



TECHNICAL MEMORANDUM

To: Jim Carsner, PWS, U.S. Army Corps of Engineers Date: December 16, 2020
From: Phil Wiescher, PhD and Curtis Riley, RLA Project: NWS-2013-1209
RE: Port of Ridgefield Carty Lake Remedial Action (NWS-2013-1209) Year 5 (2020) Vegetation Monitoring

On behalf of the Port of Ridgefield (Port), Maul Foster & Alongi, Inc. (MFA) has prepared this final Year 5 (2020) vegetation monitoring report consistent with the requirements of the U.S. Army Corps of Engineers (COE) Nationwide Permit 38 (NWS-2013-1209), issued for the Carty Lake remedial action in Ridgefield, Washington. The remedial action addressed historical contamination of sediment in Carty Lake in the U.S. Fish and Wildlife Service (USFWS) Ridgefield National Wildlife Refuge (RNWR) (see Figure 1). The remedial action was required by the Washington State Department of Ecology (Ecology) and included excavating contaminated sediment, placing clean sand to contain residual contamination, and removing a failing treated-wood retaining wall at the southern end of the lake. The wetland and the upland banks were restored with native plants, consistent with the Carty Lake Mitigation Plan (CLMP) (MFA, 2014). The remediation work was completed in 2014, and restoration plantings were completed in 2015.

In addition to the cleanup completed, the Ecology cleanup action plan requires restriction of fish consumption for protection of human health. As determined in coordination with Ecology, the Port and the RNWR will enter into an agreement, such as a memorandum of understanding, stating that a fish consumption restriction will be incorporated into an interpretive center display that is under construction at the southern end of Carty Lake. Additional evaluations of the potential for impacts to human health from fish consumption may be necessary if Carty Lake is reconnected with the Columbia River in the future.

Carty Lake is a 52-acre lake in the RNWR. In 2013, the southern end of the lake was rated as a Category II lake fringe wetland. Before remediation, nonnative reed canary grass was ubiquitous and generally dominated the shoreline, forming dense monocultures; Himalayan blackberry was dominant along the former retaining wall and the southern end of the lake. The remediation work was conducted to meet sediment standards protective of ecological receptors. The mitigation approach was developed in consultation with the COE and the USFWS. Consistent with the CLMP, the short-term temporary construction impacts are mitigated by 1.2 acres of revegetation to be maintained in the excavation area (the mitigation area) (see Figure 1). The CLMP provides ecologically based performance standards for the mitigation area that will be used to determine whether the compensatory mitigation

project is achieving its objectives. In addition, areas surrounding the mitigation area were revegetated and are maintained to impede encroachment of nonnative species. These areas are being treated at the behest of the permittee and are not regulated as mitigation areas. Permanent impacts associated with the construction of bank stabilization and remediation elements were mitigated by the purchase of mitigation credits; associated documentation is provided in the Carty Lake construction completion report (MFA, 2015).

Monitoring of the mitigation area is to be conducted annually for five years (until the end of 2020). Year 1 (2016) mitigation monitoring was conducted in summer 2016, with results provided in the November 2016 monitoring report submitted to the COE (MFA, 2016). In brief, the 2016 report concluded that the planted native vegetation was well-established, dense, and diverse in the marginal and emergent zones, and that limited invasive-species encroachment was observed in the marginal and emergent zones. In the submergent zones, invasive species (primarily the ubiquitous pondweed Eurasian watermilfoil) were more frequently observed. The performance standard for plant areal cover was met for the mitigation area, while the invasive species performance standard was not met, primarily because of the presence of milfoil in the submergent zone.

In general, the Year 2 (2017) mitigation monitoring report for the on-site mitigation area concluded that the planted native vegetation was well-established, dense, and diverse in the marginal and emergent zones (MFA, 2017). Limited invasive-species encroachment (primarily reed canary grass) from the surrounding upland areas was observed in the marginal and emergent zones. In the submergent zones, native nonplanted aquatics such as native algae, hornwort, and duckweed, were common, and invasive species (primarily the ubiquitous pondweed milfoil) were frequently observed. Ducks, great egrets, frogs, small fish, and insects were also observed, indicating that the mitigation area was serving ecological functions. As a whole, the area appears to have naturalized.

In general, the Year 3 (2018) mitigation monitoring report concluded that the planted native vegetation continued to establish itself and was dense and diverse in the marginal, emergent, and submergent zones (MFA, 2018). Some invasive-species encroachment (primarily reed canary grass) from the surrounding upland areas was observed in the marginal and emergent zones. Blue heron, great egrets, frogs, small fish, and insects were observed, indicating that the mitigation area was serving ecological functions; and the area continued its naturalization. For example, other native species (nodding beggartick flower and waterpepper) that were neither planted nor observed during Year 1 monitoring were observed in Year 3.

In Year 4 (2019) the planted native vegetation was well-established, dense, and diverse in the marginal and emergent zones; bur-reed and wapato (both culturally significant species), rush, spikerush, and sedges were widespread (MFA, 2019). Wapato had begun to naturalize and spread into the nearby banks north of the mitigation area. Increased invasive-species encroachment (primarily reed canary grass) from the surrounding upland areas was observed in the marginal and emergent zones. In the submergent zones, hornwort and duckweed were common, and invasive species (primarily milfoil) were frequently observed.

In general, Year 5 (2020) mitigation monitoring observed native vegetation that continues to establish itself and that is dense in all the planting zones in the mitigation area. Some invasive-species encroachment (primarily reed canary grass) from the surrounding upland areas was observed in the marginal and emergent zones. Great egrets, ducks, otters, small fish, and insects were observed, indicating that the mitigation area is serving ecological functions; and the area continues to naturalize.

SITE MANAGEMENT ACTIVITIES

Paul Brothers, Inc. (PBI), of Boring, Oregon, restored and planted the 1.2-acre mitigation area. Plants were installed as described in the Carty Lake construction completion report (MFA, 2015).¹ During a site inspection conducted in fall 2015,² MFA gave PBI verbal notice of substantial completion.

PBI continued ongoing maintenance of invasive-plant removal and irrigation-system repair. Following the 2016 site monitoring, MFA provided the 2016 monitoring report to PBI, informing them that some invasive-species control would be necessary to meet the associated performance standard. In addition, some upland replacement plantings surrounding the mitigation area (i.e., areas not regulated as mitigation areas) were necessary to meet maintenance requirements; PBI conducted fall/winter 2017 replacement plantings to optimize plant establishment. The replanting list included the following species: bald hip rose (*Rosa gymnocarpa*), Nootka rose (*Rosa nutkana*), Indian plum (*Oemleria cerasiformis*), salmonberry (*Rubus spectabilis*), thimbleberry (*Rubus parviflorus*), Douglas spiraea (*Spiraea douglasii*), willow species (*Salix spp.*), and serviceberry (*Amelanchier alnifolia*). Invasive species in the mitigation area marginal and emergent zones (primarily reed canary grass) were removed as part of these 2017 activities.

In spring 2018, Sound Native Plants (SNP) of Olympia, Washington, continued vegetation management with mowing, cutting, and hand-pulling competing vegetation; controlling invasive species; and operating/repairing the irrigation system. SNP conducted six irrigation/maintenance visits from April through September 2018 to manually turn on the aboveground irrigation system and manage vegetation as needed. Invasive species in the mitigation area and the marginal and emergent zones (primarily reed canary grass) were removed as part of these 2018 activities.

In 2019, some upland replacement plantings surrounding the mitigation area (i.e., areas not regulated as mitigation areas) were installed as part of the maintenance contract with SNP. This included installation of 350 live willow stakes and 300 bare root native shrubs (i.e., oceanspray, Indian plum, mock orange, cascara, and Nootka rose). To ensure the success of this newly installed vegetation, SNP retrofitted the existing irrigation system to an automated system to deliver water consistently over the summer. SNP conducted two weed-control treatments using manual methods, and had spot

¹Because plantings were not completed until 2015, instead of in 2014 as anticipated in the CLMP, Year 1 monitoring was initiated in 2016, consistent with NWS-2013-1209 requirements (i.e., Year 1 monitoring to be conducted at least one year following completion of mitigation plantings).

² This does not include PBI's ongoing maintenance requirements, which include maintaining all planted areas through October 2018 in order to meet performance standards identified in the contract documents.

applications of aquatic labeled herbicides conducted by Washington State Department of Agriculture licensed applicators.

In 2020, the initial (2015) restoration efforts and the vegetation installed as part of the 2017 replanting showed signs of becoming self-sufficient. The Port has taken on maintenance activities and continues to mow and remove competing vegetation as required. To encourage drought tolerance and successful establishment, supplemental irrigation has been discontinued.

The Year 5 (2020) mitigation monitoring results are provided below.

PERFORMANCE STANDARDS

As described in the CLMP, the performance standards for the on-site mitigation are as follows:

***Performance Standard 1.1.** As shown by the proposed grading plan (Attachment 1 to the NWS-2013-1209 Joint Aquatic Resources Permit Application), the site will be graded to the proposed contours.*

This performance standard has been met as described in the Carty Lake construction completion report (MFA, 2015).

***Performance Standard 1.2.** The areal cover of native species shall be at least 20 percent by Year 1, 40 percent by Year 3, and 60 percent by Year 5. Replace dead or dying plants as needed to meet the performance standard.*

This performance standard has been exceeded and is described in the evaluation below.

***Performance Standard 1.3.** During all monitoring, nonnative, invasive plant species will not exceed 20 percent areal cover.*

This performance standard for Year 5 is evaluated below.

***Performance Standard 1.4.** By Years 3 and 5, at least three different native species shall be present. To qualify, a species must have at least 5 percent average cover in the habitat class and must occur in at least 10 percent of the plots sampled.*

This performance standard has been exceeded and is described in the evaluation below.

COMPLIANCE MONITORING METHODOLOGY

On-site planting areas were monitored on October 15, 2020. The goal of the monitoring inspection was to determine the areal cover of native plants and the extent of nonnative, invasive plant encroachment and to identify maintenance tasks that are required in order to meet the performance standards. The monitoring, performed by MFA staff consistent with the 2016 methodology, included:

- Establishing the identity and percent cover of native and invasive vegetation, using a point-line method; monitoring points established in 2016 at fixed intervals (approximately 10 feet)

along three sampling transects spanning the on-site mitigation area were reevaluated (see Figure 2). Transect A spans, predominantly, the submergent zone planting area (deeper water portion); Transect C spans, predominantly, the emergent zone; and Transect B spans both emergent and submergent zones. All transects include sampling units in the marginal zone. A portion of Transect C intersects a higher elevation “island” that is not part of the mitigation area; data were not collected in this area. Data were recorded for plants within approximately 1 foot of the sampling units. Both native and invasive percent cover for each transect was determined based on the number of times native vegetation was present at a sampling unit divided by the total number of units in a sampling transect. A handheld global positioning system unit was used to navigate to points.

- Photodocumentation points documenting conditions and comparing plant vigor/growth between monitoring inspections. Three photodocumentation points per habitat zone were identified, as shown in Figure 2.

RESULTS

This is the fifth year of monitoring. Monitoring focused on plant identification and cover to provide management recommendations and to evaluate performance standards. Transect data are provided in the attached table and are discussed below with respect to the relevant performance standards.

In general, the planted native vegetation is well-established, dense, and diverse in the marginal and emergent zones; bur-reed, rush, spikerush, and sedges are widespread. Wapato has begun to naturalize and spread into the nearby banks north of the mitigation area. Increased invasive-species encroachment (primarily reed canary grass) from the surrounding upland areas was observed in the marginal and emergent zones. In the submergent zones, hornwort and duckweed were common, and invasive species (primarily milfoil) were frequently observed. Great egrets, ducks, otters, small fish, and insects were observed, indicating that the mitigation area is serving ecological functions, and as a whole, the area appears to have naturalized. For example, other native species (Mexican water fern and waterpepper) that were neither planted nor observed during Year 1 monitoring were observed in Years 2, 3, 4, and 5. A photo array for the mitigation area, including photodocumentation points, is attached.

CONCLUSIONS AND RECOMMENDATIONS

Performance Standard 1.2. *The areal cover of native species shall be at least 20 percent by Year 1, 40 percent by Year 3, and 60 percent by Year 5. Replace dead or dying plants as needed to meet the performance standard.*

Sixteen native species were observed in the mitigation area, and 100 percent native areal cover was observed in all transects. These conditions continue to exceed this performance standard.

Performance Standard 1.3. *During all monitoring, nonnative, invasive plant species will not exceed 20 percent areal cover.*

Areal cover for transects A (100 percent), B (100 percent), and C (100 percent) are above 20 percent for invasive species, and the performance standard is not met at this time. This is due primarily to the

presence of the pondweed Eurasian milfoil, which has encroached from Carty Lake to the north of the mitigation area, as noted during prior monitoring efforts (MFA, 2018). Eurasian milfoil is a common invasive present in much of the RNWR and was observed in Carty Lake immediately north of the mitigation area; current USFWS budgets and staffing levels do not allow treatment of enough acreage to control spreading of invasives such as milfoil (USFWS, 2010). Eurasian milfoil can be controlled by raking or seining it from the water, but it can reestablish from any remaining fragments and roots, and these activities themselves can lead to further spreading. Chemical controls can be effective, but their use would require coordination with the USFWS and evaluation of the potential for associated impacts (e.g., oxygen depletion after decomposition of the dead plant material). In both cases, it is extremely likely that milfoil would reestablish quickly because of its presence throughout the RNWR and in Carty Lake.

MFA continues to recommend not removing milfoil, as this would, at best, result in temporary, short-term improvement at significant effort and cost.

Performance Standard 1.4. *By Years 3 and 5, at least three different native species shall be present. To qualify, a species must have at least 5 percent average cover in the habitat class and must occur in at least 10 percent of the plots sampled.*

Sixteen native species were observed in the mitigation area. More than three species, Mexican water fern, Canadian waterweed, spikerush, waterpepper, bird's foot, and bur-reed, occurred in more than 10 percent of the sampling units. These and other species also show more than 5 percent cover in a habitat zone (e.g., marginal zone). Therefore, the Year 5 performance standard has been met.

This monitoring report demonstrates the completion of the required vegetation monitoring timeframe stated in the COE Nationwide Permit 38 (NWS-2013-1209), issued for the Carty Lake. As mentioned in the conclusions above, the native plant areal cover and plant variety performance standards have been met. The exceedance of invasive species in the mitigation areas does not meet performance standard 1.3 because of the presence of Eurasian milfoil in much of Carty Lake and immediately north of the mitigation area. Control of the milfoil would require a long-term approach by USFWS and would require involve a significant effort.

Vegetation monitoring and maintenance have been consistent throughout the required monitoring period and have met the attainable goals and objectives for this compensatory mitigation project. Upon receiving written concurrence from the District Commander of the COE, the Port will assume that this concludes the monitoring efforts and that no additional reports are required.

LIMITATIONS

The services undertaken in completing this report were performed consistent with generally accepted professional consulting principles and practices. No other warranty, express or implied, is made. These services were performed consistent with our agreement with our client. This report is solely for the

use and information of our client unless otherwise noted. Any reliance on this report by a third party is at such party's sole risk.

Opinions and recommendations contained in this report apply to conditions existing when services were performed and are intended only for the client, purposes, locations, time frames, and project parameters indicated. We are not responsible for the impacts of any changes in environmental standards, practices, or regulations subsequent to performance of services. We do not warrant the accuracy of information supplied by others, or the use of segregated portions of this report.

REFERENCES

MFA. 2014. Carty Lake mitigation plan, addendum to the Joint Aquatic Resources Permit Application No. NWS-2013-1209. Maul Foster & Alongi, Inc., Vancouver, Washington. January 30.

MFA. 2015. Carty Lake construction completion report. Maul Foster & Alongi, Inc., Vancouver, Washington. November 17.

MFA. 2016. Port of Ridgefield Carty Lake remedial action (NWS-2013-1209) Year 1 (2016) vegetation monitoring. Maul Foster & Alongi, Inc., Vancouver, Washington. November 11.

MFA. 2017. Port of Ridgefield Carty Lake remedial action (NWS-2013-1209) Year 2 (2017) vegetation monitoring. Maul Foster & Alongi, Inc., Vancouver, Washington. November 20.

MFA. 2018. Port of Ridgefield Carty Lake remedial action (NWS-2013-1209) Year 3 (2018) vegetation monitoring. Maul Foster & Alongi, Inc., Vancouver, Washington. December 13.

MFA. 2019. Port of Ridgefield Carty Lake remedial action (NWS-2013-1209) Year 4 (2019) vegetation monitoring. Maul Foster & Alongi, Inc., Vancouver, Washington. December 17.

USFWS. 2010. Ridgefield National Wildlife Refuge comprehensive conservation plan. U.S. Fish and Wildlife Service. September.

ATTACHMENTS

Table

Figures

Photographs

TABLE



Transect	Water Depth (feet)	Planting Zone ^a	A.PLA	A.MEX	EQ. SP	CARE	E. SP	JUNC	NAGR	L.COR	P. NAT	S.EME	P. SP	S.SP	S.LAT	E.CAN	C.DEM	L.MIN	T.LAT ^b	NA	B. CER	M.SPI	N.ODO	R. CRI	P.ARU	P.CRI
			Native Species																		Invasive Species					
A1	0	Marginal				X		X	X	X			X	X					X						X	
A2	0.5	Emergent											X			X		X	X			X				
A3	2	Submergent													X		X					X	X			
A4	2.5	Submergent													X	X	X					X	X			
A5	2.5	Submergent													X		X					X	X			X
A6	2.5	Submergent															X					X	X			
A7	2	Submergent													X		X					X	X			X
A8	2.5	Submergent													X		X					X	X			X
A9	3	Submergent		X											X	X	X					X	X			X
A10	3	Submergent		X											X	X	X					X	X			X
A11	3	Submergent		X											X	X	X			X		X	X			X
A12	2.5	Submergent		X											X	X	X					X	X			X
A13	2.5	Submergent		X											X		X					X	X			X
A14	2.5	Submergent		X											X	X	X					X				X
A15	2	Submergent		X											X		X					X	X			X
A16	1.5	Submergent		X											X	X	X			X		X				X
A17	1.25	Emergent													X		X					X				
A18	0.25	Marginal											X				X	X				X				
Native Percent Cover			100%																							
Native Species Diversity			12																							
Invasive Percent Cover			100%																							
B1	0	Marginal						X	X	X				X					X						X	
B2	1	Marginal											X			X		X	X			X				X
B3	2	Emergent		X											X	X	X					X	X			X
B4	2.5	Submergent														X	X					X	X			X
B5	3	Submergent													X	X	X					X	X			X
B6	2.5	Submergent													X		X					X	X			X
B7	2	Submergent													X		X					X	X			X
B8	1.25	Submergent										X					X					X	X			X
B9	0.25	Emergent	X				X		X		X				X		X					X			X	
B10	0	Emergent					X	X	X		X	X													X	
B11	0	Emergent					X		X			X					X					X			X	X
B12	0.75	Submergent		X											X							X				X
B13	2.5	Submergent		X													X					X	X			X
B14	3	Submergent		X											X	X	X					X				X
B15	3.5	Submergent		X													X					X	X			X
B16	3	Submergent		X											X		X					X				X
B17	1	Emergent		X							X	X			X		X	X				X				
B18	0	Marginal					X	X	X	X			X	X					X						X	
Native Percent Cover			100%																							
Native Species Diversity			13																							
Invasive Percent Cover			100%																							

Transect	Water Depth (feet)	Planting Zone ^a	A.PLA	A.MEX	EQ. SP	CARE	E. SP	JUNC	NAGR	L.COR	P. NAT	S.EME	P. SP	S.SP	S.LAT	E.CAN	C.DEM	L.MIN	T.LAT ^b	NA	B. CER	M.SPI	N.ODO	R. CRI	P.ARU	P.CRI	
			Native Species																		Invasive Species						
C1	0	Marginal							X	X			X												X		
C2	0	Marginal				X		X	X	X				X												X	
C3	0	Marginal				X		X	X	X				X												X	
C4	0	Emergent	X					X	X				X													X	
C5	0	Emergent	X				X		X			X	X							X		X				X	
C6	0	Emergent					X		X			X	X		X					X		X				X	
C7	0.25	Emergent	X	X								X						X				X					
C8	0.75	Emergent		X								X						X				X	X				X
C9	1	Emergent		X														X				X	X				X
C10	1	Emergent																X				X	X				X
C11	1.25	Emergent																X				X	X				X
C12	1.5	Emergent																X				X	X				
C13	0.5	Emergent																X				X					
C14	0.5	Emergent										X						X				X					
C15	0	Emergent					X					X	X		X					X						X	
C16	0.25	Emergent			X							X	X					X		X		X					
C17	0.75	Emergent		X									X			X		X				X					
C18	1.25	Emergent		X								X						X				X					X
C19	1	Emergent		X								X	X			X		X		X		X					X
C20	0	Marginal						X	X	X			X	X						X						X	
Native Percent Cover			100%																								
Native Species Diversity			16																								
Invasive Percent Cover			100%																								
Overall Mitigation Area Results			A.PLA	A.MEX	EQ. SP	CARE	E. SP	JUNC	NAGR	L.COR	P. NAT	S.EME	P. SP	S.SP	S.LAT	E.CAN	C.DEM	L.MIN	T.LAT ^b	NA	B. CER	M.SPI	N.ODO	R. CRI	P.ARU	P.CRI	
Species Cover (all habitats)			7%	38%	2%	5%	13%	14%	23%	13%	0%	25%	30%	11%	4%	48%	20%	77%	23%	4%	4%	79%	45%	0%	25%	54%	
Species Cover (marginal zone)			0%	0%	0%	33%	11%	67%	78%	78%	0%	0%	67%	67%	0%	11%	0%	22%	67%	0%	0%	22%	0%	0%	78%	11%	
Species Cover (emergent zone)			17%	35%	4%	0%	26%	9%	26%	0%	0%	52%	48%	0%	9%	30%	4%	78%	30%	0%	9%	78%	26%	0%	30%	35%	
Species Cover (submergent zone)			0%	54%	0%	0%	0%	0%	0%	0%	0%	4%	0%	0%	0%	79%	42%	96%	0%	8%	0%	100%	79%	0%	0%	88%	

NOTES:

Photodocumentation points shown in **bold**.

A.MEX	American water plantain
A.PLA	Mexican water fern
B.CER	nodding beggartick flower
C.DEM	hornwort
CARE	<i>Carex</i> species
E. SP	<i>Eleocharis</i> species (spikerush)
E.CAN	Canadian waterweed
EQ. SP	<i>Equisetum</i> species (horsetail reed)
JUNC	<i>Juncus</i> species
L.COR	Bird's foot
L.MIN	Duckweed
M.SPI	Eurasian watermilfoil
N. ODO	native algae
NA	native grass
NAGR	fragrant water lily
P. SP	reed canary grass
P.ARU	curlyleaf pondweed
P.CRI	waterpepper
P.NAT	floating leaf pondweed
R.CRI	curly dock
S.EME	bur-reed
S.LAT	wapato
S.SP	<i>Salix</i> species (willow)
T.LAT	broadleaf cattail

^aPlanting zone determinations are based on site observations and may differ slightly from the approximate planting zone boundaries shown in Figure 2.

^bNative but listed in Whitson, T.D. (ed) et al., 2000. Weeds of the West (9th edition). Western Society of Weed Science in cooperation with Cooperative Extension Services, University of Wyoming, Laramie, Wyoming. Native and invasive designations made according to USFWS (2010), Ridgefield National Wildlife Refuge comprehensive conservation plan. U.S. Fish and Wildlife Service. September.

FIGURES





Source: Aerial photograph (2015) obtained from National Agriculture Imagery Program.

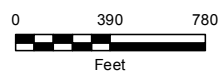
Figure 1
Site Location

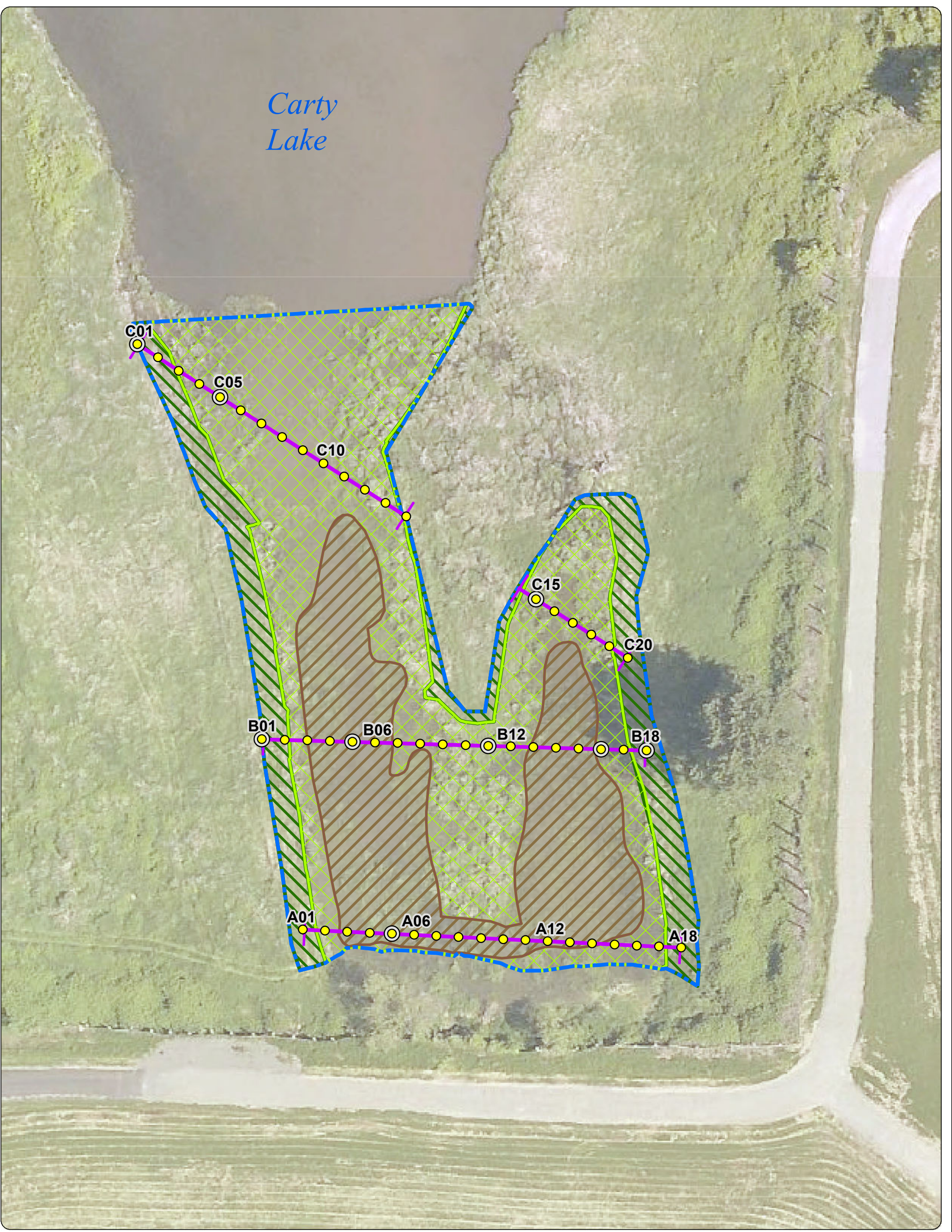
Port of Ridgefield
Ridgefield, Washington

- Legend**
-  Road
 -  Mitigation Site







This product is for informational purposes and may not have been prepared for, or be suitable for legal, engineering, or surveying purposes. Users of this information should review or consult the primary data and information sources to ascertain the usability of the information.





Source: Aerial photograph (2014) obtained from Clark County GIS.

- Notes:
1. Aerial photo date precedes remediation and restoration activities conducted from 2014 through 2015.
 2. Vegetation group boundaries are approximate.

-  Sample Location
-  Sample Photo Documentation Point
-  Mitigation Site
-  Vegetation Transect

Legend




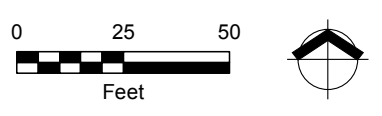
- Vegetation Groups**
-  Marginal (Approx. Elev 10 to 11)
 -  Emergent (Approx. Elev 8 to 10)
 -  Submergent (Approx. Elev 8 and Below)

Figure 2 Carty Lake Vegetation Transects

Port of Ridgefield
Ridgefield, Washington



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PHOTOGRAPHS





PHOTOGRAPHS

Project Name: NWS-2013-1209
Project Number: 9003.01.55
Location: Carty Lake
111 West Division Street
Ridgefield, Washington

Photo No. 1.

Description

Fall 2013.
Mitigation area
before
remediation.
Reed canary grass
is dominant
vegetation.
Looking
northeast.



Photo No. 2.

Description

Winter 2014/15.
Remediation area
before plantings
and temporary
dam removal.
Wildlife fencing
installed.
Looking
northwest.





MAUL
FOSTER
ALONG I

PHOTOGRAPHS

Project Name: NWS-2013-1209
Project Number: 9003.01.55
Location: Carty Lake
111 West Division Street
Ridgefield, Washington

Photo No. 3.

Description

August 2016.
Mitigation area.
Looking west.



Photo No. 4.

Description

August 2016.
Mitigation area.
Flowering
wapato and bur-
reed. Looking
northeast.





PHOTOGRAPHS

Project Name: NWS-2013-1209
Project Number: 9003.01.55
Location: Carty Lake
111 West Division Street
Ridgefield, Washington

Photo No. 5.

Description

August 2016.
South end of
mitigation area.
Looking north.



Photo No. 6.

Description

September 2017.
North end of
mitigation area.
Looking
southeast.





MAUL
FOSTER
ALONG I

PHOTOGRAPHS

Project Name: NWS-2013-1209
Project Number: 9003.01.55
Location: Carty Lake
111 West Division Street
Ridgefield, Washington

Photo No. 7.

Description

September 2018.
East end of
mitigation area.
Looking
northwest.



Photo No. 8.

Description

September 2019.
Southeast end of
mitigation area.
Looking
northwest.





PHOTOGRAPHS

Project Name: NWS-2013-1209
Project Number: 9003.01.55
Location: Carty Lake
111 West Division Street
Ridgefield, Washington

Photo No. 9.

Description

October 2020.
South end of mitigation area, looking north.



Photo No. 10.

Description

October 2020.
Northwest end of mitigation area, looking southeast.





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PHOTOGRAPHS

Project Name: NWS-2013-1209
Project Number: 9003.01.55
Location: Carty Lake
111 West Division Street
Ridgefield, Washington

Photo No. 11.

Description

October 2020.
Photo point C1.
Marginal zone.
Waterpepper,
bird's foot, and
reed canary grass
observed in
vicinity.



Photo No. 12.

Description

October 2020.
Photo point B18.
Marginal zone.
Spikerush, *Juncus*
species, cattail,
bird's foot,
waterpepper,
willow species,
and reed canary
grass observed in
vicinity.





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PHOTOGRAPHS

Project Name: NWS-2013-1209
Project Number: 9003.01.55
Location: Carty Lake
111 West Division Street
Ridgefield, Washington

Photo No. 13.

Description

October 2020.
Photo point C5.
Emergent zone.
American water
plantain, bur-
reed,
waterpepper,
nodding
beggartick,
cattail, spikerush,
and reed canary
grass observed in
vicinity.



Photo No. 14.

Description

October 2020.
Photo point C15.
Emergent zone.
Spikerush, bur-
reed, wapato,
cattail,
waterpepper, and
reed canary grass
observed in
vicinity.





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PHOTOGRAPHS

Project Name: NWS-2013-1209
Project Number: 9003.01.55
Location: Carty Lake
111 West Division Street
Ridgefield, Washington

Photo No. 15.

Description

October 2020.
Photo point B11.
Emergent zone.
Spikerush, bur-
reed,
waterpepper, and
reed canary grass
observed in
vicinity.



Photo No. 16.

Description

October 2020.
Photo point B5.
Submergent
zone. Water lily,
Canadian
waterweed,
duckweed, and
Eurasian
watermilfoil.





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PHOTOGRAPHS

Project Name: NWS-2013-1209
Project Number: 9003.01.55
Location: Carty Lake
111 West Division Street
Ridgefield, Washington

Photo No. 17.

Description

October 2020.
Photo point B16.
Submergent zone. Mexican water fern, Canadian waterweed, duckweed, and Eurasian watermilfoil.



Photo No. 18.

Description

October 2020.
Photo point B1.
Marginal zone. *Juncus* species, cattail, willow species, and reed canary grass observed in vicinity.





PHOTOGRAPHS

Project Name: NWS-2013-1209
Project Number: 9003.01.55
Location: Carty Lake
111 West Division Street
Ridgefield, Washington

Photo No. 19.

Description

October 2020.
Photo point A5.
Submergent
zone. Water lily,
Canadian
waterweed,
duckweed, and
Eurasian
watermilfoil.

