material. Larval and juvenile white sturgeon (*Acipenser transmontanus*), is the target species for the DMRS study. Relationships between benthic invertebrates, grain size, and fish assemblages will be discussed in the benthic invertebrate sampling report.

METHODS

Study Areas

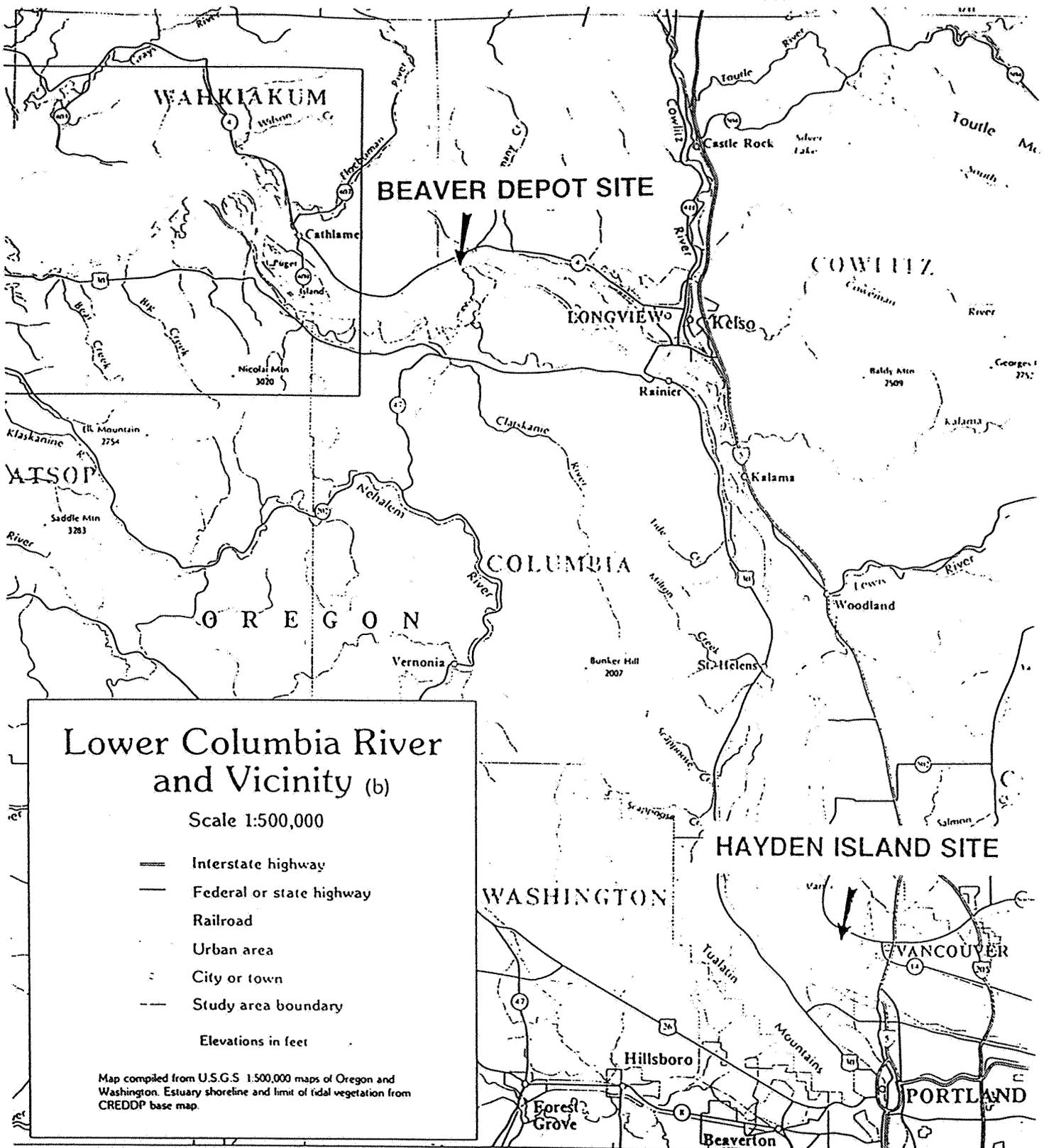
Information was collected on fish inhabiting the Beaver Depot (RKm 95.1-98.2) and Hayden Island (RKm 190.9-194.6) reaches of the Columbia River (Figure 1). Sampling was restricted to potential sediment rehandling areas on the Oregon side of the navigation channel in both reaches. This report focuses on fish collections made during cruises conducted during July 10-14, 1995 (Cruise 95-1) and October 15-21, 1995 (Cruise 95-2).

The Beaver Depot site can be characterized as a relatively high energy area. Bottom depths range from approximately 9 m to 18 m. Tidal fluctuations were approximately 1 m during the sampling event.

Bottom contours along the north side of Hayden Island (Vancouver Turning Basin) drop off rapidly from the shallow water immediately adjacent to the shoreline and reach a maximum depth of approximately 17 m. These depths are generally greater than the average navigation channel depth of 13 m. Trawl hauls were made in water depths ranging from 8 m to 17 m.

Sampling

Study methods and gear were designed to replicate as closely as possible the methods used by the National Marine Fisheries Service (NMFS) in their lower Columbia River sturgeon studies. In order to sample white sturgeon, a demersal species, a 7.9m semi-balloon otter trawl was used to collect juvenile sturgeon and a 3.0 m beam trawl was used to collect larval and young-of-the-year (YOY) sturgeon. Trawls were deployed from the MV Forerunner, a 15.2 meter research vessel operated by Clatsop Community College. Otter trawl hauls were made



Lower Columbia River and Vicinity (b)

Scale 1:500,000

- Interstate highway
- Federal or state highway
- Railroad
- Urban area
- City or town
- Study area boundary

Elevations in feet

Map compiled from U.S.G.S 1:500,000 maps of Oregon and Washington. Estuary shoreline and limit of tidal vegetation from CREDDP base map.

LEGEND

DRAWN: W. Bush
 APPROVED: S. Johnson
 DATE: September 1996
 SCALE: 1:500,000
 REVISED: _____

STUDIES OF DREDGE MATERIAL REHANDLING SITES

September 1996

SITE LOCATION MAP

Consultants in ecology and natural resource management

Fishman Environmental Services
 434 NW Sixth Avenue • Suite 304
 Portland, Oregon 97209-3600
 (503)224-0333

Figure # 1

Project # 95046

Studies of Dredged Material Rehandling Sites
Channel Deepening Feasibility Study, Project Number 51773/210
Fish Sampling Report
September 1996

during both July and October 1995. Beam trawl hauls were made during July 1995 only. Other numerically dominant species were also evaluated for this project. These included sandroller (*Percopsis transmontana*), starry flounder (*Platichthys stellatus*), and prickly sculpin (*Cottus asper*).

During Cruise 95-1, a total of six beam trawl hauls were made in the Beaver Depot area (Figure 2) followed by 7 otter trawl hauls (Figure 3). Each haul attempted to characterize a discrete topographic contour, that is, avoid major bottom elevation changes. The target sampling areas were greater than 10.7 m in depth, the minimum depth considered for rehandling sites, and the edge of the navigation channel. Six beam trawl hauls and 7 otter trawl hauls were also made in the Hayden Island reach between the northern shoreline and the navigation channel. Locations of these hauls appear in Figures 4 and 5. Global Positioning System (GPS) locations, direction of tow and compass headings for each haul are shown in Tables 1 and 2. All fish were returned to the river except representative larval specimens retained for laboratory identification. Larval fish were identified by research fishery biologists at the National Biological Survey, Columbia River Research Laboratory in Cook, Washington.

Trawl samples were numbered sequentially for the entire cruise, regardless of gear type or sample success. Every sample therefore has a discrete number.

Fish sampling during Cruise 95-2 (October 1995) consisted of 8 otter trawl hauls at Beaver Depot (Figure 6) and 9 hauls at Hayden Island (Figure 7). The beam trawl was not deployed since larval sturgeon were not present at this time of year. The otter trawl was more efficient for collecting YOY sturgeon.

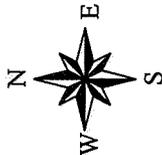
All fish in each sample were identified and counted; individual lengths and weights recorded for all YOY and larger white sturgeon and dominant species. Fork length (FL) and total length (TL) were recorded for sturgeon, fork length was recorded for all other measured fish. Weights were obtained to 0.1 g using a triple-beam balance.



Studies of Dredged Material Rehandling Sites

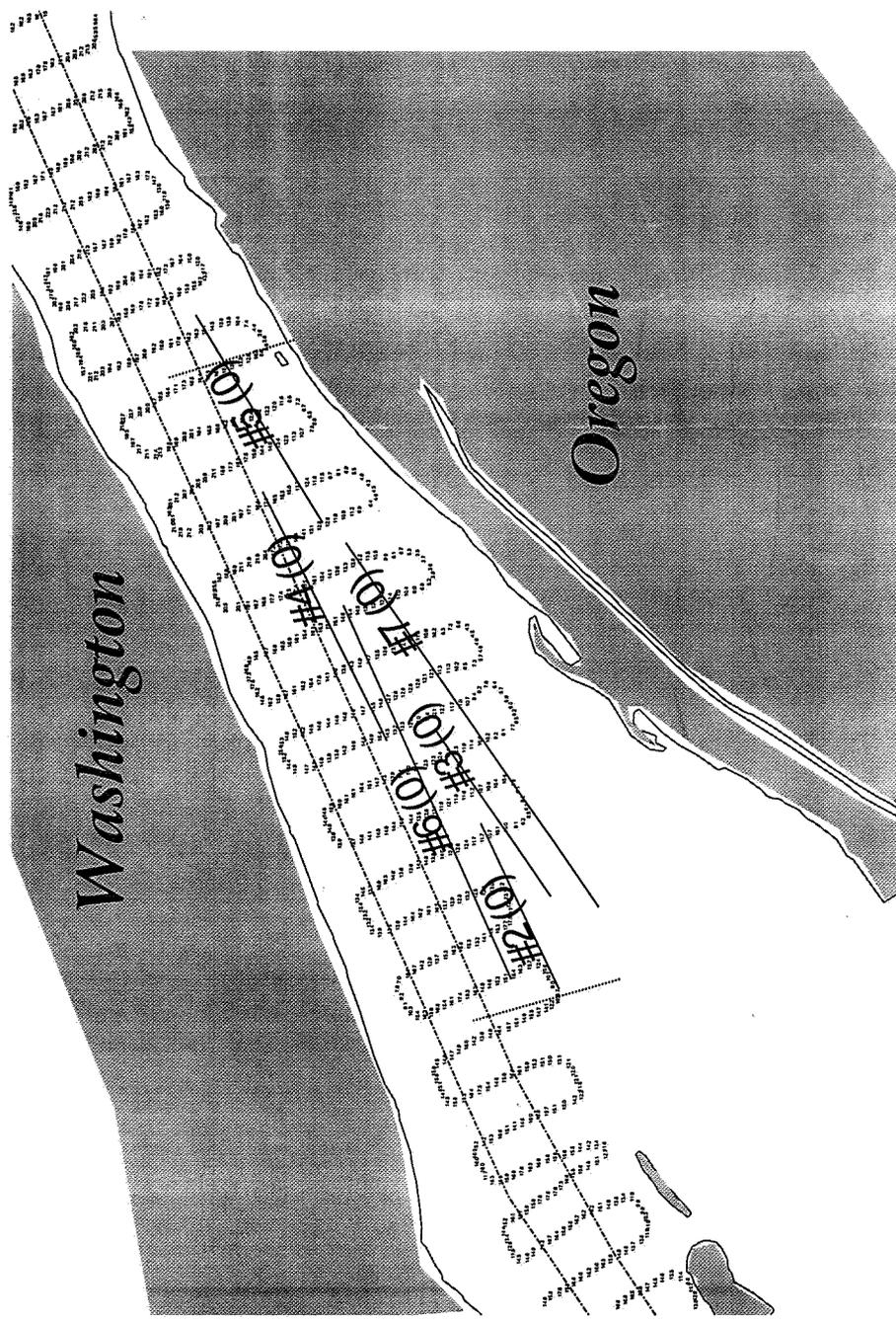
Beaver Depot Fish Sampling Sites
Cruise 95-1 Beam Trawls

River Kilometer 95.1-98.2



Soundings in Meters below Columbia River Datum

0.5 0 0.5 1 Kilometers



Legend

# 31 Haul Number		Study Boundary	
(0) Number of White Sturgeon per Haul		Mean Lower Low Water	
Beam Trawl Locations		Navigation Channel	

Map Composition: P. Britz
Approved: S. Johnson
Date: Sept. 1996

Soundings and Channel from
U.S. Army Corps of Engineers
MLLW shoreline from NOAA, NOS
Lambert Projection
1927 Datum

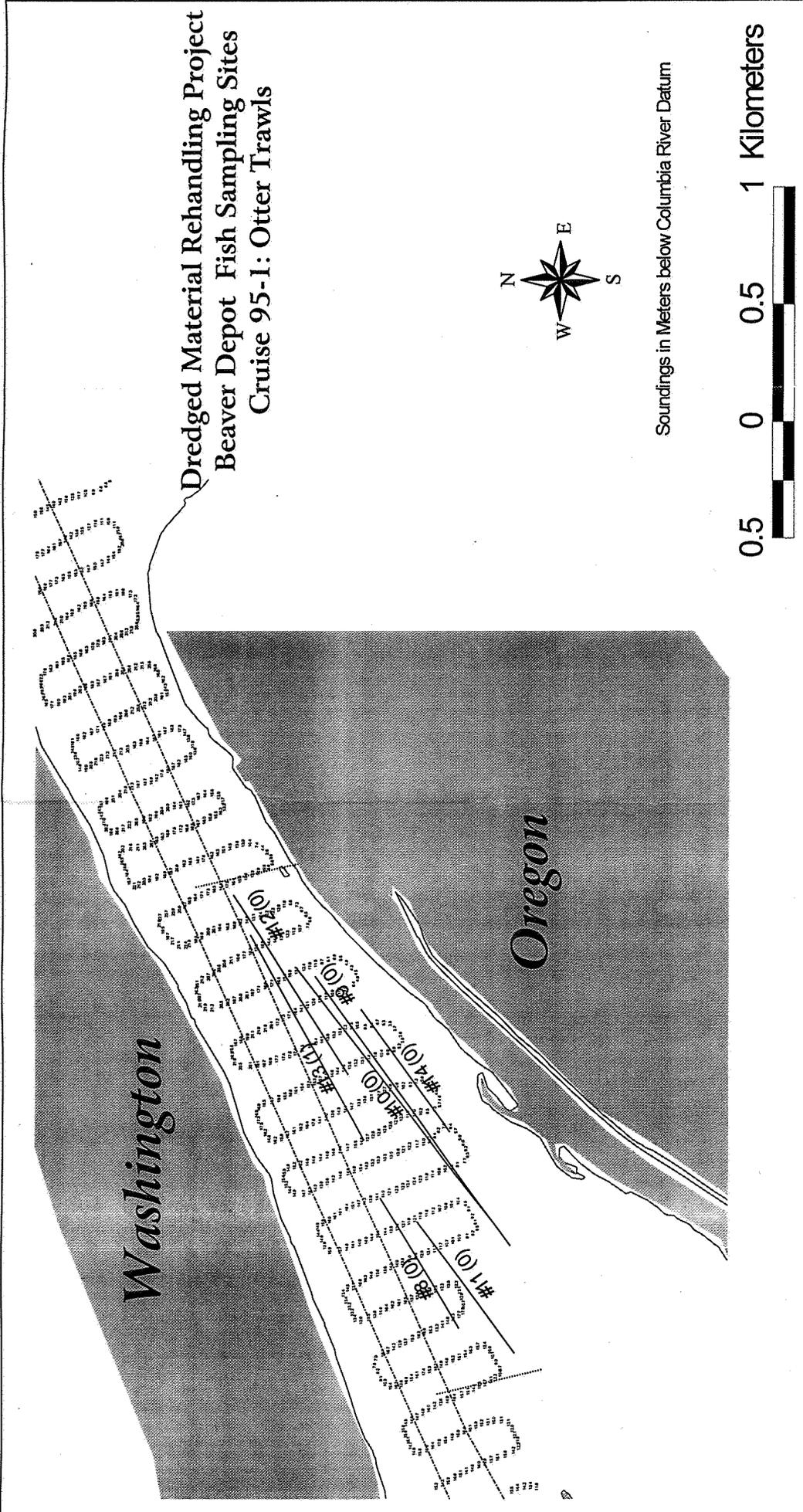
Consultants in ecology and
natural resource management



Fishman Environmental Services
434 NW Sixth Avenue * Suite 304
Portland, Oregon 97209-3600
(503)224-0333

Figure 2

Cruise 95-1 - July 1995
FES Project # 95046
Port of Portland Contract: S1529
Port of Portland Project # 51770-210

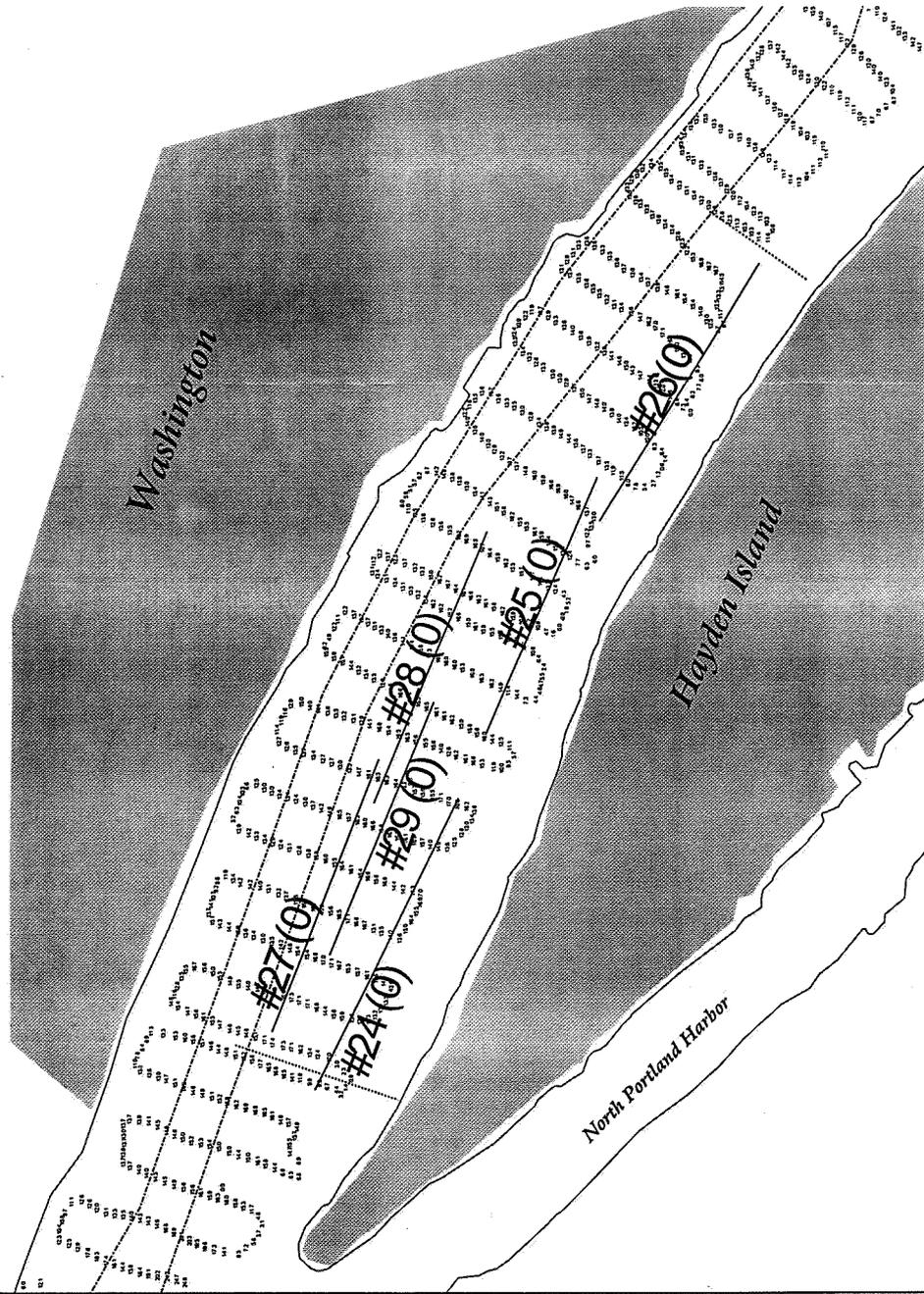


<p>Legend</p> <table border="1"> <tr> <td># 31 Haul Number</td> <td>Study Boundary</td> </tr> <tr> <td>(10) Number of White Sturgeon per Haul</td> <td>Mean Lower Low Water</td> </tr> <tr> <td>∩ Otter Trawl Locations</td> <td>Navigation Channel</td> </tr> </table>		# 31 Haul Number	Study Boundary	(10) Number of White Sturgeon per Haul	Mean Lower Low Water	∩ Otter Trawl Locations	Navigation Channel	<p>Map Composition: P. Britz Approved: S. Johnson Date: Sept. 1996</p> <p>Soundings and Channel from U.S. Army Corps of Engineers MLLW shoreline from NOAA, NOS Lambert Projection 1927 Datum</p>	
		# 31 Haul Number	Study Boundary						
(10) Number of White Sturgeon per Haul	Mean Lower Low Water								
∩ Otter Trawl Locations	Navigation Channel								
<p><i>Consultants in ecology and natural resource management</i></p> <p>Fishman Environmental Services 434 NW Sixth Avenue * Suite 304 Portland, Oregon 97209-3600 (503)224-0333</p>		<p>Figure 3</p> <p>Cruise 95-1 – July 1995 FES Project # 95046 Port of Portland Contract: S1529 Port of Portland Project # 51770-210</p>							

Studies of Dredged Material Rehandling Sites

West Hayden Island Fish Sampling Sites
Cruise 95-1 Beam Trawls

River Kilometer 190.9-194.6



Soundings in Meters below Columbia River Datum

0.5 0 0.5 1 Kilometers

Figure 4

Cruise 95-1 -- July 1995
FES Project # 95046
Port of Portland Contract: S1529
Port of Portland Project # 51770-210

Map Composition: P. Britz
Approved: S. Johnson
Date: Sept. 1996

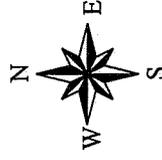
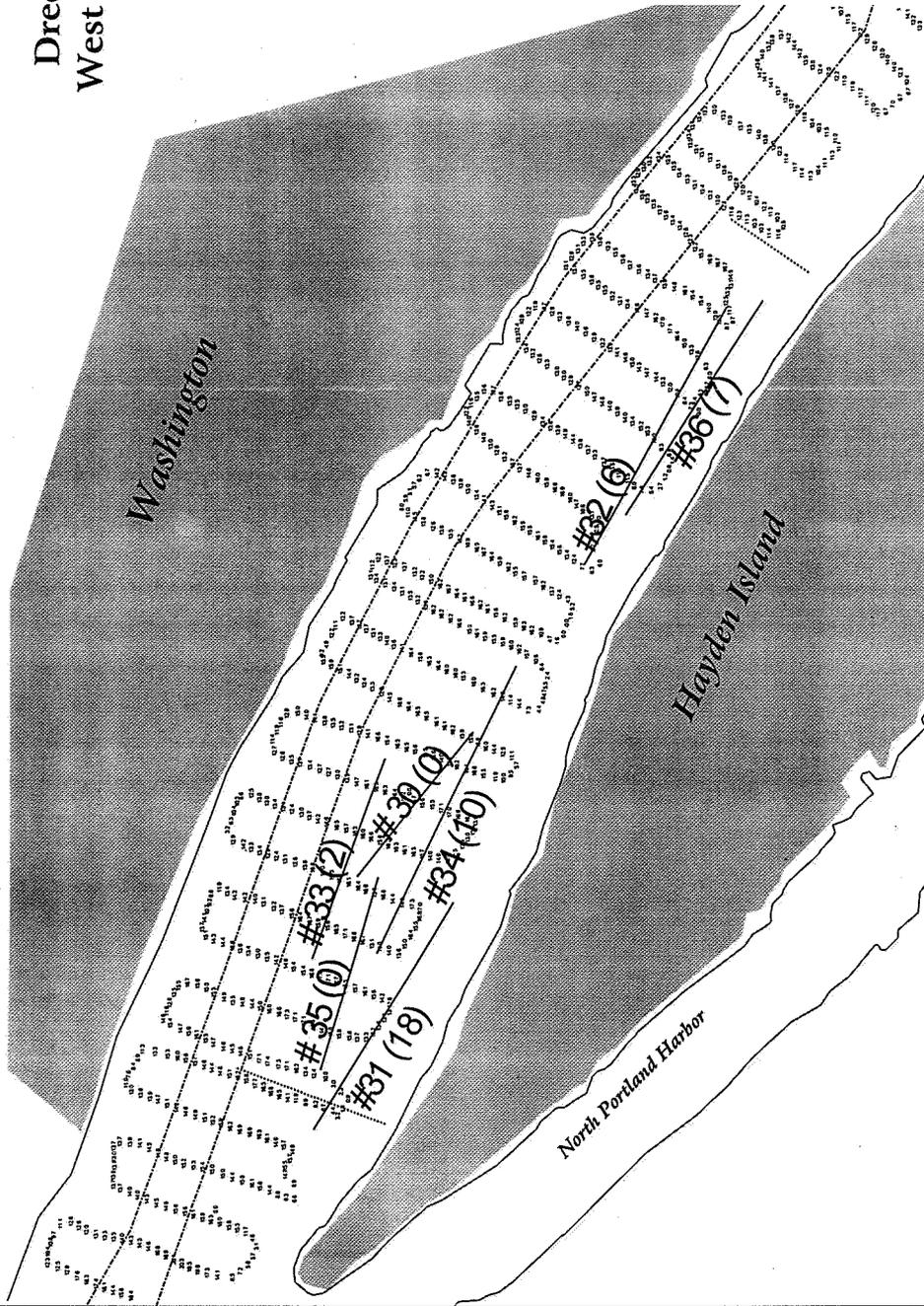
Soundings and Channel from
U.S. Army Corps of Engineers
MLLW shoreline from NOAA, NOS
Lambert Projection
1927 Datum

*Consultants in ecology and
natural resource management*

Fishman Environmental Services
434 NW Sixth Avenue * Suite 304
Portland, Oregon 97209-3600
(503)224-0333

# 31	Haul Number	Study Boundary	Mean Lower Low Water	Navigation Channel
(0)	Number of White Sturgeon per Haul	∩	∩	∩
∩	Beam Trawl Locations			

Dredged Material Rehandling Project
 West Hayden Island Fish Sampling Sites
 Cruise 95-1: Otter Trawls



Soundings in Meters below Columbia River Datum



Legend

# 31	Haul Number		Study Boundary
(10)	Number of White Sturgeon per Haul		Mean Lower Low Water
	Otter Trawl Locations		Navigation Channel

Consultants in ecology and natural resource management

Fishman Environmental Services
 434 NW Sixth Avenue * Suite 304
 Portland, Oregon 97209-3600
 (503)224-0333

Map Composition: Peter Britz
 Approved: S. Johnson
 Date: Sept. 1996

Soundings and Channel from
 U.S. Army Corps of Engineers
 MLLW shoreline from NOAA, NOS
 Lambert Projection
 1927 Datum

Figure 5

Cruise 95-1 -- July 1995
 FES Project # 95046
 Port of Portland Contract: S1529
 Port of Portland Project # 51770-210

TABLE 1. STUDIES OF DREDGED MATERIAL REHANDLING SITES: CRUISE 95-1, FISH SAMPLING LOCATIONS
 BEAVER DEPOT, 11 JULY 95; HAYDEN ISLAND, 13 JULY 95
 PROJECT NUMBER 51773/210

BEAVER DEPOT		Set Location			
Haul Gear	Latitude	Longitude	Depth	Compass	
2	BT	46°10.2"	123°12.9"	12.2	50
3	BT	46°10.2"	123°12.7"	10.7	30
4	BT	46°10.5"	123°12.3"	13.1	30
5	BT	46°10.6"	123°11.7"	12.5	30
6	BT	46°10.3"	123°12.9"	15.5	45
7	BT	46°10.1"	123°12.7"	7.6	40
8	OT	46°10.3"	123°12.8"	13.1	50
9	OT	46°10.2"	123°12.6"	11.6	35
10	OT	46°10.7"	123°11.6"	14.9	215
11	OT	46°10.2"	123°12.9"	13.4	45
12	OT	46°10.5"	123°11.9"	12.5	35
13	OT	46°10.8"	123°11.5"	16.8	200
14	OT	46°10.5"	123°11.8"	8.2	205

Haul Location					
Latitude	Longitude	Depth	Compass	Duration	Direction
46°10.3"	123°12.6"	11	45	5	US
46°10.4"	123°12.3"	10.4	25	10	US
46°10.7"	123°11.7"	13.4	25	15	US
46°10.9"	123°11.1"	18.6	30	6	US
46°10.6"	123°11.9"	16.2	30	15	US
46°10.6"	123°11.7"	9.8	25	13	US
46°10.5"	123°12.4"	14.3	50	5	US
46°10.6"	123°11.7"	12.8	45	10	US
46°10.2"	123°12.5"	7.6	215	13	DS
46°10.4"	123°12.5"	14.9	45	5	US
46°10.8"	123°11.3"	18	40	10	US
46°10.5"	123°12.2"	14.3	225	10	DS
46°10.3"	123°12.1"	6.4	215	5	DS

WEST HAYDEN ISLAND		Set Location			
Haul Gear	Latitude	Longitude	Depth	Compass	
24	BT	45°38.5"	122°44.3"	13.7	95
25	BT	45°38.2"	122°43.4"	17.1	100
26	BT	45°38.0"	122°42.7"	13.4	105
27	BT	45°38.6"	122°44.1"	15.5	100
28	BT	45°38.4"	122°43.4"	15.5	95
29	BT	45°38.4"	122°43.9"	16.5	100
30	OT	45°38.5"	122°44.1"	13.7	100
31	OT	45°38.3"	122°43.8"	17.1	280
32	OT	45°37.9"	122°42.3"	14.6	280
33	OT	45°38.2"	122°42.9"	15.5	285
34	OT	45°38.2"	122°43.3"	15.5	270
35	OT	45°38.5"	122°43.6"	16.2	285
36	OT	45°37.9"	122°42.6"	10.7	105

Haul Location					
Latitude	Longitude	Depth	Compass	Duration	Direction
45°38.3"	122°43.6"	16.5	100	10	US
45°38.0"	122°42.7"	15.8	110	10	US
45°37.8"	122°42.2"	14.3	110	9	US
45°38.4"	122°43.5"	16.2	90	11	US
45°38.2"	122°42.9"	15.2	90	10	US
45°38.3"	122°43.3"	16.2	90	10	US
45°38.4"	122°43.8"	17.1	90	5	US
45°38.5"	122°44.2"	13.1	295	5	DS
45°38.0"	122°42.9"	12.5	280	5	DS
45°38.4"	122°43.4"	14.3	285	5	DS
45°38.4"	122°43.9"	14.9	280	5	DS
45°38.5"	122°44.2"	16.8	270	5	DS
45°37.8"	122°42.4"	10.4	105	5	US

GEAR TYPES: BT = Beam Trawl; OT = Otter Trawl
 DIRECTION: US = Upstream; DS = Downstream
 UNITS: Depth = Meters; Compass = Degrees; Duration = Minutes

TABLE 2. STUDIES OF DREDGED MATERIAL REHANDLING SITES: CRUISE 95-2, FISH SAMPLING LOCATIONS
 BEAVER DEPOT, 15 OCTOBER 95; HAYDEN ISLAND, 19 OCTOBER 95
 PORT OF PORTLAND PROJECT NUMBER 51773/210

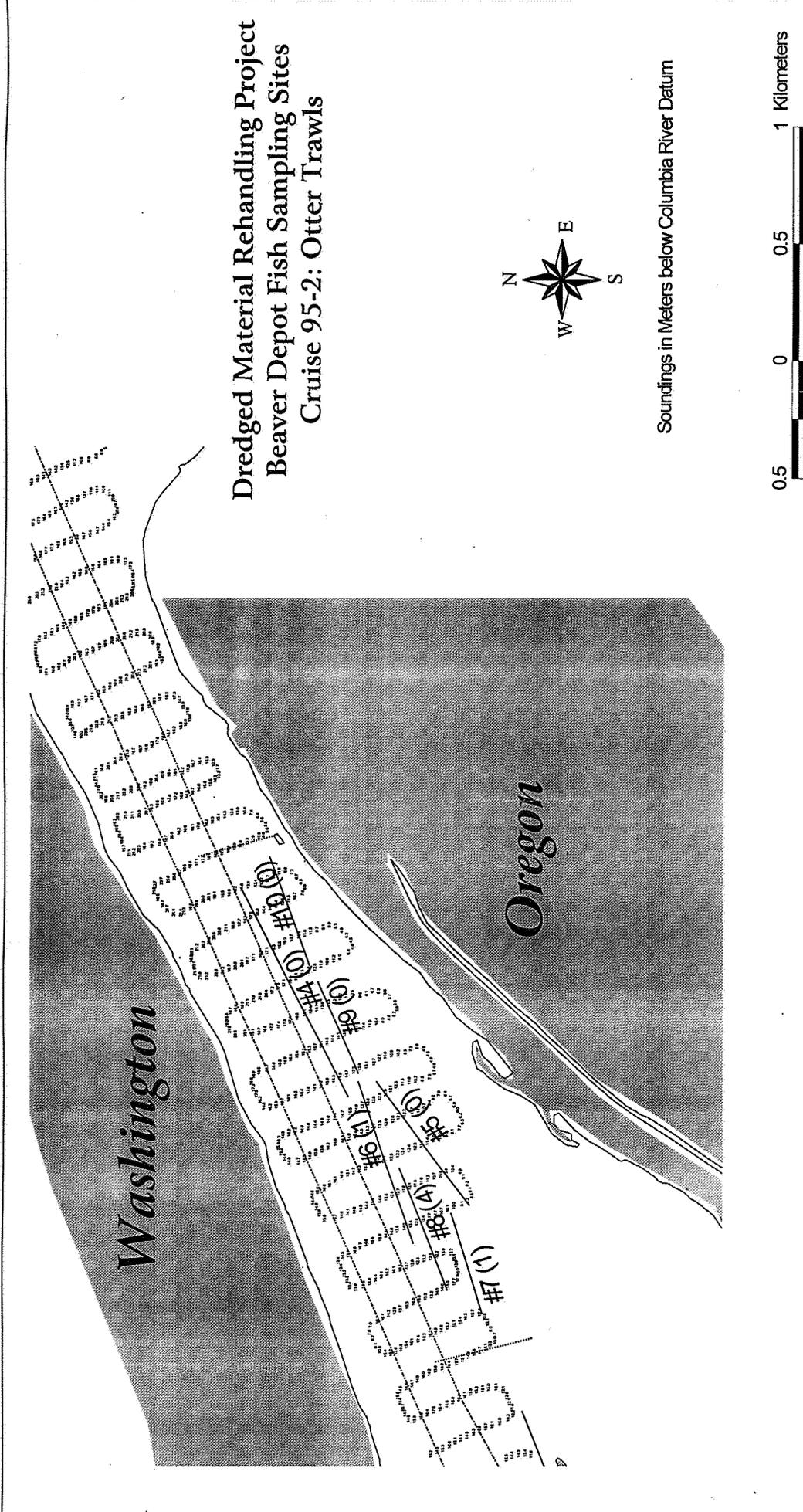
BEAVER DEPOT		Set Location			
Gear	Haul	Latitude	Longitude	Depth	Compass
OT	4	46°10.8'	123°11.6'	15.2	220°
OT	5	46°10.5'	123°12.1'	10.7	220°
OT	6	46°10.5'	123°12.1'	14	230°
OT	7	46°10.2'	123°12.8'	10.4	40°
OT	8	46°10.3'	123°12.8'	12.8	45°
OT	9	46°10.5'	123°12.1'	12.2	35°
OT	10	46°10.6'	123°11.7'	11.3	40°
OT	11	46°09.9'	123°13.8'	10.4	35°

Haul Location					
Latitude	Longitude	Depth	Compass	Duration	Direction
46°10.5'	123°12.1'	13.1	220°	6	DS
46°10.3'	123°12.5'	10.4	220°	6	DS
46°10.4'	123°12.6'	12.5	230°	6	DS
46°10.3'	123°12.5'	11.9	35°	5	US
46°10.4'	123°12.4'	12.8	30°	6	US
46°10.6'	123°11.9'	14	30°	6	US
46°10.7'	123°11.4'	14	35°	6	US
46°10.0'	123°13.4'	13.4	45°	6	US

HAYDEN ISLAND		Set Location			
Gear	Haul	Latitude	Longitude	Depth	Compass
OT	2	45°38.4'	122°44.0'	11.9	85°
OT	3	45°32.2'	122°43.5'	11.3	85°
OT	4	45°38.1'	122°42.8'	12.5	95°
OT	5	45°37.9'	122°42.3'	14.3	100°
OT	6	45°38.2'	122°43.0'	14.3	90°
OT	7	45°38.5'	122°44.1"	16.2	80°
OT	8	45°38.4'	122°43.5"	14.6	70°
OT	9	45°38.4'	122°43.7"	14.6	90°
OT	10	45°38.4'	122°43.2"	15.5	90°

Haul Location					
Latitude	Longitude	Depth	Compass	Duration	Direction
45°38.3'	122°43.7'	13.7	80°	5	US
45°38.2'	122°43.2'	12.5	70°	4	US
45°37.9'	122°42.6'	11	90°	5	US
45°37.9'	122°42.2'	11.3	110°	5	US
45°38.1'	122°42.8'	13.4	90°	5	US
45°38.5'	122°43.8'	15.2	75°	5	US
45°38.4'	122°43.4'	15.5	80°	5	US
45°38.3'	122°43.4'	11.3	80°	5	US
45°38.2'	122°42.9'	15.5	95°	5	US

GEAR TYPES: OT = Otter Trawl
 DIRECTION: US = Upstream; DS = Downstream
 UNITS: Depth = Meters; Duration = Minutes



Dredged Material Rehandling Project
 Beaver Depot Fish Sampling Sites
 Cruise 95-2: Otter Trawls

Legend

# 31	Haul Number		Study Boundary
(10)	Number of White Sturgeon per Haul		Mean Lower Low Water
	Otter Trawl Locations		Navigation Channel

Consultants in ecology and natural resource management

Fishman Environmental Services
 434 NW Sixth Avenue + Suite 304
 Portland, Oregon 97209-3600
 (503)224-0333

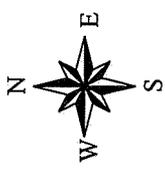
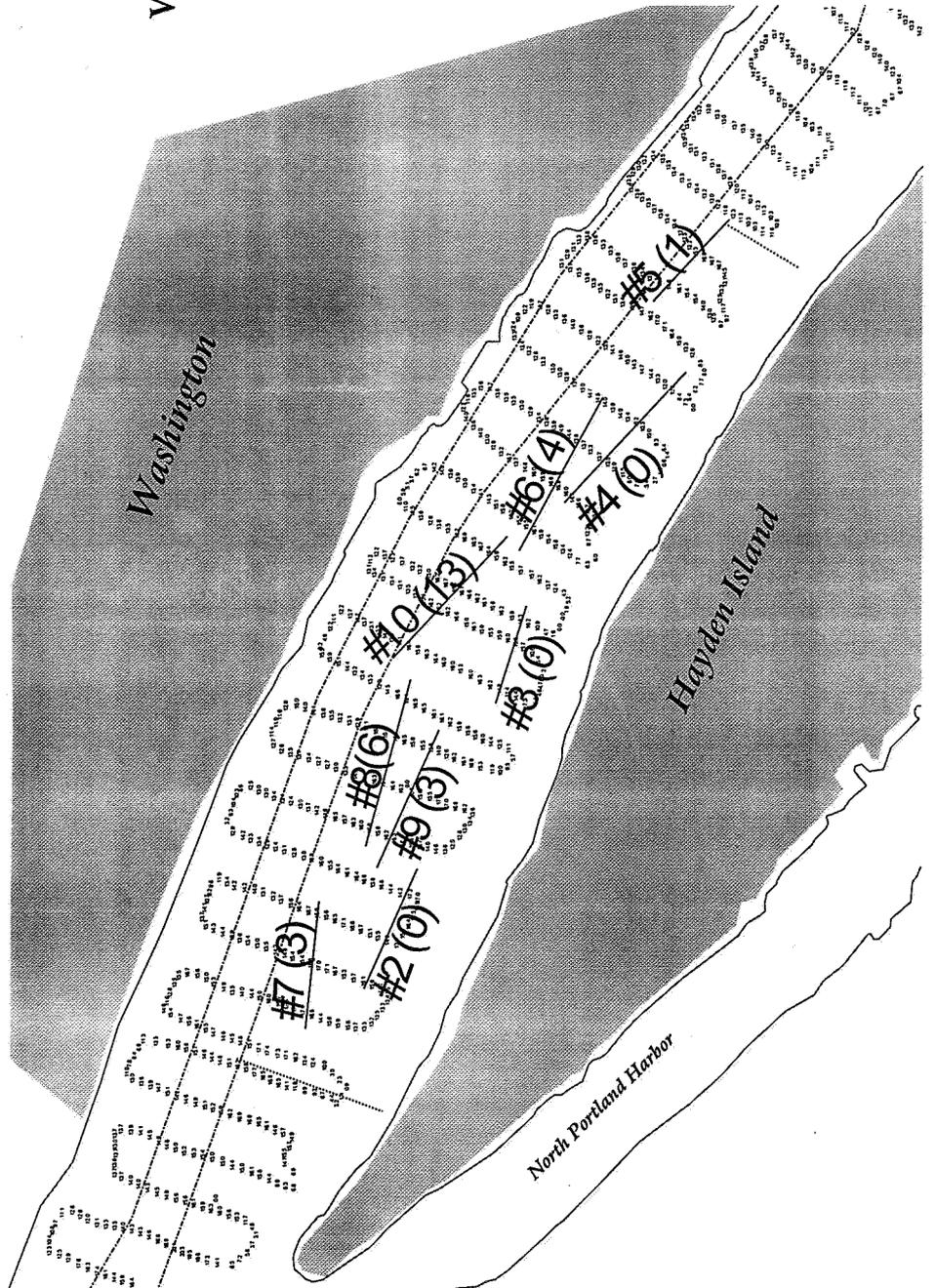
Map Composition: P. Britz
 Approved: S. Johnson
 Date: Sept. 1996

Soundings and Channel from
 U.S. Army Corps of Engineers
 MLLW shoreline from NOAA, NOS
 Lambert Projection
 1927 Datum

Figure 6

Cruise 95-2 – October 1995
 FES Project # 95046
 Port of Portland Contract: S1529
 Port of Portland Project # 51770-210

Dredged Material Rehandling Project
 West Hayden Island Fish Sampling Site
 Cruise 95-2: Otter Trawls



Soundings in Meters below Columbia River Datum



Legend

# 31	Haul Number		Study Boundary
(10)	Number of White Sturgeon per Haul		Mean Lower Low Water
	Otter Trawl Locations		Navigation Channel

Consultants in ecology and natural resource management

Fishman Environmental Services
 434 NW Sixth Avenue # Suite 304
 Portland, Oregon 97209-3600
 (503)224-0333

Map Composition: P. Britz
 Approved: S. Johnson
 Date: Sept. 1996

Soundings and Channel from
 U.S. Army Corps of Engineers
 MLLW shoreline from NOAA, NOS
 Lambert Projection
 1927 Datum

Figure 7
 Cruise 95-2 -- October 1995
 FES Project # 95046
 Port of Portland Contract: S1529
 Port of Portland Project # 51770-210

Data Analyses

Densities and biomass of white sturgeon and densities of dominant species were estimated using the catch data and a calculation of area sampled. Densities are expressed in number per hectare and weights in grams per hectare. Sampling areas were calculated by the loran-waypoint method. Waypoints were recorded at the beginning and end of the transect and entered into the loran unit from which tow distance was determined. Areas fished with the otter trawl ranged from 1,712 m² to 5,279 m². This assumes that actual effective fishing width of the otter trawl is 5.3 m or $\frac{2}{3}$ the headrope length. Effective sample width for the beam trawl is 2.7 m.

RESULTS

Catch Composition

Fish species identified from study samples are listed in Table 3. Fish catch data are presented in Tables 4 (Cruise 95-1) and 5 (Cruise 95-2).

Cruise 95-1, Beaver Depot. Otter trawl hauls during Cruise 95-1 in the Beaver Depot area contained eight fish species including white sturgeon, peamouth chub (*Mylocheilus caurinus*), largescale sucker (*Catostomus macrocheilus*), starry flounder, prickly sculpin, northern squawfish (*Ptychocheilus oregonensis*), sand roller and chinook salmon (*Oncorhynchus tshawytscha*). Prickly sculpin, peamouth chub and largescale sucker were the numerically dominant species. Only one white sturgeon (600mm FL, 690mm TL) was taken in the 13 hauls made in the vicinity of Beaver Depot. Juvenile chinook were encountered in two otter trawl hauls. It is not known whether the juvenile salmonids were captured while fishing the bottom or during deployment and/or retrieval of the net at shallow depths. Beam trawl catches at Beaver Depot consisted primarily of larval, non-target species including sculpins (cottids) and American shad (*Alosa sapidissima*). The entire non-larval catch consisted of several three-spine stickleback (*Gasterosteus aculeatus*) and one carp (*Cyprinus carpio*). It is important to note that numerous clams, mysid shrimp and *Corophium*, an aquatic amphipod, were collected in all beam trawl hauls indicating that the net was fishing along the bottom as intended.

Cruise 95-1, Hayden Island. The six beam trawl hauls made in the Hayden Island area during Cruise 95-1 were dominated by larval fish. Larval *Catostomus* spp. and individuals of the Cyprinidae family (peamouth, northern squawfish; chiselmouth (*Acrocheilus alutaceus*), and reidside shiner (*Richardsonius balteatus*), were the primary taxa. Several larval smallmouth bass (*Micropterus dolomei*), were also captured. No larval nor juvenile white sturgeon were collected in the beam trawl hauls. A summary of fish catches from both sites using both gear types is shown in Table 4.

TABLE 3. List of fish taxa collected during Cruises 95-1 and 95-2.

Scientific Name	Common Name	95-1		95-2	
		BD	HI	BD	HI
<i>Acipenser transmontanus</i>	White sturgeon	X	*	X	X
<i>Alosa sapidissima</i>	American shad	X		X	
<i>Catostomus macrocheilus</i>	Largescale sucker	X	X	X	X
<i>Cottus asper</i>	Prickly sculpin	*	X	X	X
<i>Cyprinus carpio</i>	Carp		X		X
<i>Gasterosteus aculeatus</i>	Three-spine stickleback	X	X	X	X
<i>Leptocottus armatus</i>	Pacific staghorn sculpin			X	
<i>Micropterus dolomeiui</i>	Smallmouth bass		X		
<i>Micropterus salmoides</i>	Largemouth bass		X		
<i>Mylocheilus caurinus</i>	Peamouth	X	X	X	X
<i>Oncorhynchus tshawtscha</i>	Chinook salmon	X	X		
<i>Perca flavescens</i>	Yellow perch				X
<i>Percopsis transmontana</i>	Sand roller	X	X	X	*
<i>Platichthys stellatus</i>	Starry flounder	X		*	X
<i>Pomoxis annularis</i>	White crappie				X
<i>Ptychocheilus oregonensis</i>	Northern squawfish	X		X	X
<i>Richardsonius balteatus</i>	Redside shiner		X		
<i>Stizostedion vitreum</i>	Walleye				X
BD = Beaver Depot; HI = Hayden Island; * = dominant numerically		10	11	10	12

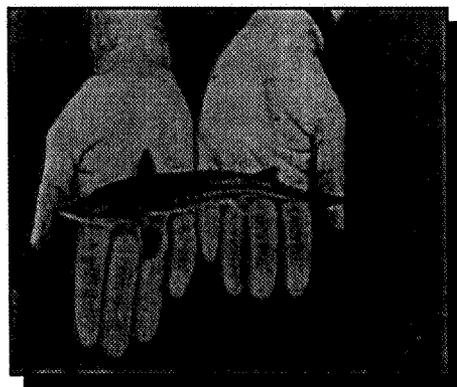
Cruise 95-2, Beaver Depot. Ten fish species were collected in the Beaver Depot area. Prickly sculpin, starry flounder, and peamouth chub were the dominant species.

Cruise 95-2, Hayden Island. Cruise 95-2 samples from the Hayden Island study area contained 11 fish species (Table 3). Sand rollers, prickly sculpin, and peamouth chub were the most abundant taxa. A catch summary for Cruise 95-2 is presented in Table 5.

Sturgeon Catch

A total of 80 white sturgeon was collected during the two fish collection cruises conducted for this study. A catch summary is presented in Table 6.

Juvenile white sturgeon were present in 5 of 7 otter trawl hauls in the Hayden Island area for Cruise 95-1. White sturgeon were the numerically dominant species followed by prickly sculpin and stone rollers. White sturgeon were primarily YOY with lengths ranging from 46-116 mm in total length (TL). A single white sturgeon (690mm TL) was taken at Beaver Depot. Length frequency distribution of white sturgeon collected during Cruises 95-1 and 95-2 are shown in Figures 8 and 9.



Six white sturgeon were taken in the 8 otter trawl hauls made in the vicinity of Beaver Depot during Cruise 95-2. The sturgeon catch included one legal-size adult (110.5 cm) and 5 young-of-the-year (YOY) ranging in total length from 165 mm - 289 mm.

A total of 28 YOY white sturgeon were present in otter trawl catches at Hayden Island during Cruise 95-2. Sturgeon ranged from 161 mm - 270 mm in total length, but also included a 580 mm adult. Larval or YOY white sturgeon were not collected in beam trawl hauls at either Beaver Depot or Hayden Island.

TABLE 6. CATCH SUMMARY FOR WHITE STURGEON STUDIES OF DREDGED MATERIAL REHANDLING SITES CHANNEL DEEPENING FEASIBILITY STUDY PORT OF PORTLAND PROJECT NUMBER 51773/210

CRUISE	HAUL NUM	GEAR	STUDY AREA	DEPTH (m)	NO. PER HAUL	NO. PER HECTARE	TOTAL WEIGHT (g)	WT. PER HECTARE (g)
95-1	31	OT	HI	15.1	18	41	13024.2	29499.9
95-1	32	OT	HI	13.6	6	12	1069.7	2198.8
95-1	33	OT	HI	14.9	2	6	355.1	1010.5
95-1	34	OT	HI	15.2	10	19	2293.7	4345.0
95-1	36	OT	HI	10.5	7	17	29.2	69.7
MEANS: (n=7)					6.1	13.6	2396.0	4589.1
95-2	5	OT	HI	12.8	1	5	48.0	256.9
95-2	6	OT	HI	13.9	4	14	174.5	598.6
95-2	7	OT	HI	15.7	3	14	193.1	908.7
95-2	8	OT	HI	15.1	6	21	333.4	1148.1
95-2	9	OT	HI	13.0	3	12	125.5	492.3
95-2	10	OT	HI	15.5	13	46	1487.8	5287.1
MEANS: (n=9)					3.3	12.4	262.5	965.7
TOTAL MEAN CATCH for STUDY AREA:					4.6	12.9	1195.9	2863.5
95-1	13	OT	BD	15.5	1	2	ND	ND
MEANS: (n=7)					0.1	0.3		
95-2	6	OT	BD	13.3	1	3	ND	ND
95-2	7	OT	BD	11.2	1	4	47.8	200.8
95-2	8	OT	BD	12.8	4	13	282.8	941.1
MEANS: (n=8)					0.8	2.5		
TOTAL MEAN CATCH for STUDY AREA:					0.5	1.5		

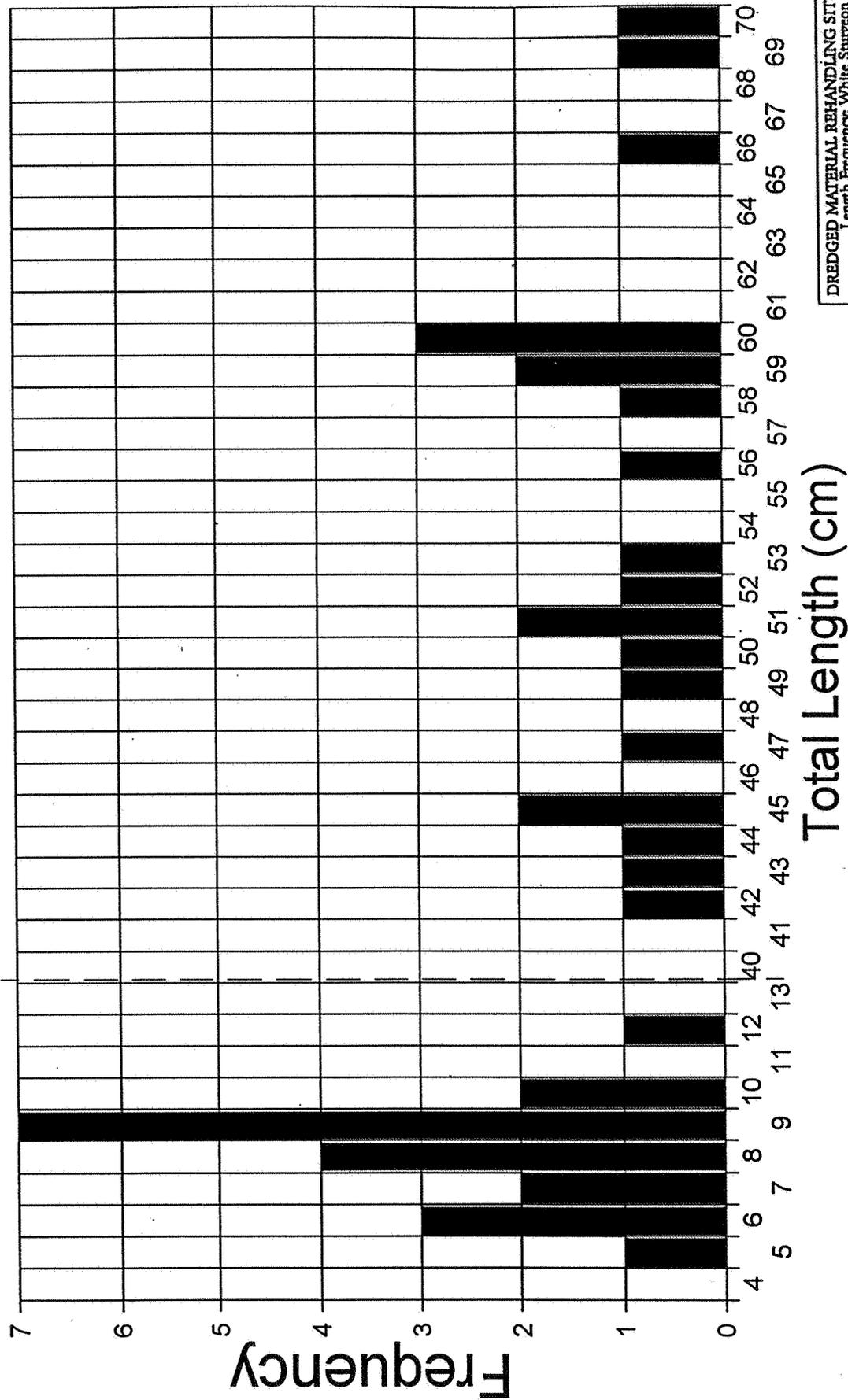
NOTES:

Cruise 95-1: 11 July 1995 (BD); 13 July 1995 (HI)
 Cruise 95-2: 15 October 1995 (BD); 19 October 1995 (HI)
 OT = Otter Trawl
 HI = Hayden Island
 BD = Beaver Depot
 ND = No Data

Mean values include hauls with zero catch

DREDGED MATERIAL REHANDLING SITE STUDY

Length Frequency: White Sturgeon



W. Hayden Island

DREDGED MATERIAL REHANDLING SITE STUDY
 Length Frequency: White Sturgeon
 Cruise 95-1

September 1996

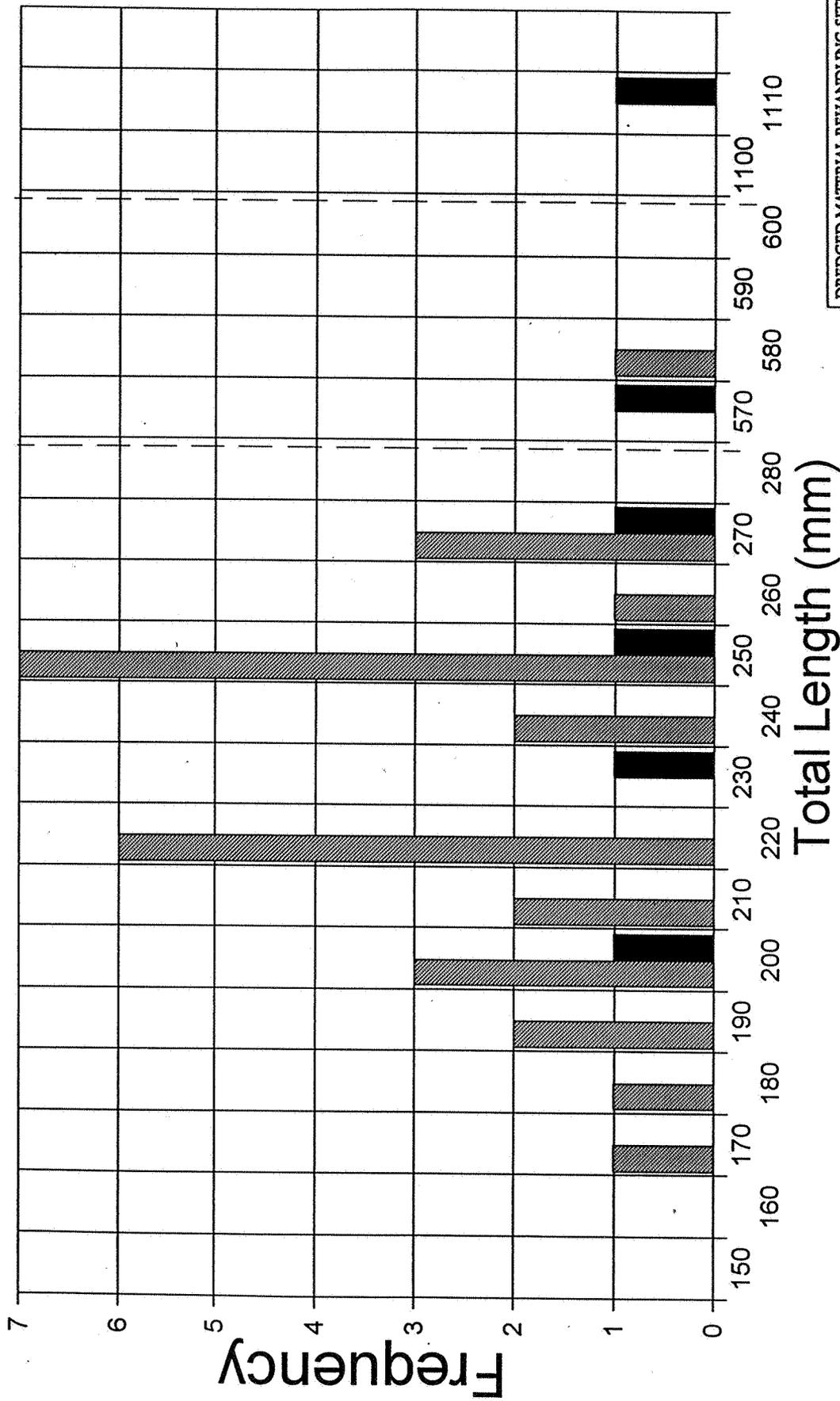
Coastal & estuary and
 natural resource management

Alaska Department of
 Natural Resources
 Wildlife Division 7700A 300
 (907)241-5311

Figure 8
 Project #95046

DREDGED MATERIAL REHANDLING SITE STUDY

Length Frequency: White Sturgeon



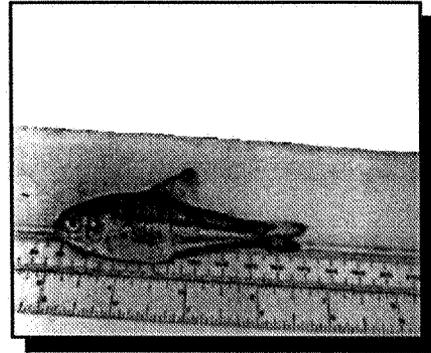
DREDGED MATERIAL REHANDLING SITE STUDY
 Length Frequency: White Sturgeon
 Cruise 95-2
 September 1996
 Oregon Department of Fish and Wildlife
 434 NW East Avenue, Suite 304
 Portland, Oregon 97209-3000
 (503) 281-6821

Figure 9
 Project #95046

Legend:
 Hayden Island (hatched box)
 Beaver Depot (solid black box)

Miscellaneous Species

Several species of note were collected during the fish sampling. The sandroller, *Percopsis transmontana*, a member of the trout-perch family, is a relatively obscure non-game species native to the Columbia River and its tributaries (Wydoski and Whitney 1979). Little is known of their habits, they are rarely found in large numbers and are considered by some to be rare. This was not the case during the October sampling in the Hayden Island area where sandrollers were the numerically dominant species in all hauls.

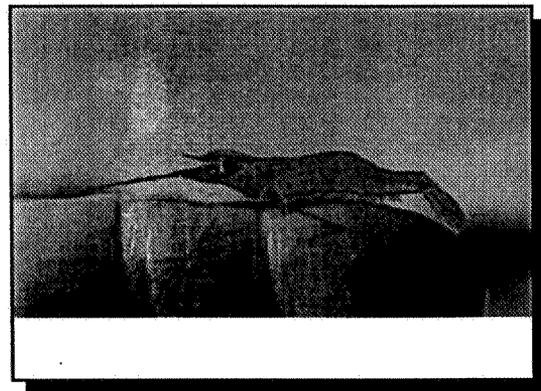


Percopsis transmontana

Starry flounder were particularly abundant in the Beaver Depot area during October. They were second in abundance to prickly sculpin which was one of the most abundant species in both areas during both cruises. The starry flounder is an estuarine and marine flatfish that typically inhabits the bottom, except in rocky areas. It is well suited to the sandy tidal flats of the lower Columbia River.

The prickly sculpin was found to be very abundant throughout both areas. It is tolerant of a wide range of salinities and, like the starry flounder, is a bottom-dweller. Abundant catches of both starry flounder and prickly sculpin are indicative that the nets were fishing near the bottom as prescribed.

It is interesting to note that incidental invertebrate species were also taken in the nets during trawl sampling. Of particular interest was an Asian freshwater shrimp, *Exopalaemon modestus*, taken in the vicinity of Hayden Island. These shrimp have recently been reported in the lower river, but this is, to our knowledge, the furthest upriver occurrence.



Exopalaemon modestus

DISCUSSION

Characterization of Fish Samples

The sampling for this project found differences in fish assemblages between the two stations and seasonally. Otter trawl catches at the Beaver Depot site were dominated numerically by prickly sculpin during both the July and October cruises. Peamouth were subdominants during both cruises, with largescale sucker also a sub-dominant during July, and starry flounder a sub-dominant during October (see box). White sturgeon juveniles were numerically dominant in otter trawl catches at Hayden Island during July, while sandrollers were dominant in October samples. Prickly sculpin were the sub-dominant species in catches at Hayden Island during both cruises.

The numerically dominant and sub-dominant fish species in the otter trawl catches are listed below (mean number per sample):

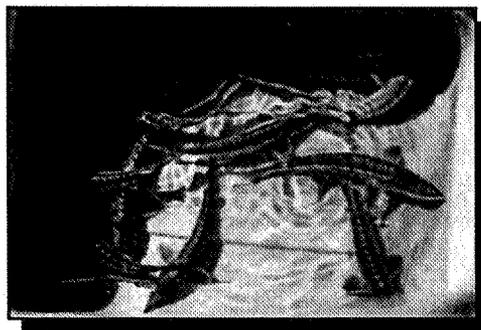
		<u>July</u>	<u>Oct</u>
Beaver Depot	Prickly sculpin	19.7	39.0
	Peamouth	2.9	18.0
	L.scale sucker	2.6	*
	Starry flounder	*	19.5
Hayden Island	White sturgeon	6.1	*
	Sandroller	*	62.3
	Prickly sculpin	2.9	12.2

* present, not numerically dominant

Differences observed in fish assemblages could be attributed to a number of factors, including: distance upriver from the estuary, season, site-specific habitat parameters, or others.

Sturgeon

White sturgeon appear to be fairly abundant in the Hayden Island area. A total of 73 sturgeon was collected in the area during the cruises. They were the numerically dominant species observed during the July cruise and the fourth most abundant species in the October sampling. Although larval sturgeon were not encountered in the area, YOY sturgeon were quite abundant during October. This may indicate that the area is utilized as a nursery area by juvenile sturgeon.



Sturgeon densities in otter trawl catches are within the range of values found during juvenile sampling conducted by NMFS in 1989 and 1990 (McCabe and Hinton 1990, 1991). The NMFS sampling was conducted throughout the lower Columbia River below Bonneville Dam. Additional unpublished data has been collected from the lower river during subsequent years. Otter trawl sturgeon densities in the NMFS samples generally ranged from 0 - 102 fish per

hectare for sampling conducted June through August and 0 - 32 fish per hectare for September or October catches. Our Hayden Island sampling found sturgeon in the range of 0 - 41 per hectare in July, and 0 - 46 per hectare in October. Sturgeon densities in our Beaver Depot trawl catches were generally lower than those found in the NMFS sampling efforts (0 - 2 per hectare in July, 0 - 13 per hectare in October compared to a range of 0 - 58 per hectare in June through August sampling and 0 - 53 for September/October sampling in the NMFS data) for that area.

Sturgeon densities from NMFS sampling in other areas of the lower Columbia River were as high as 811 sturgeon per hectare in a trawl hauls at Rkm 243 in October 1990. Sturgeon densities were generally greater upstream of Rkm 139.

Locations of high sturgeon densities within the Hayden Island sampling area varied from July to October. Highest concentrations of juvenile sturgeon were generally found in hauls made near the downstream end of the study area during July. During October, the most abundant sturgeon catches were made furthest from the shoreline (nearest to the navigation channel) and near the middle of the study area. This is quite different than the situation at Beaver Depot where only one adult sturgeon was collected during July and 6 juveniles were taken during October.

It is important to note that primarily YOY and juvenile sturgeon were found in the Hayden Island area. The results of this study support the suggestion that the area is utilized as a nursery and/or rearing area by white sturgeon. It is also important to note that although few sturgeon were taken in the Beaver Depot area, other surveys (NMFS) indicate that larval and juvenile sturgeon are present at least at certain times of the year. The small sturgeon catch during Cruise 95-1 at Beaver Depot may be the result of high river velocities at the time of sampling or other variable factors.

REFERENCES

- Fox, D., S. Bell, W. Nehlsen, and J. Damron. 1984. *The Columbia River Estuary: Atlas of Physical and Biological Characteristics*. Astoria, Oregon. CREEDP.
- Hinton, S.A., R.L. Emmett, and G.T. McCabe, Jr. 1992. *Fishes, shrimp, Benthic Invertebrates, and Sediment Characteristics in Intertidal and Subtidal Habitats at Rice Island and Miller Sands, Columbia River Estuary, 1991*. NMFS. Coastal Zone and Estuarine Studies. 53p.
- Hinton, S.A., R.L. Emmett, and G.T. McCabe, Jr. 1992. *Benthic Invertebrates and Sediment Characteristics in Subtidal Habitat at Rice Island, Columbia River Estuary, December 1991 and March 1992*. NMFS. Coastal Zone and Estuarine Studies. 22 p.

Studies of Dredged Material Rehandling Sites
Channel Deepening Feasibility Study, Project Number 51773/210
Fish Sampling Report
September 1996

- McCabe, G.T., Jr., and S.A. Hinton. 1990. Report D. *In* A. A. Nigro (ed.) Status and Habitat Requirements of White Sturgeon Populations in the Columbia River Downstream From McNary Dam. Ann. Rep. to Bonneville Power Admin. (Project 86-50), Portland, Oregon. Pp. 149-191.
- _____. 1991. Report D. *In* A. A. Nigro (ed.) Status and Habitat Requirements of White Sturgeon Populations in the Columbia River Downstream From McNary Dam. Ann. Rep. to Bonneville Power Admin. (Project 86-50), Portland, Oregon. Pp. 145-180.
- McCabe, G.T., Jr., R.L. Emmett, and S.A. Hinton. 1993. *Feeding Ecology of Juvenile White Sturgeon in the Lower Columbia River*. *Northwest Science*. Vol. 67(3), pp. 170-180.
- McCabe, G.T., Jr. and C.A. Tracy. 1994. *Spawning and Early Life History of White Sturgeon in the Lower Columbia River*. *Fishery Bulletin* 92: 760-772.
- McConnell, R.J. 1990. *An Annotated Bibliography of Aquatic Research in the Lower Columbia River (River Mile 0 to 106.5)*. U.S. Army Corps of Engineers, Portland District. Contract No. DACW57-90-M-1187.
- Parsley, M.J. and L.G. Beckman. 1994. *White Sturgeon Spawning and Rearing Habitat in the Lower Columbia River*. *North American Journal of Fisheries Management* 14:812-827.
- Tetra Tech. 1992a. *Reconnaissance Survey of the Lower Columbia River: Task 1: Summary of Existing Data and Preliminary Identification of Problem Areas and Data Gaps*. Prepared for Columbia River Bi-State Committee. Tetra Tech, Inc., Bellevue, Washington.
- Tetra Tech. 1993b. *Reconnaissance Survey of the lower Columbia River. Task 7: Conclusions and Recommendations*. Prepared for Columbia River Bi-State Committee. Tetra Tech, Inc., Redmond, Washington.
- U.S. Army Corps of Engineers. 1981. *Columbia River Channel Status*. Portland District, Corps of Engineers, Portland, Oregon.
- U.S. Army Corps of Engineers. 1993. *Biological Assessment for Dredging Operations in the Columbia and Lower Willamette Rivers*. Portland District, Planning and Engineering Division, Portland, Oregon.
- Washington Department of Fish and Wildlife and Oregon Department of Fish and Wildlife. 1994. *Status Report: Columbia River Fish Runs and Fisheries, 1938-1993*.

Studies of Dredged Material Rehandling Sites
Channel Deepening Feasibility Study, Project Number 51773/210
Fish Sampling Report
September 1996

Wydoski, R.S. and R.R. Whitney. 1979. *Inland Fishes of Washington*. University of Washington Press.